Part 0: SAR Characterization

EUT RF Exposure Compliance Test Report

IEEE Std 1528-2013

For

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

FCC ID: A3LSMA256E
Model Name: SM-A256E/DSN and SM-A256E/N

Report Number: 14938215-S2V4
Issue Date: 11/15/2023

Prepared for

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Prepared by

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CERT #0751.05

Revision History

Rev.	Date	Revisions	Revised By
V1	11/9/2023	Initial Issue	--
V2	11/13/2023	Section 6.3: Added note to Tables 6.3.2 and 6.3.3	Truc Tran
V3	11/14/2023	Section 6.3: Updated table 6.3.2 and 6.3.3	Truc Tran
V4	11/14/2023	Section 5.1: Updated note	Coltyce Sanders

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1. Attestation of Test Results

Applicant Name	SAMSUNG ELECTRONICS CO., LTD.
FCC ID	A3LSMA256E
Model Name	SM-A256E/DSN and SM-A256E/N (Used model SM-A256E/DSN for final testing)
Difference in Model Name	Model SM-A256E/DSN is electrically identical to Model SM-A256E/N. The only hardware difference is that model SM-A256E/DSN supports dual SIM, while SM-A256E/N does not SM-A256E/DSN was used to perform all final tests.
Applicable Standards	IEEE Std 1528-2013 Published RF exposure KDB procedures
Report type	SAR Characterization Report
Date Tested	9/12/2023 to 11/8/2023
SAR Characterization Purpose	The purpose of SAR Characterization is to determine the P_{Limit} for 2G/3G/4G/5G NR sub6 that satisfies the SAR_{design_target} and complies with FCC limits.

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested can demonstrate compliance with the requirements as documented in this report.

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not considered unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 A2LA, NIST, or any agency of the U.S. Government, or any agency of the U.S. government.

Approved & Released By:	Prepared By:
	
Devin Chang Senior Test Engineer UL Verification Services Inc.	Truc Tran Laboratory Engineer UL Verification Services Inc.

2. Introduction

The DUT contains S.LSI chipset supporting 2G/3G/4G/5G NR technologies. This device uses Samsung's TAS algorithm to control output power of the cellular (WWAN) transmitters. The version used allows for spatial grouping of antennas such that output power across all antennas within the same spatial group is controlled to ensure aggregate SAR under simultaneous conditions for those antennas remains below the target SAR value. To verify that the aggregate SAR from antennas within different spatial groups does not exceed limits the simultaneous conditions are verified using the aggregate SAR and where the aggregate SAR exceeds the limit either the SPLSR analysis or volume scan methods are used to verify that SAR distributions from the different spatial groupings do not overlap to the extent that localized SAR values would exceed the limit.

The purpose of SAR Characterization is to determine the P_{Limit} for 2G/3G/4G/5G NR sub6 that satisfies the SAR_{design_target} and complies with FCC limits. 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

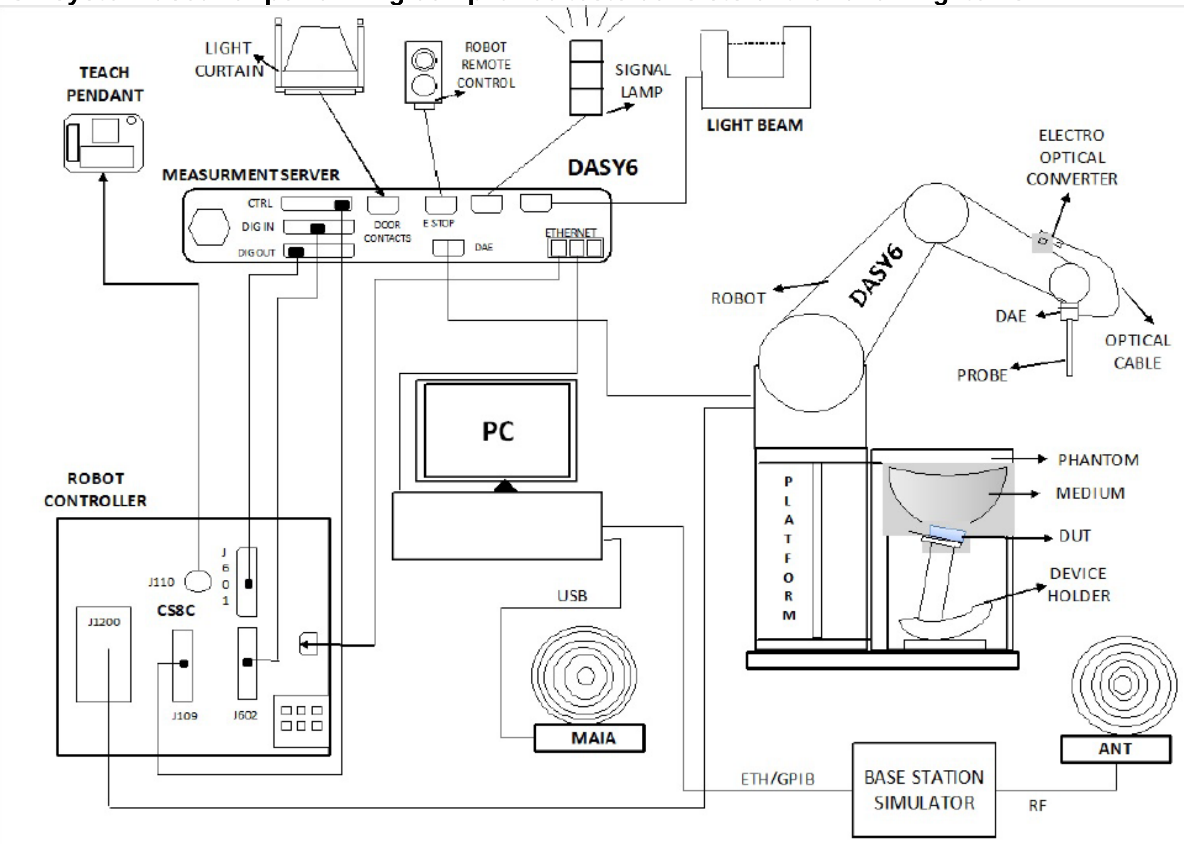
47266 Benicia Street
SAR Labs 1 to 10

UL Verification Services Inc. is accredited by A2LA, Certificate Number 0751.05

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

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



1. A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
2. An isotropic Field probe optimized and calibrated for the targeted measurement.
3. 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.
4. 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.
5. 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.
6. The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
7. A computer running Win10 and the DASY6/8[1] software.
8. Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
9. 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

[1] DASY6/8 software used: DASY6.16.2 or DASY8.16.2 and older generations.

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 IEC/IEEE 62209-1528, 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	$\frac{1}{2}\cdot\delta\cdot\ln(2)$ ± 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	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
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.

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
Dielectric Probe kit	SPEAG	DAK-3.5	1103	2/6/2024
Shorting Block	SPEAG	DAK-1.2/3.5 Short	SM DAK 200 BA	2/6/2024
Vector Network Analyzer	ROHDE & SCHWARZ	ZNLE6	101273-VA	2/19/2024
Dielectric Probe kit	SPEAG	DAK-12	1128	1/16/2024
Shorting Block	SPEAG	DAK-12 Short	SM DAK 220 AC	1/16/2024
Thermometer	Fisher Scientific	Traceable	140493798	4/30/2024

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Signal Genarator	R&S	SMB 100A	180968-GX	2/14/2024
Power Meter	HP	437B	3125U11364	1/26/2024
Power Sensor	HP	8481A	3125U11364	1/26/2024
Power Sensor	R&S	NRP18A	100992-IU	2/15/2024
Amplifier	Miteq	AMF-4D-00400600-50-30P	1795093	N/A
Bi-directional coupler	Werlatone	C8060-102	4736	N/A
DC Power Supply	Sorensen	XT 15-4	1802A01877	N/A
MXG Analog Signal Generator	Agilent	N5181A	MY50140630	1/31/2024
Power Meter	HP	437B	3125U09516	1/31/2024
Power Meter	HP	437B	3125U09248	1/31/2024
Power Sensor	Agilent	8481A	2237A31744	1/31/2024
Power Sensor	HP	8481A	2702A60780	1/31/2024
Amplifier	Miteq	AMF-4D-00400600-50-30P	1620606	N/A
Bi-directional coupler	Werlatone	C8060-102	2148	N/A
DC Power Supply	Sorensen	XT 15-4	1817A02680	N/A

Lab Equipment

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
E-Field Probe (SAR Lab 1)	SPEAG	EX3DV4	7463	4/19/2024
E-Field Probe (SAR Lab 2)	SPEAG	EX3DV4	7356	3/17/2024
E-Field Probe (SAR Lab 3)	SPEAG	EX3DV4	3989	1/26/2024
E-Field Probe (SAR Lab 9)	SPEAG	EX3DV4	7807	4/11/2024
E-Field Probe (SAR Lab 10)	SPEAG	EX3DV4	7335	1/26/2024
DATA ACQUISITION ELECTRONICS (SAR 1)	SPEAG	DAE4	1357	1/27/2024
DATA ACQUISITION ELECTRONICS (SAR 2)	SPEAG	DAE4	1674	5/11/2024
DATA ACQUISITION ELECTRONICS (SAR 3)	SPEAG	DAE4	1547	4/18/2024
DATA ACQUISITION ELECTRONICS (SAR 9)	SPEAG	DAE4	1544	1/24/2024
DATA ACQUISITION ELECTRONICS (SAR 10)	SPEAG	DAE4	1472	1/23/2024
Thermometer (SAR 1, 2, 3)	Fisherbrand	Traceable	181073792	2/29/2024
Thermometer(SAR 9, 10)	Fisherbrand	Traceable	181073792	2/29/2024
SYSTEM VALIDATION DIPOLE	SPEAG	D750V3	1019	4/13/2024
SYSTEM VALIDATION DIPOLE	SPEAG	D835V2	4d002	11/24/2023
SYSTEM VALIDATION DIPOLE	SPEAG	D1750V2	1050	4/19/2024
SYSTEM VALIDATION DIPOLE	SPEAG	D1750V2	1077	10/13/2024
SYSTEM VALIDATION DIPOLE	SPEAG	D1900V2	5d140	4/14/2024
SYSTEM VALIDATION DIPOLE	SPEAG	D2450V2	706	1/20/2024
SYSTEM VALIDATION DIPOLE	SPEAG	D2600V2	1036	4/11/2024
SYSTEM VALIDATION DIPOLE	SPEAG	D3500V2	1011	4/17/2024
SYSTEM VALIDATION DIPOLE	SPEAG	D3700V2	1039	* 5/6/2023
SYSTEM VALIDATION DIPOLE	SPEAG	D5GHzV2	1003	2/22/2024
SYSTEM VALIDATION DIPOLE	SPEAG	D5GHzV2	1138	2/3/2024
SYSTEM VALIDATION DIPOLE	SPEAG	CLA13	1008	1/12/2024

Note(s):

*Calibration has been extended via impedance measurement. Refer to UL SAR Report 14938215-S1 Appendix G for details.

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Power Meter	Keysight	N1912A	MY55196007	1/31/2024
Power Sensor	Agilent	N1921A	MY53260001	1/31/2024
Wideband Radio Communication Tester	R&S	CMW500	171873-pw	2/29/2024
Wideband Radio Communication Tester	R&S	CMW500	124593-ss	2/29/2024
Wideband Radio Communication Tester	R&S	CMW500	171871-Gd	2/29/2024
Wideband Radio Communication Tester	R&S	CMW500	170416-Lb	2/28/2024
UXM 5G Wireless Test Platform	KEYSIGHT	E7515B	MY60102066	1/31/2024

5. Device Under Test (DUT) Information

5.1. Wireless Technologies

<table>
<tr><th>Wireless technologies</th><th>Frequency bands</th><th colspan="2">Operating mode</th><th>Duty Cycle used for SAR testing</th></tr>
<tr><td rowspan="2">GSM</td><td>850
1900</td><td>Voice (GMSK)
GPRS (GMSK)
EDGE (8PSK)</td><td>GSM Class : B
Multi-Slot Class:
Class 33 - 4 Up, 5 Down</td><td>GSM Voice: 12.5%
(E)GPRS: 1 Slot: 12.5%
2 Slots: 25%
3 Slots: 37.5%
4 Slots: 50%</td></tr>
<tr><td colspan="4">Does this device support DTM (Dual Transfer Mode)? ☐ Yes ☒ No</td></tr>
<tr><td>W-CDMA
(UMTS)</td><td>Band II
Band IV
Band V</td><td colspan="2">UMTS Rel. 99 (Voice & Data)
HSDPA (Rel. 5)
HSUPA (Rel. 6)
DC-HSDPA (Rel. 8)
HSPA+ (Rel. 7) DL only</td><td>100%</td></tr>
<tr><td>LTE</td><td>FDD Band 2
FDD Band 4
FDD Band 5
FDD Band 12
FDD Band 13
FDD Band 17
FDD Band 26
TDD Band 41
FDD Band 66</td><td colspan="2">QPSK
16QAM
64QAM
256QAM
Rel. 15 Carrier Aggregation (1 Uplink and 4 Downlinks)</td><td>100% (FDD)
63.3% (TDD) Power Class 3
Refer to §6.4</td></tr>
<tr><td>5G NR (FR1)</td><td>FDD band n5
FDD band n26
TDD band n41
FDD band n66
TDD band n77</td><td colspan="2">CP-OFDM: QPSK, 16QAM, 64QAM, 256QAM
DFT-S-OFDM: π/2 BPSK (UL Only), QPSK, 16QAM, 64QAM, 256QAM</td><td>100% (FDD)
100% (TDD)</td></tr>
<tr><td rowspan="4">Wi-Fi</td><td>2.4 GHz</td><td colspan="2">802.11b
802.11g
802.11n (HT20)</td><td>97.36% (802.11b) [1]</td></tr>
<tr><td>5 GHz</td><td colspan="2">802.11a
802.11n (HT20)
802.11n (HT40)
802.11ac (VHT20)
802.11ac (VHT40)
802.11ac (VHT80)</td><td>90.94% (802.11a) [1]
89.13% (802.11n 40MHz BW) [1]
92.05% (802.11ac 80MHz BW) [1]</td></tr>
<tr><td colspan="4">Does this device support bands 5.60 ~ 5.65 GHz? ☒ Yes ☐ No</td></tr>
<tr><td colspan="4">Does this device support Band gap channel(s)? ☒ Yes ☐ No</td></tr>
<tr><td>Bluetooth</td><td>2.4 GHz</td><td colspan="2">BR, EDR, LE</td><td>77.50% (GFSK) [2]</td></tr>
<tr><td>NFC</td><td>13.56 MHz</td><td colspan="2">Type A/B/F and ISO15693</td><td>100%</td></tr>
</table>

Notes:

1. Duty cycle for Wi-Fi is referenced from UL SAR report 14938215-S1.
2. Duty cycle for Bluetooth is referenced from UL SAR report 14938215-S1.

5.2. Time-Average SAR Feature

This device uses Samsung's TAS algorithm to control output power of the cellular (WWAN) transmitters. The version used allows for spatial grouping of antennas such that output power across all antennas within the same spatial group is controlled to ensure aggregate SAR under simultaneous conditions for those antennas remains below the target SAR value. To verify that the aggregate SAR from antennas within different spatial groups does not exceed limits the simultaneous conditions are verified using the aggregate SAR and where the aggregate SAR exceeds the limit either the SPLSR analysis or volume scan methods are used to verify that SAR distributions from the different spatial groupings do not overlap to the extent that localized SAR values would exceed the limit. Please refer to the Operational Description for detailed information regarding the TAS algorithm and chipset utilized in the DUT.

5.3. Nomenclature for SAR Characterization Report

Table 5.3.1 Definitions for TAS Algorithm

Term	Description
P_{max}	Maximum Tx power that can be transmitted physically from RFIC for a given RAT.
$SAR_{regulatory\_limit}$	SAR value limit specified by FCC.
SAR_{design_target}	Target SAR level using TAS algorithm. This SAR value must be less than SAR regulatory limit and should be determined after accounting for all uncertanties and other design considerations.
P_{limit}	Power level corresponds to the SAR design target.

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.

Table 6.1.1 Definitions of Total Uncertainty and SAR_{design_target}

SAR_{design_target}			
$SAR_{design\_target} < SAR_{regulatory\_limit} \times 10^{\frac{-\text{Total Uncertainty}}{10}}$			
1g SAR (W/kg)		**10g SAR (W/kg)**	
Total Uncertainty	**1.0 dBm**	**Total Uncertainty**	**1.0 dBm**
$SAR_{regulatory\_limit}$	**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. RSI and SAR Determination

This device utilizes different Radio SAR Index (RSI) to configure different time averaged power levels based on RF Exposure scenarios. Depending on the detection scheme implemented in the device, the worst-case SAR was determined by measuring relevant exposure conditions for that RSI. Detailed descriptions of the detection mechanisms are included in the operational description.

Table 6.2.1 illustrates the Radio SAR Index (RSI) used per RF Exposure Scenario. KDB 447498 D01 was used in addition to the KDBs listed in the table below.

Table 6.2.1 RSI and Corresponding RF Exposure Scenarios

RF Exposure Scenarios	Radio SAR Index (RSI)	Description	KDB used for SAR Test
Head	4	1. Next to Ear exposure condition. 2. Handest Receiver (ear piece) is active during voice or VoIP call.	648474 D04
Body-worn	0	1. Handset used with body-worn accessory.	648474 D04
	1	1. Handset used while connected to ear-jack.	
Hotspot	3	1. Handset supports wireless router ot Hotspot mode. 2. Hotspot mode SAR test when Handset used in close proximity to body.	648474 D04 941225 D06
Extremity	0	1. Hand use condition for Handset (Phablet) when Proximity sensor is not triggered.	648747 D04 616217 D04
	2	1. Hand use condition for Handset (Phablet) when Proximity sensor is triggered.	

6.3. P_{limit} Determination of each RSI Scenario

SAR results corresponding to P_{max} for each antenna/technology/band/RSI can be found in Table 6.3.3.
P_{limit} is calculated by linearly scaling with the measured SAR at the P_{max} to correspond to t*he* SAR_{design_target}.
Table 6.3.1 shows the P_{limit} determination for each RF Exposure Scenario corresponding to SAR_{design_target}.

Table 6.3.1 P_{limit} Determination

Radio SAR Index (RSI)	P_{limit} Determination Scenario
RSI = 0	1. P_{limit} is calculated based on Body-worn SAR at 15mm for Back and Front. 2. P_{limit} is calculated based on Extremity SAR measured at 16mm, 2mm and 12mm for Back, Front and Edge Bottom respectively.
RSI = 1	1. P_{limit} is calculated based on Body-worn SAR with Ear-jack connected at 0mm for Back and Front
RSI = 2	1. P_{limit} is calculated based on Extremity SAR measured at 0mm for Back, Front, Edge Top, Edge Right, Edge Bottom and Edge Left.
RSI = 3	1. P_{limit} is calculated based on Hotspot SAR measured at 10mm for Back, Front, Edge Top, Edge Right, Edge Bottom and Edge Left.
RSI = 4	1. P_{limit} is calculated based on Head SAR at 0mm for Left Cheek, Left Tilt, Right Cheek and Right Tilt.

Notes:
Refer to Tune-up procedure and Operational Description for detailed information of P_{limit} by RSI and technology/band.

Table 6.3.2 Worst-case SAR for each Technology/Band

Tech/Band	Antenna					Worst-case SAR (W/kg)					P_{limit} (dBm) + Uncertainty (dBm)				
	Head	Body-worn	Hotspot	Extremity	Extremity	Head	Body-worn	Hotspot	Extremity	Extremity	Head	Body-worn	Hotspot	Extremity	Extremity
	RSI: 4	RSI: 0	RSI: 3	RSI: 2	RSI: 0	RSI: 4	RSI: 0	RSI: 3	RSI: 2	RSI: 0	RSI: 4	RSI: 0	RSI: 3	RSI: 2	RSI: 0
GSM 850 2 Slots	ANT A	ANT A	N/A	N/A	ANT A	0.442	0.436	N/A	N/A	0.591	32.50	32.50	N/A	N/A	N/A
GSM 850 3 Slots	N/A	N/A	ANT A	ANT A	N/A	N/A	N/A	0.306	0.392	N/A	N/A	N/A	25.30	25.30	N/A
GSM 1900 1 Slot	ANT B	ANT B	N/A	N/A	ANT B	0.132	0.182	N/A	N/A	0.824	30.50	30.50	N/A	N/A	30.50
GSM 1900 3 Slots	N/A	N/A	ANT B	ANT B	N/A	N/A	N/A	0.243	1.211	N/A	N/A	N/A	N/A	N/A	N/A
W-CDMA B2	ANT B	ANT B	ANT B	ANT B	ANT B	0.277	0.487	0.615	2.780	0.932	24.50	24.50	22.00	22.00	24.50
W-CDMA B4	ANT B	ANT B	ANT B	ANT B	ANT B	0.226	0.365	0.364	1.780	0.913	24.50	24.50	22.00	22.00	24.50
W-CDMA B5	ANT A	ANT A	ANT A	N/A	ANT A	0.303	0.394	0.965	N/A	1.318	25.00	25.00	25.00	N/A	25.00
LTE Band 2	ANT E	ANT B	ANT B	N/A	ANT E	0.232	0.231	0.642	N/A	2.639	22.50	22.00	22.00	N/A	22.00
LTE Band 5	ANT A	ANT A	ANT A	N/A	ANT A	0.340	0.333	0.719	N/A	1.289	25.00	25.00	25.00	N/A	25.00
LTE Band 12/17	ANT A	ANT A	ANT A	N/A	ANT A	0.231	0.356	0.474	N/A	1.035	24.50	24.50	24.50	N/A	24.50
LTE Band 13	ANT A	ANT A	ANT A	N/A	ANT A	0.138	0.237	0.455	N/A	1.171	24.50	24.50	24.50	N/A	24.50
LTE Band 26	ANT A	ANT A	ANT A	N/A	ANT A	0.313	0.295	0.654	N/A	1.217	25.00	25.00	25.00	N/A	25.00
LTE Band 41	ANT B	ANT B	ANT B	ANT B	ANT B	0.212	0.237	0.258	1.060	0.976	24.00	24.00	20.50	20.50	24.00
LTE Band 66	ANT E	ANT E	ANT E	N/A	ANT B	0.720	0.283	0.741	N/A	1.920	24.00	22.00	22.00	N/A	22.00
NR n5	ANT A	ANT A	ANT A	N/A	ANT A	0.290	0.232	0.512	N/A	1.100	25.00	25.00	25.00	N/A	25.00
NR n26	ANT A	ANT A	ANT A	N/A	ANT A	0.264	0.319	0.691	N/A	1.248	24.50	24.50	24.50	N/A	24.50
NR n41	ANT B	ANT B	ANT G	ANT B	ANT B	0.319	0.416	0.527	0.726	1.060	24.00	24.00	18.00	18.00	24.00
NR n66	ANT B	ANT B	ANT B	N/A	ANT B	0.104	0.137	0.281	N/A	1.646	22.00	22.00	22.00	N/A	22.00
NR n77 (Block A) PC3	ANT F	ANT F	ANT F	N/A	ANT F	0.374	0.165	0.398	N/A	1.121	16.00	18.00	18.00	N/A	18.00
NR n77 (Block C) PC3	ANT F	ANT F	ANT F	N/A	ANT F	0.237	0.173	0.371	N/A	0.969	16.00	18.00	18.00	N/A	18.00

Table 6.3.3 P_{limit} result for each Technology/Band per Radio SAR Index

Exposure Scenario		Duty Cycle	Head		Body-worn		Hotspot		Extremity		Extremity		P_{max} (dBm)
Spatial-average			1-g		1-g		1-g		10-g		10-g		
Test Distance			0 mm		15 mm		10 mm		0 mm		2, 12, 16 mm		
Power Mode (DSI)			RSI: 4		RSI: 0		RSI: 3		RSI: 2		RSI: 0		
Antenna	Tech/Band		P_{design} (dBm)	P_{limit} + Uncertainty (dBm)	P_{design} (dBm)	P_{limit} + Uncertainty (dBm)	P_{design} (dBm)	P_{limit} + Uncertainty (dBm)	P_{design} (dBm)	P_{limit} + Uncertainty (dBm)	P_{design} (dBm)	P_{limit} + Uncertainty (dBm)	
			Burst Average		Burst Average		Burst Average		Burst Average		Burst Average		Burst Average
ANT A	GSM 850 2 Slots	25.0%	37.04	32.50	37.11	32.50	N/A	N/A	N/A	N/A	39.76	32.50	32.50
	GSM 850 3 Slots	37.5%	N/A	N/A	N/A	N/A	31.44	25.30	34.35	25.30	N/A	N/A	32.50
	W-CDMA B5	100.0%	31.18	25.00	30.04	25.00	26.16	25.00	N/A	N/A	28.78	25.00	25.00
	LTE Band 5	100.0%	30.69	25.00	30.78	25.00	27.43	25.00	N/A	N/A	28.88	25.00	25.00
	LTE Band 12/17	100.0%	31.86	24.50	29.99	24.50	28.74	24.50	N/A	N/A	29.33	24.50	24.50
	LTE Band 13	100.0%	34.09	24.50	31.75	24.50	28.92	24.50	N/A	N/A	28.79	24.50	24.50
	LTE Band 26	100.0%	31.04	25.00	31.30	25.00	27.84	25.00	N/A	N/A	29.12	25.00	25.00
	NR n5	100.0%	31.37	25.00	32.34	25.00	28.91	25.00	N/A	N/A	29.57	25.00	25.00
	NR n26	100.0%	31.28	24.50	30.47	24.50	27.10	24.50	N/A	N/A	28.52	24.50	24.50
ANT B	GSM 1900 1 Slot	12.5%	40.31	30.50	38.89	30.50	N/A	N/A	N/A	N/A	36.32	30.50	29.50
	GSM 1900 3 Slots	37.5%	N/A	N/A	N/A	N/A	30.45	23.30	27.45	23.30	N/A	N/A	29.50
	W-CDMA B2	100.0%	31.07	24.50	28.62	24.50	25.11	22.00	22.54	22.00	29.79	24.50	24.50
	W-CDMA B4	100.0%	31.95	24.50	29.87	24.50	27.39	22.00	24.48	22.00	29.88	24.50	24.50
	LTE Band 2	100.0%	31.20	23.00	29.37	22.00	24.92	22.00	N/A	N/A	22.97	22.00	24.50
	LTE Band 41	63.3%	31.74	24.00	31.26	24.00	27.39	20.50	25.23	20.50	29.08	24.00	24.00
	LTE Band 66/4	100.0%	32.61	24.00	30.95	22.00	27.67	22.00	N/A	N/A	24.15	22.00	24.00
	NR n41	100.0%	29.96	24.00	28.81	24.00	25.40	18.00	24.37	18.00	28.73	24.00	24.00
	NR n66	100.0%	32.84	22.00	31.63	22.00	28.52	22.00	N/A	N/A	24.82	22.00	24.50
ANT C	NR n41	100.0%	27.11	17.50	38.00	17.50	34.78	17.50	N/A	N/A	29.07	17.50	17.50
ANT E	LTE Band 2	100.0%	29.84	22.50	33.66	22.00	28.15	22.00	N/A	N/A	22.76	22.00	24.00
	LTE Band 66/4	100.0%	26.42	24.00	28.48	22.00	24.30	22.00	N/A	N/A	24.17	22.00	24.00
ANT F	NR n77 (Block A)	100.0%	21.27	16.00	26.82	18.00	23.00	18.00	N/A	N/A	22.48	18.00	24.70
	NR n77 (Block C)	100.0%	23.25	16.00	26.63	18.00	23.31	18.00	N/A	N/A	23.11	18.00	24.70
ANT G	NR n41	100.0%	26.25	18.00	27.01	18.00	21.78	18.00	N/A	N/A	23.86	18.00	18.00
ANT H	NR n41	100.0%	29.78	18.00	32.17	18.00	27.19	18.00	N/A	N/A	26.26	18.00	18.00

Notes:

1. 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}. and will not exceed P_{max}.
2. P_{max} (Maximum Tx power) is specified in the Tune-up procedure. The Maximum Allowed power is equal to P_{max} + 1 dBm device design uncertainty.
3. Please refer to UL SAR Report 14938215-S1 §9 for conducted output power measurements.

END OF REPORT