FCC 47 CFR § 2.1093
IEEE Std 1528-2013

SAR EVALUATION REPORT
(Part 0 : SAR CHARACTERIZATION)

FOR

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

MODEL NUMBER: SM-T636B, SM-T638B

FCC ID: A3LSMT636B

REPORT NUMBER: 4790406759-S1V1

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Prepared for
SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Prepared by

UL Korea, Ltd.

26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433

IAS ACCREDITED

Testing Laboratory

TL-637

Revision History

Rev.	Date	Revisions	Revised By
V1	7/26/2022	Initial Issue	--

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1. Attestation of SAR Characterization

Applicant Name	SAMSUNG ELECTRONICS CO.,LTD.
FCC ID	A3LSMT636B
Model Number	SM-T636B, SM-T638B
Applicable Standards	FCC 47 CFR § 2.1093 IEEE Std 1528-2013 Published RF exposure KDB procedures
Report type	Part.0 : SAR Characterization
Date Tested	6/13/2022 to 7/25/2022
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

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

2. Introduction

The equipment under test (EUT) is SAMSUNG Smartphone (FCC ID : A3LSMT636B), 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

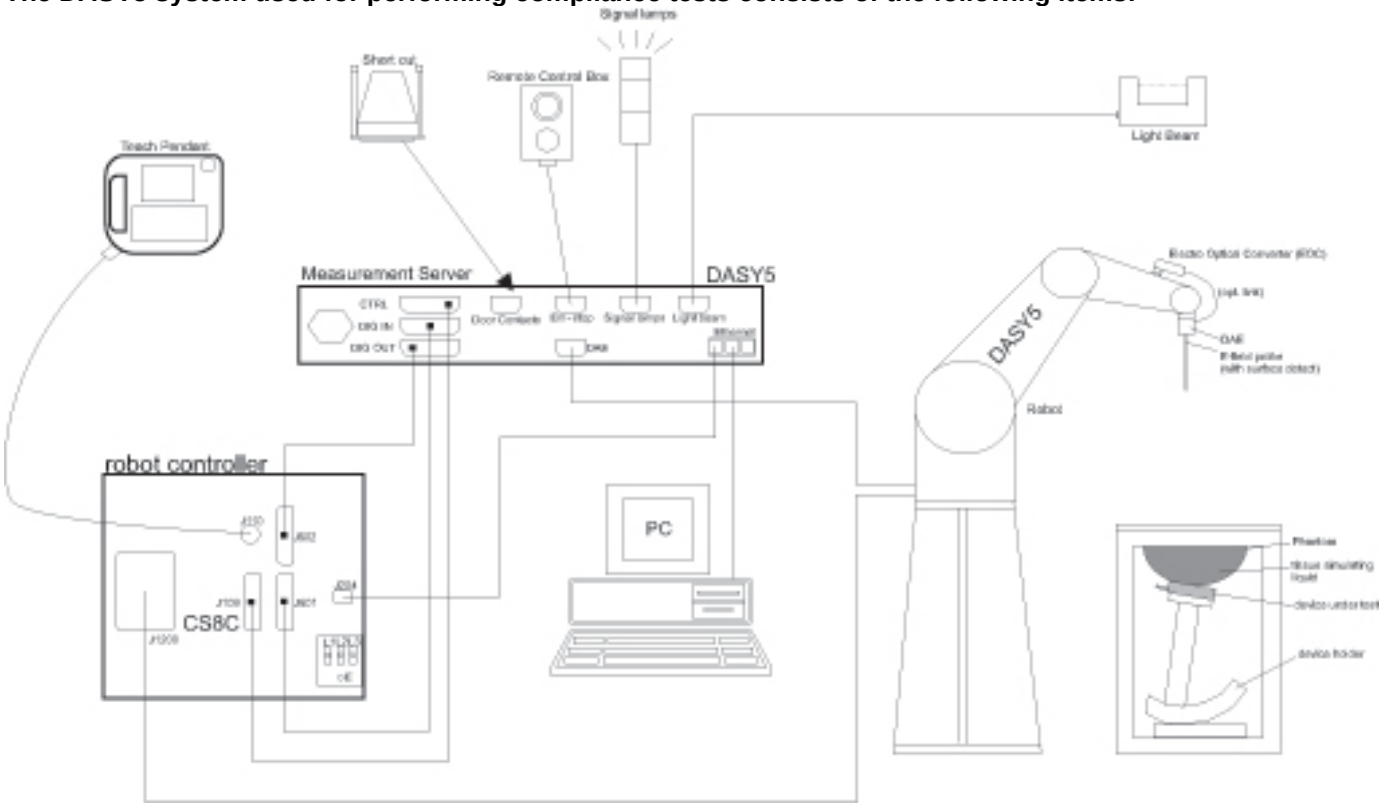
Suwon	
SAR 1 Room	SAR 6 Room
SAR 2 Room	SAR 7 Room
SAR 3 Room	SAR 8 Room
SAR 4 Room	SAR 9 Room
SAR 5 Room	

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

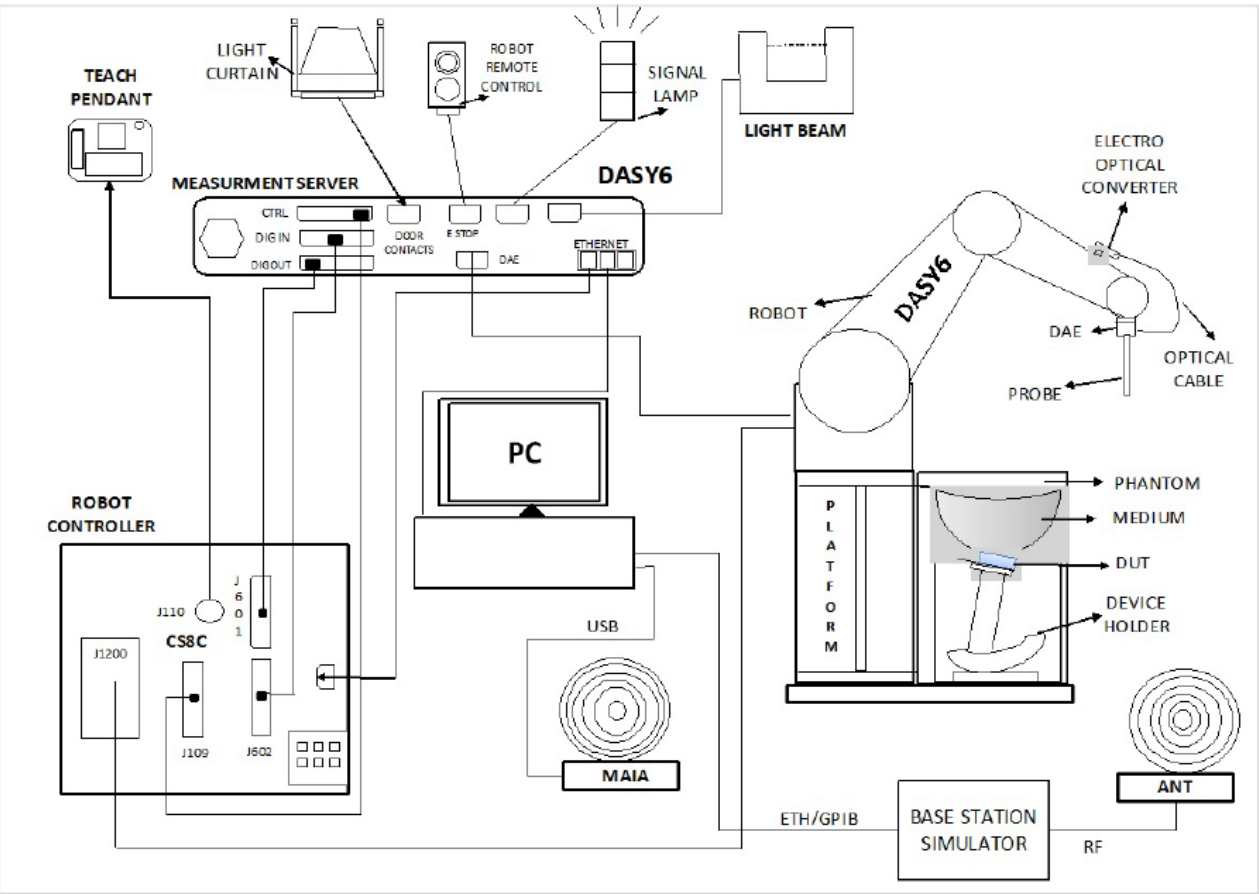
4.1. SAR Measurement System

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.

The DASY6 & 8 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 Win10 and the DASY6 or 8 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	8-6-2022
Network Analyzer	ROHDE & SCHWARZ	ZNB 20	102256	8-6-2022
Dielectric Assessment Kit	SPEAG	DAK-3.5	1196	**7-21-2022**
Dielectric Assessment Kit	SPEAG	DAKS-3.5	1133	3-28-2023
Dielectric Assessment Kit	SPEAG	DAKS_VNA R140	0060221	4-22-2023
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	LKM	DTM3000	3851	8-4-2022
Thermometer	LKM	DTM3000	3862	8-4-2022

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Agilent	N5181A	MY50145882	8-4-2022
MXG Analog Signal Generator	Keysight	N5181B	MY59100587	8-4-2022
MXG Analog Signal Generator	Keysight	N5173B	MY59101083	8-4-2022
Power Sensor	Keysight	U2000A	MY60180020	8-4-2022
Power Sensor	Agilent	U2000A	MY54260007	8-4-2022
Power Sensor	Agilent	U2000A	MY54260010	8-4-2022
Power Sensor	Keysight	U2000A	MY60490008	8-4-2022
Power Sensor	Keysight	U2000A	MY61060004	8-4-2022
Power Sensor	Keysight	U2000A	MY61010006	8-4-2022
Power Sensor	Keysight	U2000A	MY61010010	8-4-2022
Power Amplifier	EXODUS	AMP2027	1410025-AMP2027-10003	8-4-2022
Power Amplifier	EXODUS	AMP2027ADB	10002	8-4-2022
Directional Coupler	Agilent	772D	MY52180193	8-3-2022
Directional Coupler	H.P	778D	16133	8-3-2022
Directional Coupler	MINI-CIRCUITS	ZUDC20-183+	N/A	8-3-2022
Directional Coupler	MINI-CIRCUITS	ZUDC20-183+	N/A	8-3-2022
Low Pass Filter	MICROLAB	LA-15N	3943	8-3-2022
Low Pass Filter	FILTRON	L14012FL	1410003S	8-3-2022
Low Pass Filter	MICROLAB	LA-60N	3942	8-3-2022
Low Pass Filter	MINI-CIRCUITS	NLP-1200	VUU19301915	8-4-2022
Attenuator	KEYSIGHT	8491B/003	VE2017A0283	8-4-2022
Attenuator	KEYSIGHT	8491B/010	MY39271981	8-4-2022
Attenuator	KEYSIGHT	8491B/010	MY39272011	8-4-2022
Attenuator	KEYSIGHT	8491B/020	MY39271973	8-4-2022
Attenuator	MINI-CIRCUITS	BW-N3W5+	N/A	8-4-2022
Attenuator	MINI-CIRCUITS	BW-N10W5+	N/A	8-4-2022
Attenuator	MINI-CIRCUITS	BW-N10W5+	N/A	8-4-2022
Attenuator	MINI-CIRCUITS	BW-N20W5+	N/A	8-4-2022
Attenuator	MINI-CIRCUITS	BW-N20W5+	N/A	8-4-2022
E-Field Probe	SPEAG	EX3DV4	7651	5-30-2023
E-Field Probe	SPEAG	EX3DV4	7313	3-2-2023
E-Field Probe	SPEAG	EX3DV4	7314	5-31-2023
E-Field Probe	SPEAG	EX3DV4	7652	4-28-2023
E-Field Probe	SPEAG	EX3DV4	7376	7-30-2022
E-Field Probe	SPEAG	EX3DV4	7645	4-29-2023
E-Field Probe	SPEAG	EX3DV4	7646	3-29-2023
Data Acquisition Electronics	SPEAG	DAE4	1343	8-23-2022
Data Acquisition Electronics	SPEAG	DAE4	912	11-22-2022
Data Acquisition Electronics	SPEAG	DAE4	1671	5-31-2023
Data Acquisition Electronics	SPEAG	DAE4	1591	3-24-2023

Test Equipment (Continued)

Data Acquisition Electronics	SPEAG	DAE4	1670	6-7-2023
Data Acquisition Electronics	SPEAG	DAE4	1671	5-31-2023
Data Acquisition Electronics	SPEAG	DAE4	1447	3-25-2023
System Validation Dipole	SPEAG	CLA-13	1015	10-12-2022
System Validation Dipole	SPEAG	D750V3	1205	4-27-2023
System Validation Dipole	SPEAG	D835V2	4d174	3-17-2023
System Validation Dipole	SPEAG	D835V2	4d194	3-24-2023
System Validation Dipole	SPEAG	D1750V2	1125	2-24-2023
System Validation Dipole	SPEAG	D1900V2	5d190	11-24-2022
System Validation Dipole	SPEAG	D2450V2	939	7-21-2022
System Validation Dipole	SPEAG	D2450V2	960	3-24-2023
System Validation Dipole	SPEAG	D2600V2	1178	4-23-2023
System Validation Dipole	SPEAG	D5GHzV2	1184	12-3-2022
System Validation Dipole	SPEAG	D5GHzV2	1209	11-24-2022
Thermometer	Lutron	MHB-382SD	AH.91463	8-4-2022
Thermometer	Lutron	MHB-382SD	AH.50215	8-3-2022
Thermometer	Lutron	MHB-382SD	AH.50213	8-4-2022
Thermometer	Lutron	MHB-382SD	AH.45903	8-3-2022
Thermometer	Lutron	MHB-382SD	AK.18789	8-4-2022
Thermometer	Lutron	MHB-382SD	AK.12102	8-3-2022

Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMW500	150313	8-3-2022
Base Station Simulator	R & S	CMW500	150314	8-4-2022
Base Station Simulator	R & S	CMW500	162790	8-3-2022
Base Station Simulator	R & S	CMW500	169803	5-27-2023
Base Station Simulator	R & S	CMW500	169801	8-3-2022
Base Station Simulator	R & S	CMW500	169799	8-3-2022
Base Station Simulator	R & S	CMW500	169800	8-3-2022
Base Station Simulator	R & S	CMW500	169797	8-3-2022
Base Station Simulator	R & S	CMW500	169798	8-3-2022
UXM 5G Wireless Test Platform	Keysight	E7515B	MY59150850	12-13-2022
UXM 5G Wireless Test Platform	Keysight	E7515B	MY58460570	12-13-2022
UXM 5G Wireless Test Platform	Keysight	E7515B	MY57510596	8-6-2022

Note(s):

1. For System Validation Dipole, Calibration interval applied every 2 years according to referencing KDB 865664 guidance.
2. Refer to Appendix F that mentioned about justification for Extended SAR Dipole Calibrations. (for blue box items)
3. All equipments were used until Cal.Due data.

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 IV 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 12 FDD Band 13 FDD Band 17 FDD Band 25 FDD Band 26 TDD Band 41 FDD Band 66	QPSK 16QAM 64QAM 256QAM Rel. 16 Carrier Aggregation (1 Uplink and 4 Downlinks)		100% (FDD) 63.3% (TDD)
	Does this device support SV-LTE (1xRTT-LTE)? ☐ Yes ☒ No			
5G NR (Sub 6)	FDD Band n5 FDD Band n66	DFT-s-ODFM: ■ π/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM CP-ODFM: ■QPSK, 16QAM, 64QAM, 256QAM		100%
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20) 802.11ax		SISO : 99.4% (802.11b) MIMO : 96.4% (802.11g)
	5 GHz	802.11a 802.11n (HT20) & (HT40) 802.11ac (VHT20) & (VHT40) & (VHT80) 802.11ax (HE20) & (HE40) & (HE80)		SISO & MIMO : 96.7% (802.11a) 94.5% (802.11ac (VHT80)
	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 5.2 LE		76.7% (DH5)
NFC	13.56 MHz	Type A/B/F		100%

Notes

1. The Bluetooth protocol is considered source-based averaging. Bluetooth GFSK (DH5) was verified to have the highest duty cycle of 76.7% and was considered and used for SAR Testing.
2. Duty cycle for Wi-Fi is referenced from the DTS and UNII report.

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* 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 < FCC SAR limit after accounting for all device design related uncertainties
	SAR Char	Table containing P_{limit} for all technologies and bands

6. SAR Characterizations

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)	
Total Uncertainty	**1.0 dB**
SAR_regulatory_limit	**1.6 W/kg**
SAR_design_target	**1.0 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 Tablet, 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.

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

DSI and Corresponding Exposure Scenarios

RF exposure Scenarios	DSI No.	Descroption	KDB guide For SAR test
Standalone exposure Without triggering sensor	0	■Proximity sensor is not triggered even if Device was touched to user's body or hands. ■Proximity sensor is not triggered due to triggering distance.	KDB 616217 D04
Standalone exposure With triggering sensor	1	■Proximity sensor is triggered, when Device was touched to user's body or hands.	KDB 616217 D04

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)	Plimit Determination Scenarios
DSI = 0	The worst-case SAR exposure is determined as maximum SAR normalized To the limit among; 1. Standalone SAR measured at 16, 16 mm spacing for Rear, Edge1. Standalone SAR measured at 0 mm for Edge2 (Main Ant.1) 2. Standalone SAR measured at 14, 11 mm spacing for Rear, Edge1. Standalone SAR measured at 0 mm for Edge2 (Main Ant.2)
DSI = 1	1. Plimit is calculated based on Standalone SAR (1-g SAR) at 0 mm for Rear, Edge1 (Main Ant.1 & Main Ant.2)

Notes:

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

Main Ant.1)

P_{limit} = min{ P_{limit} corresponding to 1g Standalone SAR evaluation at 16 (Rear), 16 (Edge1) mm spacing, P_{limit} corresponding to 1g Standalone SAR evaluation at 0 mm for Edge2 surface}

Main Ant.2)

P_{limit} = min{ P_{limit} corresponding to 1g Standalone SAR evaluation at 14 (Rear), 11 (Edge1) mm spacing, P_{limit} corresponding to 1g Standalone SAR evaluation at 0 mm for Edge2 surface}

SAR Characterizations

Exposure condition		Standalone (Proximity Sensor off)	Standalone (Proximity Sensor On)	Pmax (Maximum tune-up Power) (dBm)
Averaging Volume		1g	1g	
test distance		16/16/0 mm - Main.1 14/11/0 mm - Main.2	0 mm	
DSI:		0	1	
RF Air Interface	Antenna	P_{limit} corresponding to 1.0 W/kg (SAR_design_target)		
GSM 850	Main.1	26.44	15.00	25.00
GSM 1900	Main.1	20.34	11.50	19.50
WCDMA Band II	Main.1	22.80	11.50	21.50
WCDMA Band IV	Main.1	23.26	12.00	22.00
WCDMA Band V	Main.1	26.60	14.00	24.00
LTE Band 2/25	Main.1	22.62	11.70	21.70
LTE Band 4/66	Main.1	23.95	12.00	22.00
LTE Band 5	Main.1	27.26	15.00	24.00
LTE Band 12	Main.1	28.75	14.00	24.00
LTE Band 13	Main.1	26.50	14.00	24.00
LTE Band 17	Main.1	28.75	16.00	24.00
LTE Band 26	Main.1	27.40	16.00	24.00
LTE Band 41	Main.2	23.98	12.00	21.50
NR n5	Main.1	27.68	16.00	24.00
NR n66	Main.1	24.29	11.50	22.80

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}.
2. 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.
3. All P_{limit} EFS and maximum tune up output Pmax levels entered in above Table correspond to average power levels after accounting for duty cycle in the case of LTE TDD modulation schemes.
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.
6. Some band’s DSIs were determined more conservative P_{limit} instead of calculation P_{limit} in Section.7.

7. SAR Test results for P_{limit} calculations

Standalone (Proximity sensor Off) (DSI = 0)

RF Exposure Conditions	band	mode	DSI	Ch.	Test distance (mm)	Test position	Output power (dbm)	meas SAR 1g (W/kg)	Plimit (dBm)	Minimim Plimit (dBm)
Standalone	GSM 850	GPRS 4 Slots	0	190	16	Rear	24.73	0.319	29.69	26.44
				190	16	Edge 1	24.73	0.166	32.53	
				190	0	Edge 2	24.73	0.674	26.44	
Standalone	GSM 1900	GPRS 2 Slots	0	661	16	Rear	18.91	0.714	20.37	20.34
				661	16	Edge 1	18.91	0.720	20.34	
				661	0	Edge 2	18.91	0.270	24.60	
Standalone	WCDMA Band II	Rel.99	0	9400	16	Rear	22.16	0.740	23.47	22.80
				9400	16	Edge 1	22.16	0.863	22.80	
				9400	0	Edge 2	22.16	0.378	26.39	
Standalone	WCDMA Band IV	Rel.99	0	1413	16	Rear	22.37	0.814	23.26	23.26
				1413	16	Edge 1	22.37	0.759	23.57	
				1413	0	Edge 2	22.37	0.516	25.24	
Standalone	WCDMA Band V	Rel.99	0	4183	16	Rear	24.13	0.407	28.03	26.60
				4183	16	Edge 1	24.13	0.120	33.34	
				4183	0	Edge 2	24.13	0.566	26.60	
Standalone	LTE Band 5	QPSK BW=10 RB 1/25	0	20525	16	Rear	23.91	0.317	28.90	27.26
				20525	16	Edge 1	23.91	0.133	32.67	
				20525	0	Edge 2	23.91	0.462	27.26	
Standalone	LTE Band 12/17	QPSK BW=10RB 1/49	0	23095	16	Rear	23.22	0.170	30.92	28.75
				23095	16	Edge 1	23.22	0.063	35.23	
				23095	0	Edge 2	23.22	0.280	28.75	
Standalone	LTE Band 13	QPSK BW=10RB 1/25	0	23230	16	Rear	23.61	0.253	29.58	26.50
				23230	16	Edge 1	23.61	0.120	32.82	
				23230	0	Edge 2	23.61	0.514	26.50	
Standalone	LTE Band 25	QPSK BW=20RB 1/0	0	26140	16	Rear	22.02	0.787	23.06	22.62
				26140	16	Edge 1	22.02	0.871	22.62	
				26140	0	Edge 2	22.02	0.384	26.18	
Standalone	LTE Band 26	QPSK BW=15RB 1/37	0	26865	16	Rear	23.70	0.203	30.63	27.40
				26865	16	Edge 1	23.70	0.115	33.09	
				26865	0	Edge 2	23.70	0.427	27.40	
Standalone	LTE Band 41	QPSK BW=20RB 1/99	0	39750	14	Rear	20.93	0.495	23.98	23.98
				39750	11	Edge 1	20.93	0.301	26.14	
				39750	0	Edge 2	20.93	0.224	27.43	
Standalone	LTE Band 66	QPSK BW=20RB 1/49	0	132072	16	Rear	22.49	0.715	23.95	23.95
				132072	16	Edge 1	22.49	0.684	24.14	
				132072	0	Edge 2	22.49	0.467	25.80	
Standalone	NR Band 5	DFT-s-OFDMQPSK BW=20RB 1/1	0	167300	16	Rear	24.10	0.221	30.66	27.68
				167300	16	Edge 1	24.10	0.113	33.57	
				167300	0	Edge 2	24.10	0.439	27.68	
Standalone	NR Band 66	DFT-s-OFDMQPSK BW=20RB 50/28	0	349000	16	Rear	22.94	0.732	24.29	24.29
				349000	16	Edge 1	22.94	0.492	26.02	
				349000	0	Edge 2	22.94	0.330	27.75	

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.

Standalone (Proximity sensor On) (DSI = 1)

RF Exposure Conditions	band	mode	DSI	Ch.	Test distance (mm)	Test position	Output power (dbm)	meas SAR 1g (W/kg)	Plimit (dBm)	Minimim Plimit (dBm)
Standalone	GSM 850	GPRS 4 Slots	1	128	0	Rear	14.89	0.216	21.55	21.55
				128	0	Edge 1	14.89	0.096	25.07	
Standalone	GSM 1900	GPRS 2 Slots	1	661	0	Rear	10.98	0.793	11.99	11.99
				661	0	Edge 1	10.98	0.544	13.62	
Standalone	WCDMA Band II	Rel.99	1	9400	0	Rear	12.30	0.964	12.46	12.46
				9400	0	Edge 1	12.30	0.726	13.69	
Standalone	WCDMA Band IV	Rel.99	1	1413	0	Rear	12.53	0.898	13.00	13.00
				1413	0	Edge 1	12.53	0.683	14.19	
Standalone	WCDMA Band V	Rel.99	1	4183	0	Rear	13.84	0.317	18.83	18.83
				4183	0	Edge 1	13.84	0.157	21.88	
Standalone	LTE Band 5	QPSK BW=10 RB 25/12	1	20525	0	Rear	14.59	0.315	19.61	19.61
				20525	0	Edge 1	14.59	0.189	21.83	
Standalone	LTE Band 12	QPSK BW=10 RB 25/12	1	23095	0	Rear	13.20	0.231	19.56	19.56
				23095	0	Edge 1	13.20	0.151	21.41	
Standalone	LTE Band 13	QPSK BW=10 RB 25/25	1	23230	0	Rear	13.69	0.211	20.45	20.45
				23230	0	Edge 1	13.69	0.173	21.31	
Standalone	LTE Band 17	QPSK BW=10 RB 25/12	1	26140	0	Rear	15.14	0.307	20.27	20.27
				26140	0	Edge 1	15.14	0.180	22.59	
Standalone	LTE Band 25	QPSK BW=20 RB 50/24	1	26140	0	Rear	12.30	0.698	13.86	13.12
				26140	0	Edge 1	12.30	0.827	13.12	
Standalone	LTE Band 26	QPSK BW=15 RB 36/20	1	26865	0	Rear	15.40	0.484	18.55	18.55
				26865	0	Edge 1	15.40	0.236	21.67	
Standalone	LTE Band 41	QPSK BW=20 RB 1/99	1	39750	0	Rear	12.33	0.793	13.34	13.34
				39750	0	Edge 1	12.33	0.150	20.57	
Standalone	LTE Band 66	QPSK BW=20 RB 50/24	1	132072	0	Rear	12.17	0.803	13.12	13.12
				132072	0	Edge 1	12.17	0.557	14.71	
Standalone	NR Band 5	DFT-s-OFDM QPSK BW=20 RB 1/1	1	167300	0	Rear	15.90	0.417	19.70	19.70
				167300	0	Edge 1	15.90	0.235	22.19	
Standalone	NR Band 66	DFT-s-OFDM QPSK BW=20 RB 50/28	1	349000	0	Rear	12.08	0.826	12.91	12.91
				349000	0	Edge 1	12.08	0.601	14.29	

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