SAR TEST REPORT

No. 24T04Z102024-003

For HMD Global Oy

Locator

Model Name: TA-1698

with

Hardware Version: V0.21

Software Version: TA1698.GLO_001

FCC ID: 2AJOTTA-1698

Issued Date: 2024-11-11

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Issue Date	Description
24T04Z102024-003	Rev.0	2024-11-1	Initial creation of test report
24T04Z102024-003	Rev.1	2024-11-11	1. Revise the lab's FCC designation number on page5. 2. Revise the product's Equipment class on page7.

TABLE OF CONTENT

1 Test Laboratory

1.1 Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website.

1.2 Testing Location

Company Name:	CTTL
Address:	No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191.

1.3 Testing Environment

Temperature:	18°C~25°C,
Relative humidity:	30%~ 70%
Ground system resistance:	< 0.5 Ω
Ambient noise & Reflection:	< 0.012 W/kg

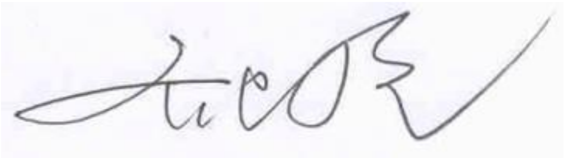
1.4 Project Data

Project Leader:	Qi Dianyuan
Test Engineer:	Yao Juming
Testing Start Date:	October 7, 2024
Testing End Date:	October 25, 2024

1.5 Signature

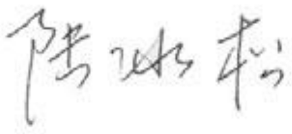
Yao Juming

(Prepared this test report)



Qi Dianyuan

(Reviewed this test report)



Lu Bingsong

Deputy Director of the laboratory

(Approved this test report)

2 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for HMD Global Oy Locator TA-1698 is as follows:

Table 2.1: Highest Reported SAR (1g)

Technology Band	Body-Worn (Separation Distance 5mm)	Equipment Class
Band23	1.24	Licensed
Band255	1.15	
BT	0.01	DTS

The SAR values found for the locator are below the maximum recommended levels of 1.6 W/kg as averaged over any 1g tissue according to the ANSI C95.1-1992.

For body operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal and which provides a minimum separation distance of 5 mm between this device and the body of the user. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output.

The measurement together with the test system set-up is described in annex C of this test report. A detailed description of the equipment under test can be found in chapter 4 of this test report. The highest reported SAR value is obtained at the case of **(Table 2.1),** and the values are**:**

Body-worn: 1.24 W/kg (1g)

3 Client Information

3.1 Applicant Information

Company Name:	HMD Global Oy
Address/Post:	Bertel Jungin aukio 9, 02600 Espoo, Finland
Contact Person:	Reza Serafat
Contact Email:	reza.serafat@hmdglobal.com
Telephone:	+491735287964
Fax:	/

3.2 Manufacturer Information

Company Name:	HMD Global Oy
Address/Post:	Bertel Jungin aukio 9, 02600 Espoo, Finland
Contact Person:	Reza Serafat
Contact Email:	reza.serafat@hmdglobal.com
Telephone:	+491735287964
Fax:	/

4 Equipment Under Test (EUT) and Ancillary Equipment (AE)

4.1 About EUT

Description:	Locator
Model name:	TA-1698
Operating mode(s):	NB-IOT Band 23/255/256,BT
Tested Tx Frequency:	2000.1–2019.9 MHz (Band 23)
	1626.6–1660.4 MHz (Band 255)
	2402–2480 MHz (BT)
GPRS/EGPRS Multislot Class:	N/A
Test device production information:	Production unit
Device type:	Portable device
Antenna type:	Integrated antenna
Hotspot mode:	Not Support

4.2 Internal Identification of EUT used during the test

EUT ID*	SN	HW Version	SW Version
EUT1	TA1698000000202	V0.21	TA1698.GLO_001
EUT2	TA1698000000115	V0.21	TA1698.GLO_001
EUT3	TA1698000000185	V0.21	TA1698.GLO_001
EUT4	TA1698000000250	V0.21	TA1698.GLO_001

*EUT ID: is used to identify the test sample in the lab internally.

Note: It is performed to test SAR with the EUT1-2 and conducted power with the EUT3-4.

4.3 Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
AE1	Battery	Horizon008	/	SHENZHEN UTILITY ENERGY CO., LTD.

*AE ID: is used to identify the test sample in the lab internally.

5 TEST METHODOLOGY

5.1 Applicable Limit Regulations

ANSI C95.1–1992:IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

5.2 Applicable Measurement Standards

IEEE 1528–2013: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

KDB447498 D01: General RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

KDB941225 D05 SAR for LTE Devices v02r05: SAR Evaluation Considerations for LTE Devices

KDB941225 D06 Hotspot Mode SAR v02r01: SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities

KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz.

KDB865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations

6 Specific Absorption Rate (SAR)

6.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

6.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ) . The equation description is as below:

$$SAR = \frac{d}{dt}\left(\frac{dW}{dm}\right) = \frac{d}{dt}\left(\frac{dW}{\rho dv}\right)$$

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

$$SAR = c\left(\frac{\delta T}{\delta t}\right)$$

Where: C is the specific head capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

$$SAR = \frac{\sigma |E|^2}{\rho}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of tissue and E is the RMS electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

7 Tissue Simulating Liquids

7.1 Targets for tissue simulating liquid

Table 7.1: Targets for tissue simulating liquid

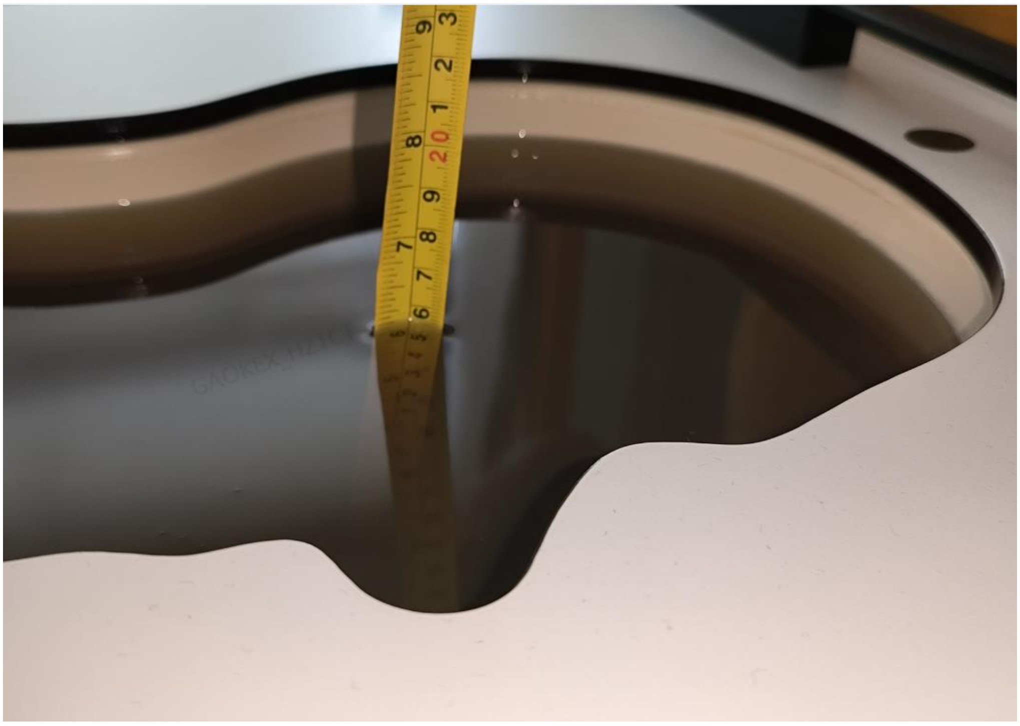
Frequency(MHz)	Liquid Type	Conductivity(σ)	± 5%Range	Permittivity(ε)	± 5%Range
1640	Head	1.31	1.24～1.38	40.24	38.23～42.25
2000	Head	1.40	1.33～1.47	40.00	38.00～42.00
2450	Head	1.80	1.71～1.89	39.20	37.24～41.16

7.2 Dielectric Performance

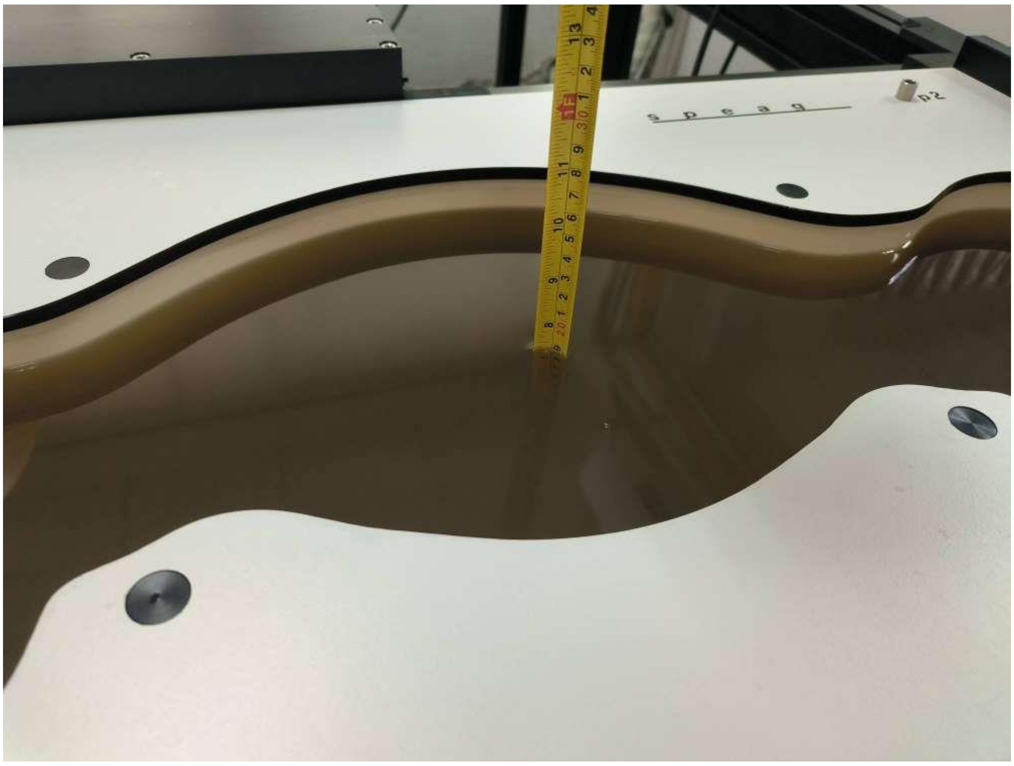
Table 7.2: Dielectric Performance of Tissue Simulating Liquid

Measurement Date yyyy/mm/dd	Frequency	Type	Permittivity ε	Drift	Conductivity σ (S/m)	Drift
2024/10/24	Head	1640MHz	39.54	-1.74%	1.321	0.84%
2024/10/25	Head	2000MHz	39.38	-1.55%	1.36	-2.86%
2024/10/7	Head	2450MHz	39.59	0.99%	1.767	-1.83%

Note: The liquid temperature is 22.0℃



Picture 7.1: Liquid depth in the Head Phantom

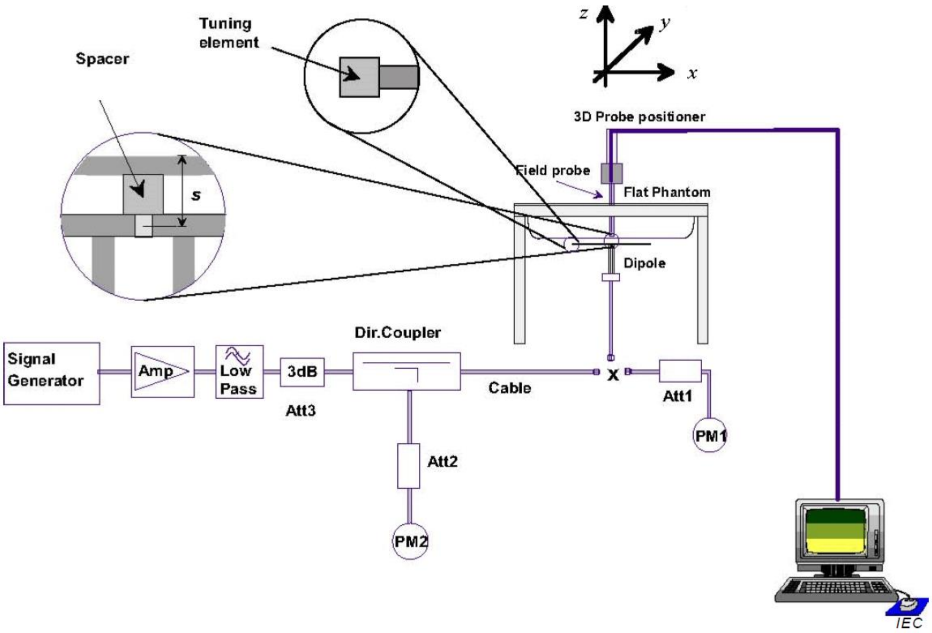


Picture 7.2 Liquid depth in the Flat Phantom

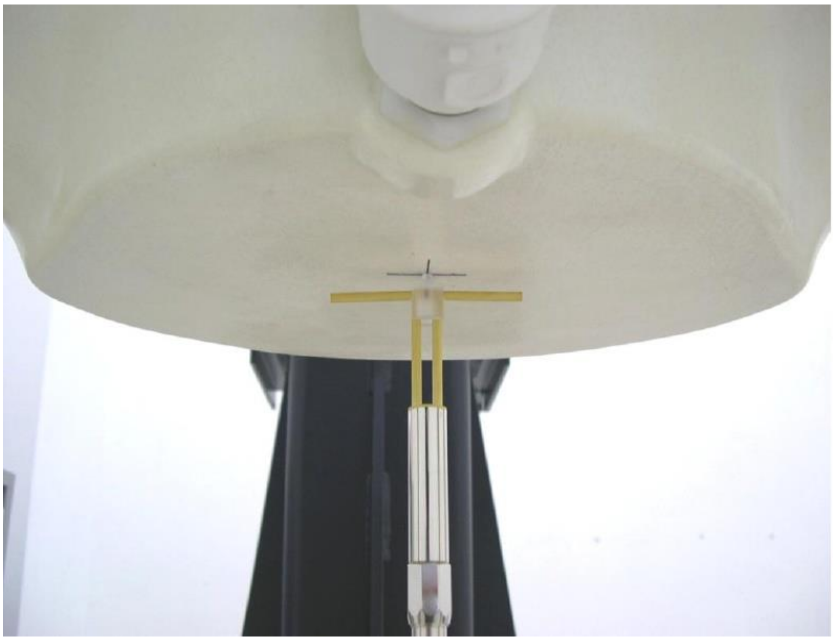
8 System verification

8.1 System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



Picture 8.1 System Setup for System Evaluation



Picture 8.2 Photo of Dipole Setup

8.2 System Verification

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 system verification results are required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR. The details are presented in annex B.

Table 8.1: System Verification of Head

Measurement Date (yyyy-mm-dd)	Frequency	Target value (W/kg)		Measured value (W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
2024/10/24	1640MHz	18.6	34.1	18.96	34.88	1.94%	2.29%
2024/10/25	2000MHz	21.3	41	21	40.52	-1.41%	-1.17%
2024/10/7	2450MHz	24.5	52.2	24.48	52.12	-0.08%	-0.15%

9 Measurement Procedures

9.1 Tests to be performed

In order to determine the highest value of the peak spatial-average SAR of a handset, all device positions, configurations and operational modes shall be tested for each frequency band according to steps 1 to 3 below. A flowchart of the test process is shown in picture 9.1.

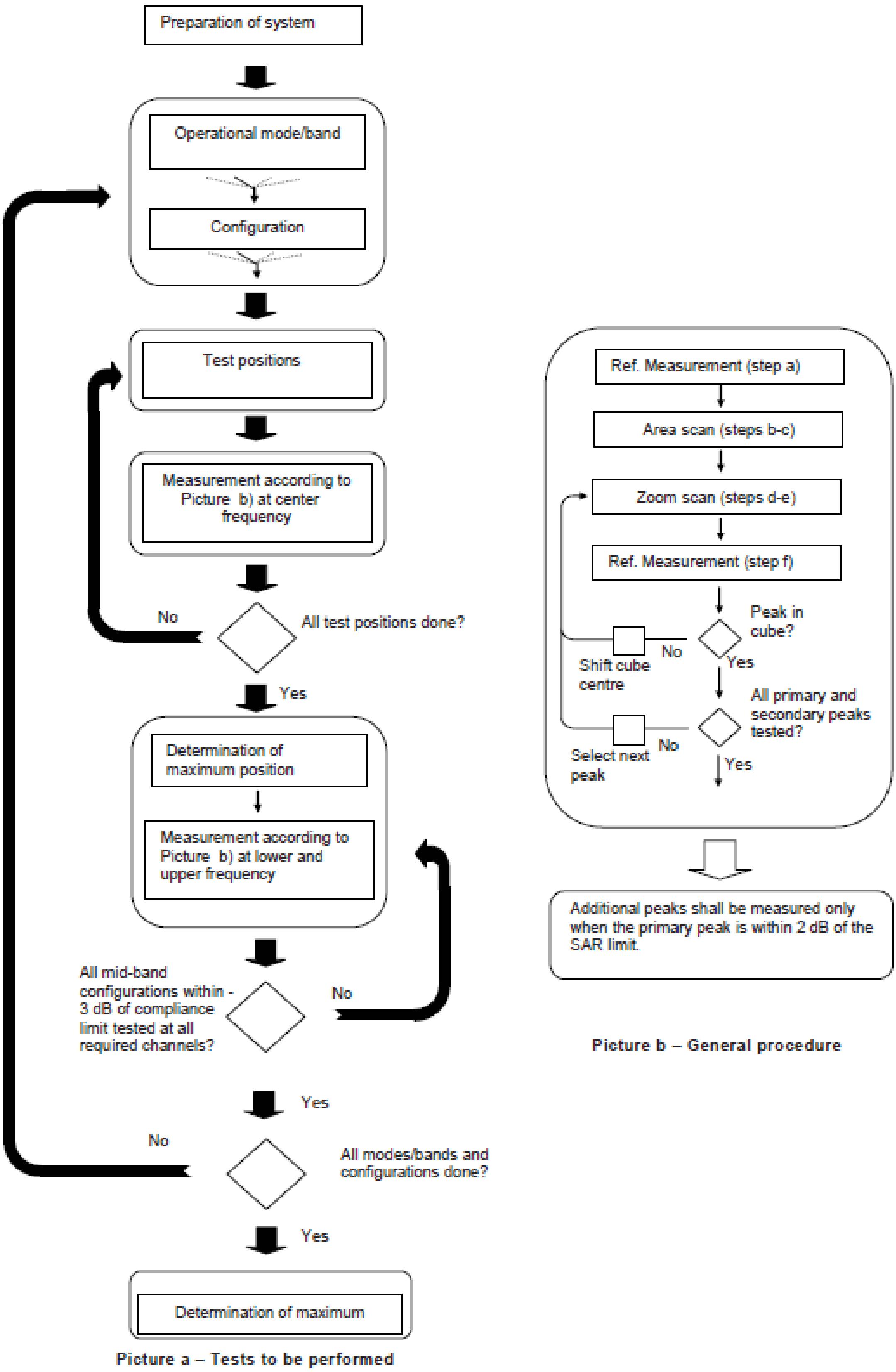
Step 1: The tests described in 9.2 shall be performed at the channel that is closest to the centre of the transmit frequency band (f_c) for:

a) all device positions (cheek and tilt, for both left and right sides of the SAM phantom, as described in annex D),
b) all configurations for each device position in a), e.g., antenna extended and retracted, and
c) all operational modes, e.g., analogue and digital, for each device position in a) and configuration in b) in each frequency band.

If more than three frequencies need to be tested according to 11.1 (i.e., $N_c > 3$), then all frequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing highest peak spatial-average SAR determined in Step 1,perform all tests described in 9.2 at all other test frequencies, i.e., lowest and highest frequencies. In addition, for all other conditions (device position, configuration and operational mode) where the peak spatial-average SAR value determined in Step 1 is within3 dB of the applicable SAR limit, it is recommended that all other test frequencies shall be tested as well.

Step 3: Examine all data to determine the highest value of the peak spatial-average SAR found in Steps 1 to 2.



Picture 9.1Block diagram of the tests to be performed

9.2 General Measurement Procedure

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements and fully documented in SAR reports to qualify for TCB approval. Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2003. The results should be documented as part of the system validation records and may be requested to support test results when all the measurement parameters in the following table are not satisfied.

<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 <u>reported</u> 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>

9.3 WCDMA Measurement Procedures for SAR

The following procedures are applicable to WCDMA handsets operating under 3GPP Release99, Release 5 and Release 6. The default test configuration is to measure SAR with an established radio link between the DUT and a communication test set using a 12.2kbps RMC (reference measurement channel) configured in Test Loop Mode 1. SAR is selectively confirmed for other physical channel configurations (DPCCH & $DPDCH_n$), HSDPA and HSPA (HSUPA/HSDPA) modes according to output power, exposure conditions and device operating capabilities. Both uplink and downlink should be configured with the same RMC or AMR, when required. SAR for Release 5 HSDPA and Release 6 HSPA are measured using the applicable FRC (fixed reference channel) and E-DCH reference channel configurations. Maximum output power is verified according to applicable versions of 3GPP TS 34.121 and SAR must be measured according to these maximum output conditions. When Maximum Power Reduction (MPR) is not implemented according to Cubic Metric (CM) requirements for Release 6 HSPA, the following procedures do not apply.

For Release 5 HSDPA Data Devices:

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}	CM/dB
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15	15/15	64	12/15	24/25	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

For Release 6 HSPA Data Devices

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (dB)	MPR (dB)	AG Index	E-TFCI
1	11/15	15/15	64	11/15	22/15	209/225	1039/225	4	1	1.5	1.5	20	75
2	6/15	15/15	64	6/15	12/15	12/15	12/15	4	1	1.5	1.5	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	1.5	1.5	15	92
4	2/15	15/15	64	2/15	4/15	4/15	56/75	4	1	1.5	1.5	17	71
5	15/15	15/15	64	15/15	24/15	30/15	134/15	4	1	1.5	1.5	21	81

Rel.8 DC-HSDPA (Cat 24)

SAR test exclusion for Rel.8 DC-HSDPA must satisfy the SAR test exclusion requirements of Rel.5 HSDPA. SAR test exclusion for DC-HSDPA devices is determined by power measurements according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to qualify for SAR test exclusion.

9.4 SAR Measurement for LTE

SAR tests for LTE are performed with a base station simulator, Rohde & Rchwarz CMW500. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. All powers were measured with the CMW 500.

It is performed for conducted power and SAR based on the KDB941225 D05.

SAR is evaluated separately according to the following procedures for the different test positions in each exposure condition – head, body, body-worn accessories and other use conditions. The procedures in the following subsections are applied separately to test each LTE frequency band.

1) QPSK with 1 RB allocation
   Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.
2) QPSK with 50% RB allocation
   The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.
3) QPSK with 100% RB allocation
   For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 1) and 2) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

TDD test:

TDD testing is performed using guidance from FCC KDB 941225 D05 and the SAR test guidance provided in April 2013 TCB works hop notes. TDD is tested at the highest duty factor using UL-DL configuration 0 with special subframe configuration 6 and applying the FDD LTE procedures in KDB 941225 D05. SAR testing is performed using the extended cyclic prefix listed in 3GPP TS 36.211.

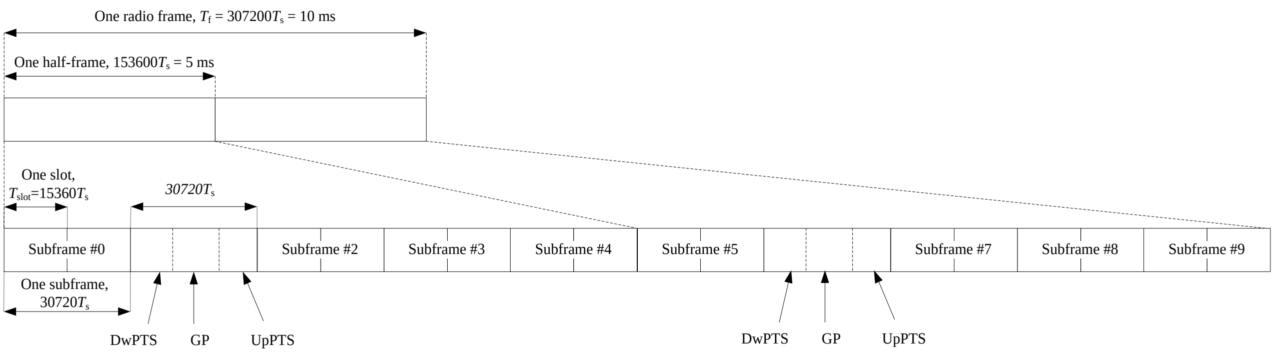


Figure 9.2: Frame structure type 2 (for 5 ms switch-point periodicity)

Table 9.1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Table 9.2: Uplink-downlink configurations

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

Duty factor is calculated by:

Duty factor = uplink frame*6+UpPTS*2/one frame length

= $(30720.T_s * 6+5120.\ T_s*2)/307200.T_s$

= 0.633

9.5 Bluetooth & Wi-Fi Measurement Procedures for SAR

Normal network operating configurations are not suitable for measuring the SAR of 802.11 transmitters in general. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure that the results are consistent and reliable.

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in a test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

9.6 Power Drift

To control the output power stability during the SAR test, DASY5 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 section14 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

10 Area Scan Based 1-g SAR

10.1 Requirement of KDB

According to the KDB447498 D01, when the implementation is based the specific polynomial fit algorithm as presented at the 29th Bioelectromagnetics Society meeting (2007) and the estimated 1-gSAR is ≤ 1.2 W/kg, a zoom scan measurement is not required provided it is also not needed for any other purpose; for example, if the peak SAR location required for simultaneous transmission SAR test exclusion can be determined accurately by the SAR system or manually to discriminate between distinctive peaks and scattered noisy SAR distributions from area scans.

There must not be any warning or alert messages due to various measurement concerns identified by the SAR system; for example, noise in measurements, peaks too close to scan boundary, peaks are too sharp, spatial resolution and uncertainty issues etc. The SAR system verification must also demonstrate that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR (See Annex B). When all the SAR results for each exposure condition in a frequency band and wireless mode are based on estimated 1-g SAR, the 1-g SAR for the highest SAR configuration must be determined by a zoom scan.

10.2 Fast SAR Algorithms

The approach is based on the area scan measurement applying a frequency dependent attenuation parameter. This attenuation parameter was empirically determined by analyzing a large number of phones. The MOTOROLA FAST SAR was developed and validated by the MOTOROLA Research Group in Ft. Lauderdale.

In the initial study, an approximation algorithm based on Linear fit was developed. The accuracy of the algorithm has been demonstrated across a broad frequency range (136-2450 MHz)and for both 1- and 10-g averaged SAR using a sample of 264 SAR measurements from 55wireless handsets. For the sample size studied, the root-mean-squared errors of the algorithm mare 1.2% and 5.8% for 1- and 10-g averaged SAR, respectively. The paper describing the algorithm in detail is expected to be published in August 2004 within the Special Issue of Transactions on MTT.

In the second step, the same research group optimized the fitting algorithm to an Polynomial fit whereby the frequency validity was extended to cover the range 30-6000MHz. Details of this study can be found in the BEMS 2007 Proceedings.

Both algorithms are implemented in DASY software.

11 Conducted Output Power

11.1 NB-IOT Measurement result

The Tune up power for NB-IOT Band (dBm)

Band	Tune up (dBm)	
	SAR sensor off	SAR sensor on
	DSI0	DSI1
Band23	24.5	19
Band255	24	19.5

Band23-DSI0

Band 23-Full Power							
Sub-carrier Spacing(kHz)	Modulation	RB Size	RB Offset	Frequency(Channel)			Tune up
				2000.1MHz (25501)	2010MHz (25600)	2019.9MHz (25699)	
3.75	BPSK	1	1	23.48	23.02	23.63	24.5
3.75	BPSK	1	46	23.51	22.95	23.67	24.5
3.75	QPSK	1	1	23.58	22.94	23.74	24.5
3.75	QPSK	1	46	23.51	22.95	23.75	24.5
15	BPSK	1	1	23.78	23.35	23.84	24.5
15	BPSK	1	10	23.76	23.15	23.78	24.5
15	QPSK	1	1	23.85	23.44	23.9	24.5
15	QPSK	1	10	23.81	23.1	23.84	24.5
15	QPSK	3	0	23.3	22.71	23.11	24.5
15	QPSK	3	9	23.25	22.63	23.07	24.5
15	QPSK	6	0	22.63	22.06	22.31	23.5
15	QPSK	6	6	22.65	22.02	22.36	23.5
15	QPSK	12	0	21.58	21.11	21.54	22.5

Band23-DSI1

Band 23-Reduced Power							
Sub-carrier Spacing(kHz)	Modulation	RB Size	RB Offset	Frequency(Channel)			Tune up
				2000.1MHz (25501)	2010MHz (25600)	2019.9MHz (25699)	
3.75	BPSK	1	1	17.68	17.07	17.13	19
3.75	BPSK	1	46	17.68	17.06	17.17	19
3.75	QPSK	1	1	17.69	17.1	17.15	19
3.75	QPSK	1	46	17.66	17.08	17.18	19
15	BPSK	1	1	17.9	17.31	17.42	19
15	BPSK	1	10	17.88	17.3	17.4	19
15	QPSK	1	1	17.84	17.28	17.41	19
15	QPSK	1	10	17.93	17.29	17.42	19
15	QPSK	3	0	18.01	17.49	17.44	19
15	QPSK	3	9	17.98	17.46	17.36	19
15	QPSK	6	0	17.96	17.34	17.37	19
15	QPSK	6	6	17.93	17.33	17.21	19
15	QPSK	12	0	17.92	17.28	17.32	19

Band255-DSI0

Band 255-Full Power							
Sub-carrier Spacing(kHz)	Modulation	RB Size	RB Offset	Frequency(Channel)			Tune up
				1626.6MHz (261505)	1643.5MHz (261674)	1660.4MHz (261843)	
3.75	BPSK	1	1	22.54	22.4	22.76	24
3.75	BPSK	1	46	22.81	22.36	22.6	24
3.75	QPSK	1	1	22.78	22.39	22.74	24
3.75	QPSK	1	46	22.5	22.35	22.96	24
15	BPSK	1	1	22.49	22.55	23.07	24
15	BPSK	1	10	22.48	22.48	23.1	24
15	QPSK	1	1	22.35	22.51	23.09	24
15	QPSK	1	10	23.03	22.67	23.11	24
15	QPSK	3	0	21.85	22.2	22.79	24
15	QPSK	3	9	21.9	22.15	22.8	24
15	QPSK	6	0	21.21	21.49	22.01	23
15	QPSK	6	6	21.17	21.5	22	23
15	QPSK	12	0	20.22	20.49	21.08	23

Band255-DSI1

Band 255-Reduced Power							
Sub-carrier Spacing(kHz)	Modulation	RB Size	RB Offset	Frequency(Channel)			Tune up
				1626.6MHz (261505)	1643.5MHz (261674)	1660.4MHz (261843)	
3.75	BPSK	1	1	16.63	16.96	17.39	18.5
3.75	BPSK	1	46	16.7	16.94	17.4	18.5
3.75	QPSK	1	1	16.74	16.93	17.37	18.5
3.75	QPSK	1	46	16.73	16.91	17.41	18.5
15	BPSK	1	1	16.9	17.1	17.56	18.5
15	BPSK	1	10	17.08	17.11	17.54	18.5
15	QPSK	1	1	17.11	17.13	17.53	18.5
15	QPSK	1	10	17.25	17.08	17.54	18.5
15	QPSK	3	0	17.59	17.52	17.74	18.5
15	QPSK	3	9	17.75	17.64	17.79	18.5
15	QPSK	6	0	16.94	17.23	17.65	18.5
15	QPSK	6	6	16.89	17.23	17.62	18.5
15	QPSK	12	0	16.93	17.21	17.61	18.5

11.2 BT Measurement result

BLE-1M			
Channel 0	Channel 19	Channel 39	Tune up
-0.72	-0.90	-1.03	2.00

12 Simultaneous TX SAR Considerations

12.1 Introduction

The simultaneous transmission possibilities for this device are listed as below:

NB-IOT+BT	Not Support

12.2 Transmit Antenna Separation Distances

Please refer to the file < The Photos of SAR test - 24T04Z102024-003>.

12.3 SAR Measurement Positions

According to the KDB941225 D06 Hot Spot SAR, the edges with less than 2.5 cm distance to the antennas need to be tested for SAR.

SAR measurement positions						
Mode	Front	Rear	Left edge	Right edge	Top edge	Bottom edge
NTN	Yes	Yes	Yes	Yes	No	Yes
BT	Yes	Yes	No	No	Yes	Yes

13 Evaluation of Simultaneous

N/A

14 SAR Test Result

14.1 SAR results for NB-IOT

Test Position	Frequency Band	Channel Number	Frequency (MHz)	Test Setup	Position	Distance	Fig No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle (%)	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
Body	Band23	25699	2019.9	15kHz SCS QPSK 1RB-Low	Front	16mm	\	23.9	24.5	86	0.65	**0.75**	0.379	**0.44**	0.06
Body	Band23	25699	2019.9	15kHz SCS QPSK 1RB-Low	Rear	16mm	\	23.9	24.5	86	0.761	**0.87**	0.455	**0.52**	0.02
Body	Band23	25501	2000.1	15kHz SCS QPSK 1RB-Low	Rear	16mm	\	23.85	24.5	86	0.601	**0.70**	0.355	**0.41**	-0.11
Body	Band23	25600	2010	15kHz SCS QPSK 1RB-Low	Rear	16mm	\	23.44	24.5	86	0.666	**0.85**	0.41	**0.52**	-0.07
Body	Band23	25501	2000.1	15kHz SCS QPSK 3RB-Low	Front	5mm	\	18.01	19	86	0.676	**0.85**	0.387	**0.49**	0.06
Body	Band23	25699	2019.9	15kHz SCS QPSK 3RB-Low	Rear	5mm	1	17.44	19	86	0.863	**1.24**	0.509	**0.73**	0.09
Body	Band23	25501	2000.1	15kHz SCS QPSK 3RB-Low	Rear	5mm	\	18.01	19	86	0.693	**0.87**	0.411	**0.52**	-0.11
Body	Band23	25600	2010	15kHz SCS QPSK 3RB-Low	Rear	5mm	\	17.49	19	86	0.691	**0.98**	0.401	**0.57**	0.07
Body	Band23	25699	2019.9	15kHz SCS QPSK 1RB-High	Left	5mm	\	23.9	24.5	86	0.646	**0.74**	0.355	**0.41**	0.05
Body	Band23	25699	2019.9	15kHz SCS QPSK 1RB-High	Right	5mm	\	23.9	24.5	86	0.284	**0.33**	0.164	**0.19**	-0.1
Body	Band23	25699	2019.9	15kHz SCS QPSK 1RB-High	Bottom	5mm	\	23.9	24.5	86	0.597	**0.69**	0.324	**0.37**	0.07
Body	Band255	261843	1660.4	15kHz SCS QPSK 1RB-High	Front	16mm	\	23.11	24	86	0.594	**0.73**	0.387	**0.48**	-0.11
Body	Band255	261843	1660.4	15kHz SCS QPSK 1RB-High	Rear	16mm	\	23.11	24	86	0.703	**0.86**	0.42	**0.52**	0.02
Body	Band255	261505	1626.6	15kHz SCS QPSK 1RB-High	Rear	16mm	\	23.03	24	86	0.683	**0.85**	0.352	**0.44**	0.03
Body	Band255	261674	1643.5	15kHz SCS QPSK 1RB-High	Rear	16mm	\	22.67	24	86	0.624	**0.85**	0.349	**0.47**	0.07
Body	Band255	261843	1660.4	15kHz SCS QPSK 1RB-High	Front	5mm	\	17.79	18.5	86	0.591	**0.70**	0.353	**0.42**	0.06
Body	Band255	261505	1626.6	15kHz SCS QPSK 1RB-High	Front	5mm	2	17.75	18.5	86	0.964	**1.15**	0.541	**0.64**	0.15
Body	Band255	261674	1643.5	15kHz SCS QPSK 1RB-High	Front	5mm	\	17.64	18.5	86	0.702	**0.86**	0.408	**0.50**	-0.02
Body	Band255	261843	1660.4	15kHz SCS QPSK 1RB-High	Rear	5mm	\	17.79	18.5	86	0.704	**0.83**	0.401	**0.47**	-0.11
Body	Band255	261505	1626.6	15kHz SCS QPSK 1RB-High	Rear	5mm	\	17.75	18.5	86	0.955	**1.14**	0.53	**0.63**	0.08
Body	Band255	261674	1643.5	15kHz SCS QPSK 1RB-High	Rear	5mm	\	17.64	18.5	86	0.756	**0.92**	0.44	**0.54**	-0.07
Body	Band255	261843	1660.4	15kHz SCS QPSK 1RB-High	Left	5mm	\	23.11	24	86	0.293	**0.36**	0.181	**0.22**	-0.17
Body	Band255	261843	1660.4	15kHz SCS QPSK 1RB-High	Right	5mm	\	23.11	24	86	0.345	**0.42**	0.224	**0.27**	0.18
Body	Band255	261843	1660.4	15kHz SCS QPSK 1RB-High	Bottom	5mm	\	23.11	24	86	0.309	**0.38**	0.184	**0.23**	0.17

14.2 SAR Evaluation For BT

Test Position	Frequency Band	Channel Number	Frequency (MHz)	Test Setup	Position	Distance	Fig No.	EUT Measured Power (dBm)	Tune up (dBm)	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
Body	BT BLE	0	2402	BLE	Front	5mm	\	-0.72	2	<0.01	<0.01	<0.01	<0.01	\
Body	BT BLE	0	2402	BLE	Rear	5mm	3	-0.72	2	0.007	**0.01**	0.005	**0.01**	0.07
Body	BT BLE	0	2402	BLE	Left	5mm	\	-0.72	2	<0.01	<0.01	<0.01	<0.01	\

15 SAR Measurement Variability

SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

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; steps2) 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 ≥ 1.45W/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

Band	Frequency		Setup	Test Position	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
	Ch.	MHz						
B23	25699	2019.9	15kHz SCS QPSK 3RB-Low	Rear 5mm	0.863	0.836	1.03	\
B255	261505	1626.6	15kHz SCS QPSK 1RB-High	Front 5mm	0.964	0.942	1.02	\
B255	261505	1626.6	15kHz SCS QPSK 1RB-High	Rear 5mm	0.955	0.931	1.03	\

16 Measurement Uncertainty

16.1 Measurement Uncertainty for Normal SAR Tests (300MHz~3GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.0	N	1	1	1	6.0	6.0	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	N	1	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521

Combined standard uncertainty	$u_c' = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						9.55	9.43	257
Expanded uncertainty (confidence interval of 95 %)	$u_e = 2u_c$						19.1	18.9	

16.2 Measurement Uncertainty for Normal SAR Tests (3~6GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.55	N	1	1	1	6.55	6.55	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	∞
13	Post-processing	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞

21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						10.7	10.6	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						21.4	21.1	

16.3 Measurement Uncertainty for Fast SAR Tests (300MHz~3GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.0	N	1	1	1	6.0	6.0	∞
2	Isotropy	B	4.7	R	√3	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	√3	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	√3	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	√3	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	√3	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	√3	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	√3	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	√3	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	√3	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.4	R	√3	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	√3	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	√3	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	7.0	R	√3	1	1	4.0	4.0	∞
Test sample related										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
17	Drift of output power	B	5.0	R	√3	1	1	2.9	2.9	∞
Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	√3	1	1	2.3	2.3	∞
19	Liquid conductivity (target)	B	5.0	R	√3	0.64	0.43	1.8	1.2	∞

20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	√3	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						10.4	10.3	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						20.8	20.6	

16.4 Measurement Uncertainty for Fast SAR Tests (3~6GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.55	N	1	1	1	6.55	6.55	∞
2	Isotropy	B	4.7	R	√3	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	√3	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	√3	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	√3	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	√3	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	√3	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	√3	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	√3	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	√3	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.8	R	√3	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	√3	1	1	3.9	3.9	∞
13	Post-processing	B	1.0	R	√3	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	14.0	R	√3	1	1	8.1	8.1	∞
Test sample related										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5

17	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						13.5	13.4	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						27.0	26.8	

17 MAIN TEST INSTRUMENTS

Table 17.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	E5071C	MY46110673	December 25, 2023	One year
02	Power sensor	NRP110T	101139	January 13, 2024	One year
03	Power sensor	NRP110T	101159	January 13, 2024	One year
04	Signal Generator	E4438C	MY49071430	December 25, 2023	One year
05	Dielectric Probe Kit	85070E	Agilent	No Calibration Requested	
06	Directional Coupler	778D	MY48220584	No Calibration Requested	
07	Amplifier	60S1G4	0331848	No Calibration Requested	
08	BTS	CMW500	159890	January 9, 2024	One year
09	E-field Probe	SPEAG EX3DV4	7307	May 28, 2024	One year
10	DAE	SPEAG DAE4	1807	May 14, 2024	One year
11	Dipole Validation Kit	SPEAG D1640V2	325	July 11,2024	One year
12	Dipole Validation Kit	SPEAG D2000V2	1034	July 10,2024	One year
13	Dipole Validation Kit	SPEAG D2450V2	853	July 10,2024	One year

END OF REPORT BODY

Appendixes

ANNEX A Graph Results
ANNEX B System Verification Results
ANNEX C SAR Measurement Setup
ANNEX D Position of the wireless device in relation to the phantom
ANNEX E Equivalent Media Recipes
ANNEX F System Validation
ANNEX G Probe Calibration Certificate
ANNEX H Dipole Calibration Certificate
ANNEX I SAR Sensor Triggering Data Summary
ANNEX J Accreditation Certificate