FCC 47 CFR § 2.1093
IEEE Std 1528-2013

SAR EVALUATION REPORT

(Part 0 : SAR CHARACTERIZATION)

FOR

GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC

MODEL NUMBER: SM-A716V

FCC ID: A3LSMA716V

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IAS ACCREDITED

Testing Laboratory

TL-637

Revision History

Rev.	Date	Revisions	Revised By
V1	5/29/2020	Initial Issue	--
V2	6/5/2020	Revised typo in Sec.6.3 Reviesd tune-up list & note.3 in SAR Characterizations's table.. Added Maximum allowed power list & note in Sec.7.	Sunghoon.kim

Table of Contents

1. Attestation of SAR Characterization

Applicant Name	SAMSUNG ELECTRONICS CO.,LTD.
FCC ID	A3LSMA716V
Model Number	SM-A716V
Applicable Standards	FCC 47 CFR § 2.1093 IEEE Std 1528-2013 Published RF exposure KDB procedures
Report type	Part.0 : SAR Characterization
Date Tested	3/30/2020 to 4/26/2020 , 5/10/2020 to 5/15/2020
Part 0 Purpose	Part 0 is the procedures for determining P_{Limit} for 2G/3G/4G/5G NR sub6 to satisfy *SAR_design_target* in order to FCC limit's requirement.

UL Korea, 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 Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account 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, 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 Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, 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 IAS, any agency of the Federal Government, or any agency of any government.

This test report contains SAR measurements to support a Permissive Change application that only affect specific exposure conditions for the GSM 1900 cellular operations. The tables in sections 1 and 1.1 below, and data used for the simultaneous analysis in section 13, for the operating bands and modes not detailed in this report have been taken directly from the test report submitted to support the original filing for device certification.

Approved & Released By:	Prepared By:
	
Justin Park Operations Leader UL Korea, Ltd. Suwon Laboratory	Sunghoon Kim Engineer UL Korea, Ltd. Suwon Laboratory

2. Introduction

The equipment under test (EUT) is samsung Phablet (FCC ID : A3LSMA716V), it contains the Qualcomm modems supporting 2G/3G/4G/5G NR technologies. These modems are enable with Qualcomm Smart Transmit feature to control and manage transmitting power in real time and to ensure at all times the time-averaged RF exposure is in compliance with FCC requirement.

This purpose of the part 0 report is to determine SAR char is derived from SAR test measurements and conducted power measurements to determine P_{Limit} for each technology/band. The P_{Limit} represents the maximum time-averaged power level for the corresponding radio/antenna configuration.

3. Facilities and Accreditation

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

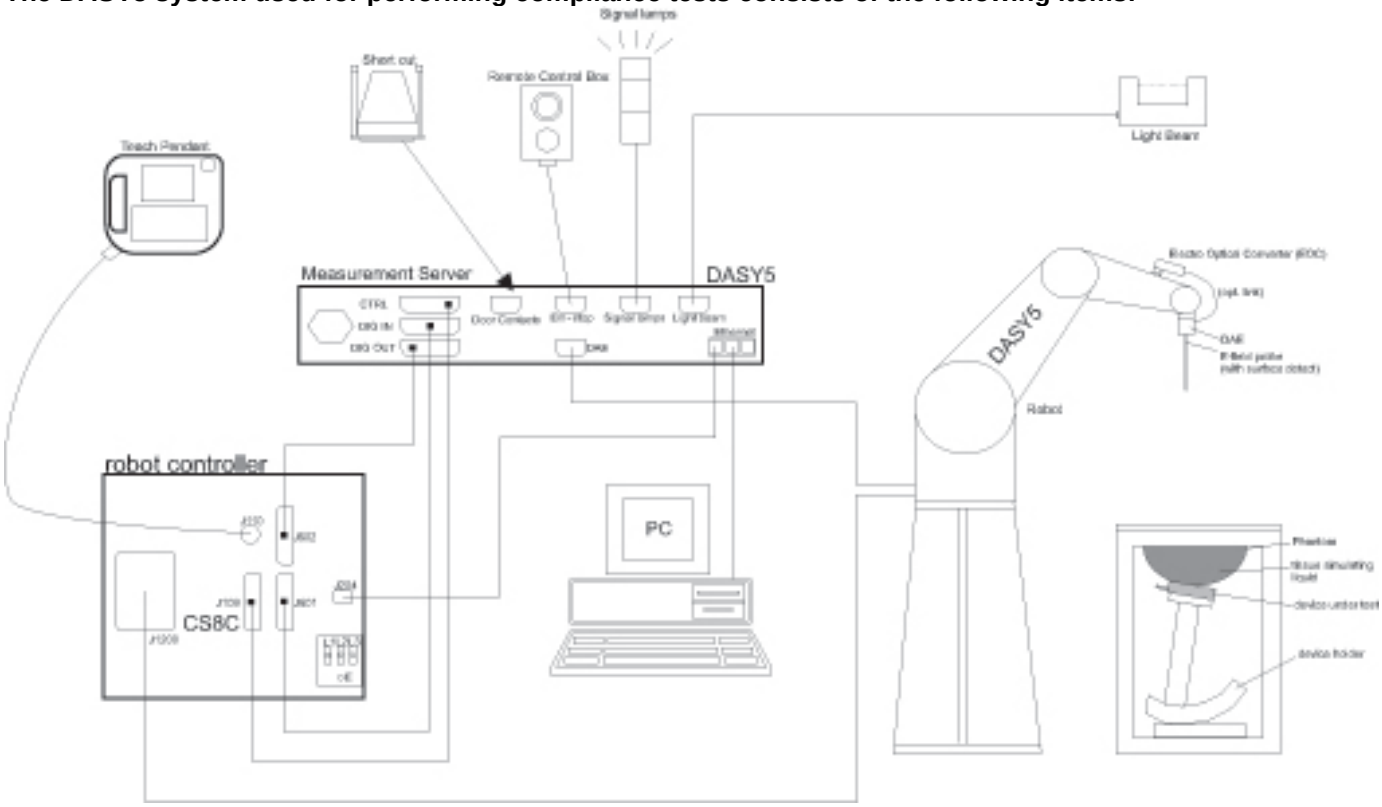
Suwon
SAR 1 Room
SAR 2 Room
SAR 3 Room
SAR 4 Room
SAR 5 Room

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.
The full scope of accreditation can be viewed at https://www.iasonline.org/wp-content/uploads/2017/05/TL-637 -cert-New.pdf.

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

The DASY5 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 WinXP or Win7 and the DASY5 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 Scan Procedures

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 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.	

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

			≤ 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	≤ $1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan (FCC only)

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation the extrapolated distance should not be larger than the step size in Z-direction.

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.

Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Network Analyzer	Agilent	E5071C	MY46522054	8-7-2020
Dielectric Assessment Kit	SPEAG	DAK-3.5	1196	6-18-2020
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	LKM	DTM3000	3424	8-9-2020

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Agilent	N5181A	MY50145882	8-6-2020
Power Sensor	Agilent	U2000A	MY54260010	8-9-2020
Power Sensor	Agilent	U2000A	MY54260007	8-9-2020
Power Amplifier	EXODUS	1410025-AMP2027-10003	10003	8-8-2020
Directional Coupler	Agilent	772D	MY52180193	8-7-2020
Directional Coupler	Agilent	778D	MY52180432	8-7-2020
Low Pass Filter	MICROLAB	LA-15N	03943	8-7-2020
Low Pass Filter	FILTRON	L14012FL	1410003S	8-7-2020
Attenuator	Agilent	8491B/003	MY39269292	8-7-2020
Attenuator	Agilent	8491B/010	MY39269315	8-7-2020
Attenuator	Agilent	8491B/020	MY39269298	8-7-2020
E-Field Probe (SAR1)	SPEAG	EX3DV4	7376	9-27-2020
E-Field Probe (SAR3)	SPEAG	EX3DV4	7314	8-29-2020
E-Field Probe (SAR3)	SPEAG	EX3DV4	7376	9-27-2020
E-Field Probe (SAR4)	SPEAG	EX3DV4	7545	9-23-2020
E-Field Probe (SAR5)	SPEAG	EX3DV4	3871	8-29-2020
Data Acquisition Electronics (SAR1)	SPEAG	DAE4	1494	7-18-2020
Data Acquisition Electronics (SAR3)	SPEAG	DAE4	1468	9-20-2020
Data Acquisition Electronics (SAR4)	SPEAG	DAE4	1591	9-11-2020
Data Acquisition Electronics (SAR5)	SPEAG	DAE4	1343	8-27-2020
System Validation Dipole	SPEAG	D750V3	1122	2-24-2022
System Validation Dipole	SPEAG	D835V2	4d174	2-24-2022
System Validation Dipole	SPEAG	D1750V2	1125	2-21-2022
System Validation Dipole	SPEAG	D1900V2	5d190	10-23-2020
System Validation Dipole	SPEAG	D2600V2	1097	9-19-2021
Thermometer (SAR1)	Lutron	MHB-382SD	AH.50215	8-8-2020
Thermometer (SAR3)	Lutron	MHB-382SD	AH.50213	8-8-2020
Thermometer (SAR4),(SAR5)	Lutron	MHB-382SD	AH.91463	8-8-2020

Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMW500	150313	8-8-2020
Base Station Simulator	R & S	CMW500	150314	8-8-2020
Base Station Simulator	R & S	CMW500	162790	8-9-2020
UXM 5G Wireless Test Platform	Keysight	E7515B	MY57510596	2-5-2021

5. Device Under Test (DUT) Information

5.1. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode		Duty Cycle used for SAR testing
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	GSM Voice: 12.5% (E)GPRS: 1 Slot: 12.5% 2 Slots: 25% 3 Slots: 37.5% 4 Slots: 50%
	Does this device support DTM (Dual Transfer Mode)? ☐ Yes ☒ No			
W-CDMA (UMTS)	Band II Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Category 24) HSUPA (Category 6) DC-HSDPA (Category 24) HSPA+ (DL only)		100%
LTE	FDD Band 2 FDD Band 4 FDD Band 5 FDD Band 7 FDD Band 12 FDD Band 13 FDD Band 66	QPSK 16QAM 64QAM Rel. 15 Carrier Aggregation (1 Uplink and 3 Downlinks)		100% (FDD)
	Does this device support SV-LTE (1xRTT-LTE)? ☐ Yes ☒ No			
5G NR (Sub 6GHz)	NR Band n2 NR Band n5 NR Band n66	DFT-s-ODFM (QPSK, 16QAM, 64QAM, 256QAM) CP-ODFM (QPSK, 16QAM, 64QAM, 256QAM) Only Support to NSA mode (EN-DC)		100%
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)		SISO mode : 98.6% (802.11b) MIMO mode : 98.6% (802.11g)
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT20) 802.11ac (VHT40) 802.11ac (VHT80)		SISO mode: 98.7% (802.11a) MIMO mode: 98.7% (802.11a)
	Does this device support bands 5.60 ~ 5.65 GHz? ☒ Yes ☐ No			
	Does this device support Band gap channel(s)? ☒ Yes ☐ No			
Bluetooth	2.4 GHz	Version 5.0 LE		76.8% (DH5)

Notes:

This device supports only supports Smart transmit feature for 2G/3G/4G/5G NR operations. But Smart transmit feature does not support for Other technologies (WLAN/BT/NFC).

5.2. Time-Averaging for SAR

This device is enabled with Qualcomm Smart Transmit algorithm to control and manage transmitting power in real time and to ensure that the time-averaged RF exposure from 2G/3G/4G/5G NR Sub6 WWAN is compliance with FCC requirement. This part.0 report shows SAR characterization of WWAN radios for 2G/3G/4G/5G NR Sub6. Characterization is achieved by determining P_{Limit} for 2G/3G/4G/5G NR Sub6 that correspond to the *SAR_design_target*s after accounting for all device design related uncertainty. The SAR Characterization is denoted as SAR Char in this report.

5.3. Nomenclature for Part 0 Report

Technology	Term	Description
2G/3G/4G/ 5G NR Sub6	P_{limit}	Power level that corresponds to the exposure design target (*SAR_design_target*) after accounting for all device design related uncertainties
	P_{max}	Maximum tune up output power
	SAR_design_target	Target SAR level < SAR limit after accounting for all device design related uncertainties
	SAR Char	Table containing P_{limit} for all technologies and bands

6. SAR Characterization

6.1. SAR Design Target

SAR_Design_target is determined by ensuring that it is less than FCC SAR limit after accounting for total device designed related uncertainties specified by the manufacturer.

SAR_design_target			
$SAR\_design\_target < SAR\_regulatory\_limit \times 10^{\frac{-Total\ Uncertainty}{10}}$			
1g SAR (W/kg)		**10g SAR (W/kg)**	
Total Uncertainty	**1.0 dB**	**Total Uncertainty**	**1.0 dB**
SAR_regulatory_limit	**1.6 W/kg**	***SAR_regulatory_limit***	**4.0 W/kg**
SAR_design_target	**1.0 W/kg**	***SAR_design_target***	**2.5 W/kg**

6.2. DSI and SAR Determination

This device uses different Device State Index (DSI) to configure different time averaged power levels based on certain exposure scenarios. Depending on the detection scheme implemented in the smartphone, the worst-case SAR was determined by measurements for the relevant exposure conditions for that DSI. Detailed descriptions of the detection mechanisms are included in the operational description. When 1g SAR and 10g SAR exposure comparison is needed, the worst-case was determined from SAR normalized to 1g or 10g SAR limit.

The device state index (DSI) conditions used in below table represent different exposure scenarios.

DSI and Corresponding Exposure Scenarios

Exposure Scenario	Description	KDB guide for SAR test
Head exposure (DSI = 1)	Audio receiver is active during voice or VoIP call.	KDB 648474 D04 (Head)
Hotspot exposure (DSI = 2)	User active Hotspot mode through the UI (User Interface).	KDB 941225 D06 (Hotspot mode)
Product Specific 10g With triggering sensor (DSI = 3)	Hand use conditions for Phablet device, and Proximity sensor is triggered	KDB 648474 D04 (Phablet device) KDB 616217 D04 (Proximity sensor)
Product Specific 10g Without triggering sensor (DSI = 0)	Hand use conditions for Phablet device, and Proximity sensor is not triggered due to triggering distance.	KDB 648474 D04 (Phablet device) KDB 616217 D04 (Proximity sensor)
Body-worn exposure (DSI = 0)	Device are used with body-worn accessories.	KDB 648474 D04 (body-worn accessory)

6.3. SAR Char

SAR results corresponding to P_{max} for each antenna/technology/band/DSI can be found in Section.7. P_{limit} is calculated by linearly scaling with the measured SAR at the P_{max} to correspond to *the SAR_ design_target*. P_{limit} determination for each exposure scenario corresponding to *SAR_design_target* are shown in table.

P_{Limit} Determination

Device State Index (DSI)	P_{Limit} Determination Scenarios
DSI = 0	The worst-case SAR exposure is determined as maximum SAR normalized To the limit among; 1. Body-worn SAR 2. Product specific 10g SAR measured at 9, 7 and 11 mm spacing for back, Front, Bottom respectively 3. Product specific 10g SAR measured at 0 mm for left and right surfaces
DSI = 1	P_{limit} is calculated based on 1g Head SAR
DSI = 2	P_{limit} is calculated based on 1g Hotspot SAR at 10mm
DSI = 3	P_{limit} is calculated based on 10g Extremity SAR at 0 mm for back, front, and bottom surfaces

Notes:

For DSI = 0, P_{limit} is calculated by:

P_{limit} = min{ P_{limit} corresponding to 1g Body worn SAR evaluation at 15 mm spacing,

P_{limit} corresponding to Product specific 10g SAR evaluation at 7 ~ 11 mm spacing

P_{limit} corresponding to Product specific 10g SAR evaluation at 0 mm for left and right}

SAR Characterizations

Device State Index (DSI)	0	0	1	2	3	Pmax (Maximum tune-up Power) (dBm)
Exposure scenario	Body-worn	Product Specific 10-g without triggering sensor	Head	Hotspot	Product Specific 10-g with triggering sensor	
Test Distance (mm)	15	0 / 9 / 7/ 11	0	10	0	
Spatial-average	1g	10g	1g	1g	10g	
DSI:	0	0	1(RCV WIFI)	2	3	
WWAN Bands	Plimit (dBm)					
GSM 850	29.7	33.3	33.1	27.2	26.9	25.5
GSM 1900	28.1	29.3	35.2	19.7	20.7	22.2
WCDMA Band II	27.5	28.4	34.9	20.5	20.5	23.5
WCDMA Band V	30.3	34.1	31.0	28.1	27.3	23.5
LTE Band 2	28.4	28.9	34.3	20.5	20.5	23.5
LTE Band 5	29.0	32.1	30.5	26.4	26.8	23.5
LTE Band 7	29.4	26.5	31.7	21.5	20.5	22.5
LTE Band 12	30.3	34.1	34.2	29.1	28.1	23.5
LTE Band 13	29.4	32.2	31.4	27.1	26.9	24.0
LTE Band 4/66	28.8	28.9	38.3	21.0	21.0	24.0
NR band n2	27.8	30.4	33.7	19.5	20.0	24.0
NR band n5	28.6	30.5	30.6	26.4	26.3	23.5
NR band n66	25.6	28.3	32.2	18.0	20.0	23.5

Notes:

1. For all modes/bands, DSI mode operates according to priority. Please refer to operational description.
2. If P_{limit} is higher than P_{max} for some modes / bands, The modes/bands will operate at a power level up to P_{max}.
3. P_{max} (Maximum tune-up power) is specified in tune-up document. The maximum allowed power is equal to maximum tune up power + 1 dB device design uncertainty.
4. For GSM bands, P_{limit} was calculated according to frame-average output power.
5. P_{limit}(DSI = 0) was determined to be the lower of “Body-worn” and “Product Specific 10-g at Max power” in each WWAN Bands.

7. SAR Test results for *Plimit* calculations

Head exposure (DSI = 1)

RF Exposure Conditions	band	mode	DSI	Ch.	Test distance (mm)	Test position	Maximum allowed power (dBm)	Measured Output power (dbm)	measured SAR 1g (W/kg)	Plimit (dBm)	Minimim Plimit (dBm)
Head	GSM 850	2 slots	1	190	0	Left Touch	26.5	25.0	0.154	33.1	33.1
				190	0	Left Tilt		25.0	0.110	34.6	
				190	0	Right Touch		25.0	0.131	33.8	
				190	0	Right Tilt		25.0	0.099	35.1	
Head	GSM 1900	3 slots	1	661	0	Left Touch	23.2	22.3	0.052	35.2	35.2
				661	0	Left Tilt		22.3	0.013	41.1	
				661	0	Right Touch		22.3	0.039	36.4	
				661	0	Right Tilt		22.3	0.026	38.3	
Head	WCDMA Band II	Rel.99	1	9400	0	Left Touch	24.5	22.8	0.063	34.9	34.9
				9400	0	Left Tilt		22.8	0.018	40.2	
				9400	0	Right Touch		22.8	0.052	35.7	
				9400	0	Right Tilt		22.8	0.033	37.7	
Head	WCDMA Band V	Rel.99	1	4183	0	Left Touch	24.5	23.0	0.081	33.8	31.0
				4183	0	Left Tilt		23.0	0.055	35.6	
				4183	0	Right Touch		23.0	0.157	31.0	
				4183	0	Right Tilt		23.0	0.072	34.4	
Head	LTE Band 2	QPSK BW=20 RB 1/49	1	18900	0	Left Touch	24.5	23.8	0.089	34.3	34.3
				18900	0	Left Tilt		23.8	0.050	36.8	
				18900	0	Right Touch		23.8	0.065	35.6	
				18900	0	Right Tilt		23.8	0.042	37.5	
Head	LTE Band 5	QPSK BW=20 RB 1/25	1	20525	0	Left Touch	24.5	23.6	0.151	31.8	30.5
				20525	0	Left Tilt		23.6	0.088	34.1	
				20525	0	Right Touch		23.6	0.202	30.5	
				20525	0	Right Tilt		23.6	0.086	34.2	
Head	LTE Band 7	QPSK BW=20 RB 1/49	1	20850	0	Left Touch	23.5	22.5	0.119	31.7	31.7
				20850	0	Left Tilt		22.5	0.059	34.8	
				20850	0	Right Touch		22.5	0.088	33.0	
				20850	0	Right Tilt		22.5	0.088	33.0	
Head	LTE Band 12	QPSK BW=10 RB 1/25	1	23095	0	Left Touch	24.5	23.8	0.078	34.8	34.2
				23095	0	Left Tilt		23.8	0.056	36.3	
				23095	0	Right Touch		23.8	0.091	34.2	
				23095	0	Right Tilt		23.8	0.051	36.7	
Head	LTE Band 13	QPSK BW=10 RB 1/25	1	23230	0	Left Touch	25.0	23.6	0.123	32.7	31.4
				23230	0	Left Tilt		23.6	0.084	34.4	
				23230	0	Right Touch		23.6	0.165	31.4	
				23230	0	Right Tilt		23.6	0.080	34.6	
Head	LTE Band (66/4)	QPSK BW=20 RB 1/49	1	132572	0	Left Touch	25.0	23.8	0.035	38.3	38.3
				132572	0	Left Tilt		23.8	0.033	38.6	
				132572	0	Right Touch		23.8	0.027	39.4	
				132572	0	Right Tilt		23.8	0.016	41.7	
Head	NR n2 (DFT-s-OFDM)	QPSK BW=20 RB 1/1	1	380000	0	Left Touch	25.0	23.7	0.100	33.7	33.7
				380000	0	Left Tilt		23.7	0.057	36.1	
				380000	0	Right Touch		23.7	0.072	35.1	
				380000	0	Right Tilt		23.7	0.058	36.0	
Head	NR n5 (DFT-s-OFDM)	QPSK BW=20 RB 1/1	1	167300	0	Left Touch	24.5	23.1	0.123	32.2	30.6
				167300	0	Left Tilt		23.1	0.088	33.7	
				167300	0	Right Touch		23.1	0.177	30.6	
				167300	0	Right Tilt		23.1	0.090	33.6	
Head	NR n66 (DFT-s-OFDM)	QPSK BW=20 RB 1/53	1	344000	0	Left Touch	24.5	23.8	0.143	32.2	32.2
				344000	0	Left Tilt		23.8	0.058	36.1	
				344000	0	Right Touch		23.8	0.112	33.3	
				344000	0	Right Tilt		23.8	0.117	33.1	

Notes:

1. The maximum allowed power is equal to maximum tune up power + 1 dB device design uncertainty
2. Measured Output power refer to Sec.9 in SAR part.1 report.

Body-worn exposure (DSI = 0)

RF Exposure Conditions	band	mode	DSI	Ch.	Test distance (mm)	Test position	Maximum allowed power (dBm)	Measured Output power (dbm)	measured SAR 1g (W/kg)	P_{limit} (dBm)	Minimim P_{limit} (dBm)
Body-worn	GSM 850	2 slots	0	190	15	Rear	26.5	25.0	0.342	29.7	29.7
				190	15	Front		25.0	0.165	32.8	
Body-worn	GSM 1900	3 slots	0	661	15	Rear	23.2	22.3	0.266	28.1	28.1
				661	15	Front		22.3	0.193	29.5	
Body-worn	WCDMA Band II	Rel.99	0	9400	15	Rear	24.5	22.8	0.345	27.5	27.5
				9400	15	Front		22.8	0.246	28.9	
Body-worn	WCDMA Band V	Rel.99	0	4183	15	Rear	24.5	23.0	0.185	30.3	30.3
				4183	15	Front		23.0	0.159	30.9	
Body-worn	LTE Band 2	QPSK BW=20	0	18900	15	Rear	24.5	23.8	0.344	28.4	28.4
				18900	15	Front		23.8	0.281	29.3	
Body-worn	LTE Band 5	QPSK BW=20	0	20525	15	Rear	24.5	23.6	0.287	29.0	29.0
				20525	15	Front		23.6	0.254	29.5	
Body-worn	LTE Band 7	QPSK BW=20	0	20850	15	Rear	23.5	22.5	0.204	29.4	29.4
				20850	15	Front		22.5	0.162	30.4	
Body-worn	LTE Band 12	QPSK BW=10	0	23095	15	Rear	24.5	23.8	0.224	30.3	30.3
				23095	15	Front		23.8	0.183	31.1	
Body-worn	LTE Band 13	QPSK BW=10	0	23230	15	Rear	25.0	23.6	0.267	29.4	29.4
				23230	15	Front		23.6	0.214	30.3	
Body-worn	LTE Band (66/4)	QPSK BW=20	0	132572	15	Rear	25.0	23.8	0.312	28.8	28.8
				132572	15	Front		23.8	0.284	29.2	
Body-worn	NR n2 (DFT-s-OFDM)	QPSK BW=20	0	380000	15	Rear	25.0	23.7	0.388	27.8	27.8
				380000	15	Front		23.7	0.285	29.1	
Body-worn	NR n5 (DFT-s-OFDM)	QPSK BW=20	0	167300	15	Rear	24.5	23.1	0.282	28.6	28.6
				167300	15	Front		23.1	0.245	29.2	
Body-worn	NR n66 (DFT-s-OFDM)	QPSK BW=20	0	344000	15	Rear	24.5	23.8	0.649	25.6	25.6
				344000	15	Front		23.8	0.438	27.3	

Notes:

1. The maximum allowed power is equal to maximum tune up power + 1 dB device design uncertainty
2. Measured Output power refer to Sec.9 in SAR part.1 report.

Hotspot exposure (DSI = 2)

RF Exposure Conditions	band	mode	DSI	Ch.	Test distance (mm)	Test position	Maximum allowed power (dBm)	Measured Output power (dbm)	measured SAR 1g (W/kg)	P_{limit} (dBm)	Minimim P_{limit} (dBm)
Hotspot	GSM 850	2 slots	2	190	10	Rear	26.5	25.0	0.608	27.2	27.2
				190	10	Front		25.0	0.285	30.5	
				190	10	Edge 2		25.0	0.151	33.2	
				190	10	Edge 3		25.0	0.372	29.3	
				190	10	Edge 4		25.0	0.039	39.1	
Hotspot	GSM 1900	3 slots	2	661	10	Rear	23.2	22.3	0.452	25.8	22.0
				661	10	Front		22.3	0.378	26.6	
				661	10	Edge 2		22.3	0.080	33.3	
				661	10	Edge 3		22.3	1.070	22.0	
				661	10	Edge 4		22.3	0.136	31.0	
Hotspot	WCDMA Band II	Rel.99	2	9400	10	Rear	24.5	22.8	0.687	24.5	21.0
				9400	10	Front		22.8	0.464	26.2	
				9400	10	Edge 2		22.8	0.133	31.6	
				9400	10	Edge 3		22.8	1.520	21.0	
				9400	10	Edge 4		22.8	0.146	31.2	
Hotspot	WCDMA Band V	Rel.99	2	4183	10	Rear	24.5	23.0	0.305	28.1	28.1
				4183	10	Front		23.0	0.230	29.3	
				4183	10	Edge 2		23.0	0.157	31.0	
				4183	10	Edge 3		23.0	0.221	29.5	
				4183	10	Edge 4		23.0	0.056	35.5	
Hotspot	LTE Band 2	QPSK BW=20 RB 1/49	2	18900	10	Rear	24.5	23.8	0.661	25.6	21.5
				18900	10	Front		23.8	0.573	26.2	
				18900	10	Edge 2		23.8	0.167	31.5	
				18900	10	Edge 3		23.8	1.680	21.5	
				18900	10	Edge 4		23.8	0.159	31.8	
Hotspot	LTE Band 5	QPSK BW=10 RB 1/25	2	20525	10	Rear	24.5	23.6	0.528	26.4	26.4
				20525	10	Front		23.6	0.363	28.0	
				20525	10	Edge 2		23.6	0.242	29.8	
				20525	10	Edge 3		23.6	0.304	28.8	
				20525	10	Edge 4		23.6	0.063	35.6	
Hotspot	LTE Band 7	QPSK BW=20 RB 1/49	2	20850	10	Rear	23.5	22.5	0.339	27.2	25.7
				20850	10	Front		22.5	0.275	28.1	
				20850	10	Edge 3		22.5	0.481	25.7	
				20850	10	Edge 4		22.5	0.376	26.7	
Hotspot	LTE Band 12	QPSK BW=10 RB 1/25	2	23095	10	Rear	24.5	23.8	0.291	29.1	29.1
				23095	10	Front		23.8	0.231	30.1	
				23095	10	Edge 2		23.8	0.175	31.3	
				23095	10	Edge 3		23.8	0.116	33.1	
				23095	10	Edge 4		23.8	0.081	34.7	
Hotspot	LTE Band 13	QPSK BW=10 RB 1/25	2	23230	10	Rear	25.0	23.6	0.452	27.1	27.1
				23230	10	Front		23.6	0.281	29.1	
				23230	10	Edge 2		23.6	0.229	30.0	
				23230	10	Edge 3		23.6	0.313	28.7	
				23230	10	Edge 4		23.6	0.114	33.0	
Hotspot	LTE Band (66/4)	QPSK BW=20 RB 1/49	2	132572	10	Rear	25.0	23.8	0.600	26.0	21.7
				132572	10	Front		23.8	0.522	26.6	
				132572	10	Edge 2		23.8	0.226	30.2	
				132572	10	Edge 3		23.8	1.610	21.7	
				132572	10	Edge 4		23.8	0.094	34.0	
Hotspot	NR n2 (DFT-s-OFDM)	QPSK BW=20 RB 1/1	2	380000	10	Rear	25.0	23.7	0.512	26.6	21.2
				380000	10	Front		23.7	0.501	26.7	
				380000	10	Edge 2		23.7	0.143	32.1	
				380000	10	Edge 3		23.7	1.780	21.2	
				380000	10	Edge 4		23.7	0.192	30.8	
Hotspot	NR n5 (DFT-s-OFDM)	QPSK BW=20 RB 1/1	2	167300	10	Rear	24.5	23.1	0.467	26.4	26.4
				167300	10	Front		23.1	0.346	27.7	
				167300	10	Edge 2		23.1	0.182	30.5	
				167300	10	Edge 3		23.1	0.322	28.0	
				167300	10	Edge 4		23.1	0.079	34.1	
Hotspot	NR n66 (DFT-s-OFDM)	QPSK BW=20 RB 1/53	2	344000	10	Rear	24.5	23.8	1.230	22.9	19.3
				344000	10	Front		23.8	0.915	24.1	
				344000	10	Edge 2		23.8	0.250	29.8	
				344000	10	Edge 3		23.8	2.780	19.3	
				344000	10	Edge 4		23.8	0.267	29.5	

Notes:

1. The maximum allowed power is equal to maximum tune up power + 1 dB device design uncertainty
2. Measured Output power refer to Sec.9 in SAR part.1 report.
3. Some bands were determined more conservative P_{limit} instead of calculation P_{limit}.

Product Specific 10-g without triggering sensor (DSI = 0)

RF Exposure Conditions	band	mode	DSI	Ch.	Test distance (mm)	Test position	Maximum allowed power (dBm)	Measured Output power (dbm)	measured SAR 1g (W/kg)	Plimit (dBm)	Minimim Plimit (dBm)
Product Specific 10-g	GSM 850	2 slots	0	190	9	Rear	26.5	25.0	0.373	33.3	33.3
				190	7	Front		25.0	0.192	36.2	
				190	0	Edge 2		25.0	0.231	35.4	
				190	11	Edge 3		25.0	0.157	37.0	
				190	0	Edge 4		25.0	0.224	35.5	
Product Specific 10-g	GSM 1900	3 slots	0	661	9	Rear	23.2	22.3	0.334	31.1	29.3
				661	7	Front		22.3	0.276	31.9	
				661	0	Edge 2		22.3	0.143	34.8	
				661	11	Edge 3		22.3	0.508	29.3	
				661	0	Edge 4		22.3	0.386	30.4	
Product Specific 10-g	WCDMA Band II	Rel.99	0	9400	9	Rear	24.5	22.8	0.429	30.5	28.4
				9400	7	Front		22.8	0.385	31.0	
				9400	0	Edge 2		22.8	0.239	33.0	
				9400	11	Edge 3		22.8	0.701	28.4	
				9400	0	Edge 4		22.8	0.368	31.2	
Product Specific 10-g	WCDMA Band V	Rel.99	0	4183	9	Rear	24.5	23.0	0.194	34.1	34.1
				4183	7	Front		23.0	0.174	34.5	
				4183	0	Edge 2		23.0	0.168	34.7	
				4183	11	Edge 3		23.0	0.097	37.1	
				4183	0	Edge 4		23.0	0.194	34.1	
Product Specific 10-g	LTE Band 2	QPSK BW=20 RB 1/49	0	18900	9	Rear	24.5	23.8	0.457	31.1	28.9
				18900	7	Front		23.8	0.516	30.6	
				18900	0	Edge 2		23.8	0.263	33.5	
				18900	11	Edge 3		23.8	0.758	28.9	
				18900	0	Edge 4		23.8	0.423	31.5	
Product Specific 10-g	LTE Band 5	QPSK BW=10 RB 1/25	0	20525	9	Rear	24.5	23.6	0.352	32.1	32.1
				20525	7	Front		23.6	0.212	34.3	
				20525	0	Edge 2		23.6	0.208	34.4	
				20525	11	Edge 3		23.6	0.134	36.3	
				20525	0	Edge 4		23.6	0.171	35.2	
Product Specific 10-g	LTE Band 7	QPSK BW=20 RB 1/49	0	20850	9	Rear	23.5	22.5	0.227	32.9	26.5
				20850	7	Front		22.5	0.333	31.2	
				20850	11	Edge 3		22.5	0.161	34.4	
				20850	0	Edge 4		22.5	1.000	26.5	
Product Specific 10-g	LTE Band 12	QPSK BW=10 RB 1/25	0	23095	9	Rear	24.5	23.8	0.199	34.8	34.1
				23095	7	Front		23.8	0.233	34.1	
				23095	0	Edge 2		23.8	0.144	36.2	
				23095	11	Edge 3		23.8	0.050	40.8	
				23095	0	Edge 4		23.8	0.126	36.7	
Product Specific 10-g	LTE Band 13	QPSK BW=10 RB 1/25	0	23230	9	Rear	25.0	23.6	0.329	32.4	32.2
				23230	7	Front		23.6	0.344	32.2	
				23230	0	Edge 2		23.6	0.223	34.1	
				23230	11	Edge 3		23.6	0.124	36.7	
				23230	0	Edge 4		23.6	0.198	34.6	
Product Specific 10-g	LTE Band (66/4)	QPSK BW=20 RB 1/49	0	132572	9	Rear	25.0	23.8	0.424	31.5	28.9
				132572	7	Front		23.8	0.514	30.6	
				132572	0	Edge 2		23.8	0.316	32.7	
				132572	11	Edge 3		23.8	0.768	28.9	
				132572	0	Edge 4		23.8	0.604	29.9	
Product Specific 10-g	NR n2 (DFT-s-OFDM)	QPSK BW=20 RB 1/1	0	380000	9	Rear	25.0	23.7	0.327	32.5	30.4
				380000	7	Front		23.7	0.414	31.5	
				380000	0	Edge 2		23.7	0.214	34.4	
				380000	11	Edge 3		23.7	0.531	30.4	
				380000	0	Edge 4		23.7	0.474	30.9	
Product Specific 10-g	NR n5 (DFT-s-OFDM)	QPSK BW=20 RB 1/1	0	167300	9	Rear	24.5	23.1	0.441	30.7	30.5
				167300	7	Front		23.1	0.452	30.5	
				167300	0	Edge 2		23.1	0.269	32.8	
				167300	11	Edge 3		23.1	0.172	34.7	
				167300	0	Edge 4		23.1	0.286	32.5	
Product Specific 10-g	NR n66 (DFT-s-OFDM)	QPSK BW=20 RB 1/53	0	344000	9	Rear	24.5	23.8	0.800	28.7	28.3
				344000	7	Front		23.8	0.823	28.6	
				344000	0	Edge 2		23.8	0.405	31.7	
				344000	11	Edge 3		23.8	0.876	28.3	
				344000	0	Edge 4		23.8	0.763	28.9	

Notes:

1. The maximum allowed power is equal to maximum tune up power + 1 dB device design uncertainty
2. Measured Output power refer to Sec.9 in SAR part.1 report.

Product Specific 10-g with triggering sensor (DSI = 3)

RF Exposure Conditions	band	mode	DSI	Ch.	Test distance (mm)	Test position	Maximum allowed power (dBm)	Measured Output power (dbm)	measured SAR 1g (W/kg)	P_{limit} (dBm)	Minimim P_{limit} (dBm)
Product Specific 10-g	GSM 850	2 slots	3	190	0	Rear	26.5	25.0	1.620	26.9	26.9
				190	0	Front		25.0	1.580	27.0	
				190	0	Edge 3		25.0	0.768	30.1	
Product Specific 10-g	GSM 1900	3 slots	3	661	0	Rear	23.2	22.3	1.640	24.2	22.6
				661	0	Front		22.3	1.050	26.1	
				661	0	Edge 3		22.3	2.360	22.6	
Product Specific 10-g	WCDMA Band II	Rel.99	3	9400	0	Rear	24.5	22.8	1.950	23.9	21.1
				9400	0	Front		22.8	1.450	25.2	
				9400	0	Edge 3		22.8	3.770	21.1	
Product Specific 10-g	WCDMA Band V	Rel.99	3	4183	0	Rear	24.5	23.0	0.923	27.3	27.3
				4183	0	Front		23.0	0.900	27.4	
				4183	0	Edge 3		23.0	0.396	31.0	
Product Specific 10-g	LTE Band 2	QPSK BW=20 RB 1/49	3	18900	0	Rear	24.5	23.8	1.720	25.4	21.4
				18900	0	Front		23.8	1.490	26.0	
				18900	0	Edge 3		23.8	4.360	21.4	
Product Specific 10-g	LTE Band 5	QPSK BW=10 RB 1/25	3	20525	0	Rear	24.5	23.6	1.190	26.8	26.8
				20525	0	Front		23.6	0.981	27.7	
				20525	0	Edge 3		23.6	0.471	30.8	
Product Specific 10-g	LTE Band 7	QPSK BW=20 RB 1/49	3	20850	0	Rear	23.5	22.5	2.450	22.6	21.8
				20850	0	Front		22.5	2.230	23.0	
				20850	0	Edge 3		22.5	2.940	21.8	
Product Specific 10-g	LTE Band 12	QPSK BW=10 RB 1/25	1	23095	0	Rear	24.5	23.8	0.915	28.1	28.1
				23095	0	Front		23.8	0.843	28.5	
				23095	0	Edge 3		23.8	0.731	29.1	
Product Specific 10-g	LTE Band 13	QPSK BW=10 RB 1/25	1	23230	0	Rear	25.0	23.6	0.998	27.6	26.9
				23230	0	Front		23.6	1.170	26.9	
				23230	0	Edge 3		23.6	0.488	30.7	
Product Specific 10-g	LTE Band (66/4)	QPSK BW=20 RB 1/49	1	132572	0	Rear	25.0	23.8	2.120	24.5	22.7
				132572	0	Front		23.8	1.640	25.6	
				132572	0	Edge 3		23.8	3.220	22.7	
Product Specific 10-g	NR n2 (DFT-s-OFDM)	QPSK BW=20 RB 1/1	1	380000	0	Rear	25.0	23.7	2.170	24.3	21.8
				380000	0	Front		23.7	1.320	26.5	
				380000	0	Edge 3		23.7	3.830	21.8	
Product Specific 10-g	NR n5 (DFT-s-OFDM)	QPSK BW=20 RB 1/1	1	167300	0	Rear	24.5	23.1	0.999	27.1	26.3
				167300	0	Front		23.1	1.190	26.3	
				167300	0	Edge 3		23.1	0.467	30.4	
Product Specific 10-g	NR n66 (DFT-s-OFDM)	QPSK BW=20 RB 1/53	1	344000	0	Rear	24.5	23.8	2.820	23.2	21.1
				344000	0	Front		23.8	2.570	23.6	
				344000	0	Edge 3		23.8	4.650	21.1	

Notes:

1. The maximum allowed power is equal to maximum tune up power + 1 dB device design uncertainty
2. Measured Output power refer to Sec.9 in SAR part.1 report.
3. Some bands were determined more conservative P_{limit} instead of calculation P_{limit}.

END OF REPORT