

FCC 47 CFR § 2.1093 IEEE Std 1528-2013

SAR EVALUATION REPORT (Part 1 : Test in Static Transmission Condition)

FOR

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

MODEL NUMBER: SM-A256E/DSN, SM-A256E/N

FCC ID: A3LSMA256E

REPORT NUMBER: 4791131433-S1V2

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

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Testing Laboratory

TL-637

Revision History

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V1	1/9/2024	Initial Issue	
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1. Attestation of Test Results

Applicant Name		SAMSUNG ELECTRONICS CO.,LTD.				
FCC ID		A3LSMA256E				
Model Number		SM-A256E/DEN,	SM-A256E/N			
Applicable Standards		FCC 47 CFR § 2.1093 IEEE Std 1528-2013 Published RF exposure KDB procedures				
			SAR Limi	its (W/Kg)		
Exposure Category		Peak spatial-average (1g of tissue)				
General population / Uncontrolled exposure		1.6				
	141	Equipment Class - The Highest Reported SAR (W/kg)				
RF Exposure Conc	litions	PCE	DTS	NII	DSS	
Head		0.10	0.10	0.47	0.06	
Body-worn		0.16	0.13	0.39	0.02	
Hotspot		0.36	0.34	0.67	0.08	
	Head	0.60	0.19	0.60	0.60	
Simultaneous TX	Body-worn	0.57	0.30	0.57	0.57	
	Hotspot	1.06	0.68	1.06	1.06	
Date Tested		12/29/2023 to 1/4/2024				
Test Results		Pass				
This supplementar	v report is a report ev	aluating the bandwi	dth of NR Band n66	Sup to 40MHz whic	ch is not covered	

This supplementary report is a report evaluating the bandwidth of NR Band n66 up to 40MHz, which is not covered in 14938215-S1V5 FCC Report_SAR.

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:	
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Operations Leader	Laboratory Engineer	
UL Korea, Ltd. Suwon Laboratory	UL Korea, Ltd. Suwon Laboratory	

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2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE STD 1528-2013, ANSI C63.26-2015 the following FCC Published RF exposure <u>KDB</u> procedures:

- o 447498 D04 Interim General RF Exposure Guidance v01
- o 648474 D04 Handset SAR v01r03
- o 690783 D01 SAR Listings on Grants v01r03
- o 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 941225 D05 SAR for LTE Devices v02r05
- o 941225 D06 Hotspot Mode v02r01
- 971168 D01 Power Meas License Digital System v03r01

In addition to the above, the following information was used:

- <u>TCB workshop</u> October, 2016; RF Exposure Procedures (DUT Holder Perturbations)
- o <u>TCB workshop</u> April, 2019; RF Exposure Procedures (Tissue Simulating Liquids (TSL))
- o TCB workshop October, 2020; 5G RFX Policies (Intra-band and Inter-band NSA-EN-DC evaluation)
- o <u>TCB workshop</u> April, 2022; RF Exposure Procedures (5G NR FR1 Measurement)

3. Facilities and Accreditation

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

Suwon	
SAR 8 Room	

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.

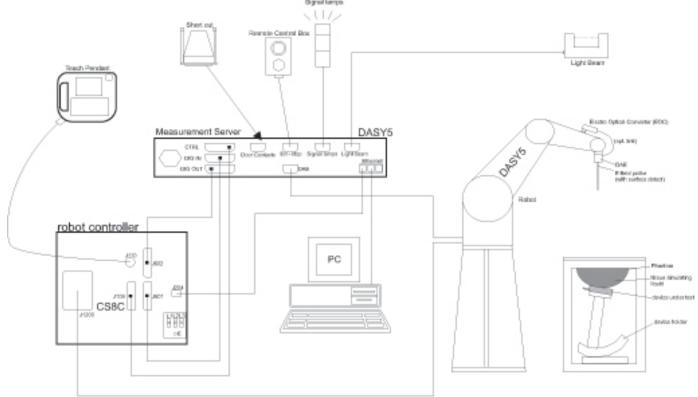
The full scope of accreditation can be viewed at <u>https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf.</u>

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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, ADconversion, 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.

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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.

1	Area Scan Para	meters extracted f	from KDB 865	664 D01	SAR Meas	urement 100 MI	Iz to 6 GHz	
- [

	\leq 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	$5 \pm 1 \text{ mm}$	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5 \text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^{\circ} \pm 1^{\circ}$	$20^\circ\pm1^\circ$
	\leq 2 GHz: \leq 15 mm 2 - 3 GHz: \leq 12 mm	$\begin{array}{l} 3-4 \ \mathrm{GHz:} \leq 12 \ \mathrm{mm} \\ 4-6 \ \mathrm{GHz:} \leq 10 \ \mathrm{mm} \end{array}$
Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area}	When the x or y dimension o measurement plane orientation the measurement resolution r x or y dimension of the test d measurement point on the test	on, is smaller than the above, must be \leq the corresponding levice with at least one

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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.

			\leq 3 GHz	> 3 GHz		
Maximum zoom scan spatial resolution Δx_{Zoom} , Δy_{Zoom}			$\leq 2 \text{ GHz}: \leq 8 \text{ mm}$ 2 - 3 GHz: $\leq 5 \text{ mm}^*$	$3 - 4 \text{ GHz:} \le 5 \text{ mm}^*$ $4 - 6 \text{ GHz:} \le 4 \text{ mm}^*$		
	uniform grid: $\Delta z_{Zoom}(n)$		\leq 5 mm	$\begin{array}{l} 3-4 \; \mathrm{GHz:} \leq 4 \; \mathrm{mm} \\ 4-5 \; \mathrm{GHz:} \leq 3 \; \mathrm{mm} \\ 5-6 \; \mathrm{GHz:} \leq 2 \; \mathrm{mm} \end{array}$		
Maximum zoom scan spatial resolution, normal to phantom surface	graded	$\Delta z_{Z_{com}}(1)$: between 1 st two points closest to phantom surface	\leq 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm		
	grid	Δz _{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 <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.

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.

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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
Netw ork Analyzer	Agilent	E5071C	MY 46522054	7-24-2024
Dielectric Assessment Kit	SPEAG	DAK-12	1158	9-20-2024
Shorting block	SPEAG	DAK-12 Short	SM DAK 220 AD	N/A
Thermometer	LKM	DTM3000	3851	7-25-2024
Thermometer	LKM	DTM3000	3862	7-25-2024

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Keysight	N5173B	MY59101083	7-27-2024
Pow er Sensor	KEYSIGHT	U2000A	MY 60490008	7-25-2024
Pow er Sensor	KEYSIGHT	U2000A	MY60160004	7-25-2024
Pow er Amplifier	EXODUS	AMP2027ADB	10002	1-6-2024
Directional Coupler	KRYTAR	100318010	215542	1-5-2024
Low Pass Filter	SPEAG	WLKX10-11000-13640-21000-60TS	1	7-25-2024
Attenuator	KEYSIGHT	8491B/010	MY 39272011	7-25-2024
Attenuator	KEYSIGHT	8491B/020	MY 39272302	7-24-2024
Attenuator	KEYSIGHT	8491B/003	MY 39272275	7-25-2024
E-Field Probe	SPEAG	EX3DV4	7645	9-20-2024
Data Acquisition Electronics	SPEAG	DA E4	1468	8-24-2024
System Validation Dipole	SPEAG	D1750V2	1125	11-30-2024
Thermometer	Lutron	MHB-382SD	AK.12102	7-31-2024

Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
UXM 5G Wireless Test Platform	KEYSIGHT	E7515B	MY 57510596	7-27-2024
Radio Communication Test Station	Anritsu	MT8000A	6272466165	10-18-2024
Radio Communication Analyzer	Anritsu	MT8821C	6161094351	11-30-2024

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. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be \leq 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

5.1. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 2, Clause 4.4.3 in IEC Guide 115:2021.

6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Refer to	Appendix A.					
Back Cover	🛛 The I	In the Back Cover is not removable.					
Battery Options	🛛 The i	echargeable battery is	not user accessible				
Wireless Router (Hotspot)		Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices. ⊠ Mobile Hotspot (Wi-Fi 2.4 GHz)					
	🛛 Mobi	⊠ Mobile Hotspot (Wi-Fi 5.2 GHz , Wi-Fi 5.8 GHz)					
Wi-Fi Direct	Wi-Fi Di	Wi-Fi Direct enabled devices transfer data directly between each other					
	⊠ Wi-Fi Direct (Wi-Fi 2.4 GHz)						
	⊠ Wi-Fi Direct (Wi-Fi 5.2 GHz_UNII-1, Wi-Fi 5.8 GHz_UNII-3)						
Test Sample Information							
	No.	S/N	Notes				
	1	R3CW50B175N	WWAN Conducted				
	2	RZCWB07LW5E	SAR				
	3	RZCWB07LY6Z	SAR				

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6.2. Wireless Technologies

Wireless technologies	Frequency bands	Opera	ting mode	Duty Cycle used for SAR testing
GSM	850 1900 Does this device support [Voice (GMSK) GPRS (GMSK) EGPRS (8PSK) DTM (Dual Transfer Mode)?	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 □ Yes ⊠ No	GSM Voice: 12.5% (E)GPRS: 1 Slot: 12.5% 2 Slots: 25% 3 Slots: 37.5% 4 Slots: 50%
W-CDMA (UMTS)	Band II Band IV Band V	UMTS Rel. 99 (Voice & Da HSDPA (Rel. 5) HSUPA (Rel. 6) DC-HSDPA (Rel. 8) HSPA+ (Rel.7) DL only	100%	
LTE	FDD Band 2 FDD Band 4 FDD Band 5 FDD Band 12 FDD Band 13 FDD Band 17 FDD Band 26 TDD Band 41 ¹ FDD Band 66	QPSK 16QAM 64QAM 256QAM Rel. 15 Carrier Aggregatio	n (1 Uplink and 4 Downlinks)	100% (FDD) 63.3% (TDD)
5G NR (Sub 6)	Does this device support S NR Band n5 NR Band n26 NR Band n41 NR Band n66 NR Band n77	SV-LTE (1xRTT-LTE)? □ Ye DFT-s-ODFM: ■ π/2 BPSK, QPSK, 16Q/ CP-ODFM: ■QPSK, 16QAM, 64QAM	am, 64qam, 256qam	100%
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20) 802.11ac (VHT20)		97.36% (802.11b)
	5 GHz	802.11a 802.11n (HT20), 802.11n 802.11ac (VHT20), 802.11 802.11ac (VHT80)		90.94% (802.11a) 89.13% (802.11n 40MHz BW) 92.05% (802.11ac 80MHz BW)
	· · · ·	oands 5.60 ~ 5.65 GHz? ⊠ ໂ		
		Band gap channel(s)? ⊠ Yes	S 🗆 No	
Bluetooth	2.4 GHz	Version 5.3 LE		77.50%
NFC	13.56 MHz	Type A/B/F and ISO15693		100%

Notes:

1. The Bluetooth protocol is considered source-based averaging. Bluetooth GFSK (DH5) was verified to have the highest duty cycle of 77.5% and was considered and used for SAR Testing.

2. Measured Duty Cycle is not required due to SAR test exemption.

6.3. Nominal and Maximum Output Power

KDB 447498 sec.4.1. at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit

Maximum allowed output power means that Pmax or PLimit + 1dB device uncertainty for each DSI.

NR-Sub6 Bands

		Maximum allow ed output pow er (dBm)							
RF Air interface	Antenna	Mode				Plimit			
			Pmax	RSI = 0 (Free)	RSI = 1 (Earjack)	RSI = 2 (Grip)	RSI = 3 (Hotspot)	RSI = 4 (RCV)	
NR Band n66	Ant.B	DFT-s-OFDM QPSK	24.50	22.00	22.00	22.00	22.00	22.00	

6.4. NR (Sub 6GHz) SAR Test and Reporting Considerations

Item	Descriptior	scription												
Frequency range,							Frequency	/ range: 1710 -	1780 MHz					
Channel Bandwidth,	Band n66						С	hannel Bandwid	lth					
Numbers and Frequencues		100 MHz	90 MHz	80 MHz	70 MHz	60 MHz	50 MHz	40 MHz	30 MHz	25 MHz	20 MHz	15 MHz	10 MHz	5 MHz
	Low							346000/ 1730	345000/ 1725	344500/ 1722.5	344000 /1720	343500 /1717.5	343000 /1715	342500 /1712.5
	Mid							349000/ 1745	349000/ 1745	349000/ 1745	349000/ 1745	349000/ 1745	349000/ 1745	349000/ 1745
	High							352000/ 1760	353000/ 1765	353500/ 1767.5	354000 /1770	354500 /1772.5	355000 /1775	355500 /1777.5
SCS	NR FDD Bands : 15 kHz													
Modulations Supported in UL			D	FT-s-OFDM:	π/2 BPSK, C	PSK, 16QA	vi, 64qam, 25	6QAM & CP-(OFDM: QPSł	K, 16QAM, 64	qam, 256qa	М		
A-MPR (Additional MPR) disabled for SAR Testing?		Yes												
EN-DC Carrier Aggregation Possi	ble Combina	tions												
LTE Anchor Bands for NR Band n66							LTE Band	2/5/12/13						

Notes:

- 1. SAR test for NR bands and LTE anchor Bands were performed separately due to limitations in SAR probe calibration factors.
- And, Due to test setup limitations, SAR testing for NR was performed using test mode software to establish the connection.
- 2. NR configurations of SAR test were determined according to Section 5.2 of KDB 941225 D05.

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7. RF Exposure Conditions (Test Configurations)

Refer to Appendix A for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

Wireless technologies	RF Exposure Conditions	Antenaa	DUT-to-User Separation	Test Position	Antenna-to- edge/surface	SAR Required	Note
				Left Touch	N/A	Yes	
	Head	All Antennas	0 mm	Left Tilt (15°)	N/A	Yes	
	Head	An Antennas	0 mm	Right Touch	N/A	Yes	
				Right Tilt (15°)	N/A	Yes	
	Body-worn &	All Antennas	15 mm	Rear	N/A	Yes	
	Hotspot	An Antennas	15 1111	Front	N/A	Yes	
		Ant.B	10 mm	Rear	< 25 mm	Yes	
				Front	< 25 mm	Yes	
WWAN	Linter et			Тор	> 25 mm	No	1
VVVAIN	Hotspot			Left	< 25 mm	Yes	
				Bottom	< 25 mm	Yes	
				Right	> 25 mm	No	1
				Rear	Refer to notes 2 & 3		
				Front			
	Product Specific	All Main Antennas	0 mm	Тор			
	10-g	All Main Antennas	U IIIII	Left			
				Bottom			
				Right			

Note(s):

1. SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR.

2. For Phablet devices: When hotspot mode applies, Product specific 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.

3. For Phablet devices: When hotspot mode applies and power reduction applies to hotspot mode, Product specific 10-g SAR is required for each test position that has and adjusted SAR to maximum power that is > 1.2 W/kg.

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8. Dielectric Property Measurements & System Check

8.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18° C to 25° C and within $\pm 2^{\circ}$ C of the temperature when the tissue parameters are characterized.

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 - 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Target Frequency (MHz)	Н	ead	Body		
rarger requency (Mirz)	ε _r	σ (S/m)	ε _r	σ (S/m)	
150	52.3	0.76	61.9	0.80	
300	45.3	0.87	58.2	0.92	
450	43.5	0.87	56.7	0.94	
835	41.5	0.90	55.2	0.97	
900	41.5	0.97	55.0	1.05	
915	41.5	0.98	55.0	1.06	
1450	40.5	1.20	54.0	1.30	
1610	40.3	1.29	53.8	1.40	
1800 – 2000	40.0	1.40	53.3	1.52	
2450	39.2	1.80	52.7	1.95	
3000	38.5	2.40	52.0	2.73	
5000	36.2	4.45	49.3	5.07	
5100	36.1	4.55	49.1	5.18	
5200	36.0	4.66	49.0	5.30	
5300	35.9	4.76	48.9	5.42	
5400	35.8	4.86	48.7	5.53	
5500	35.6	4.96	48.6	5.65	
5600	35.5	5.07	48.5	5.77	
5700	35.4	5.17	48.3	5.88	
5800	35.3	5.27	48.2	6.00	

SAR test were performed in All RF exposure conditions using Head tissue according to TCB workshop note of April. 2019.

IEEE Std 1528-2013

Refer to Table 3 within the IEEE Std 1528-2013

Dielectric Property Measurements Results:

SAR 8 Room

Date	Freq. (MHz)		Lic	quid Parameters	Measured	Target	Delta (%)	Limit ±(%)
	Head 1750 2024-01-02 Head 1710	e'	40.9000	Relative Permittivity (ε_r):	40.90	40.08	2.03	5
		e"	13.7200	Conductivity (σ):	1.34	1.37	-2.48	5
2024 01 02		e'	40.9100	Relative Permittivity (ε_r):	40.91	40.15	1.90	5
2024-01-02		e"	13.8300	Conductivity (σ):	1.31	1.35	-2.33	5
Head 178	Hoad 1780	e'	40.8800	Relative Permittivity (ε_r):	40.88	40.04	2.10	5
	Tieau 1700	e"	13.6700	Conductivity (σ):	1.35	1.39	-2.38	5

8.2. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
 For 5 GHz band The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- Distance between probe sensors and phantom surface was set to 2.5 mm.
 For 5 GHz band Distance between probe sensors and phantom surface was set to 1.4 mm
- The dipole input power (forward power) was 100 mW.
- The results are normalized to 1 W input power.

Reference Target SAR Values

The reference SAR values can be obtained from the calibration certificate of system validation dipoles.

System Dipole	System Dipole Serial No. Cal. Date		Cal. Due Date	Target SAR Values (W/kg)		
System Dipole			Cal. Due Dale	1g/10g	Head	
D1750V2	D1750V2 1125 11-30-2022		11-30-2024	1g	37.40	
D1750V2	1125	11-30-2022	11-30-2024	10g	19.70	

Note(s):

1. For System Validation Dipole, Calibration interval applied every 2 years according to referencing KDB 865664 guidance.

System Check Results

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within 10% of the manufacturer calibrated dipole SAR target.

SAR 8 Room

	System	Dipole	T.S. Liquid		Measured Results		Target	Delta	
Date Tested	Туре	Serial #			Zoom Scan to 100 mW	Normalize to 1 W	(Ref. Value)	±10 %	Plot No.
1-2-2024	D1750V2	1125	Head	1g	3.72	37.2	37.40	-0.53	1
1-2-2024	1-2-2024 D1750V2 1125		Tieau	10g	2.05	20.5	19.70	4.06	I

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9. Conducted Output Power Measurements

9.1. NR (Sub 6GHz)

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS 138.521-1 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS138.521-1.

Modulation		MPR (dB)					
	Edge RB allocations	Outer RB allocations	Inner RB allocations				
DFT-s-OFDM PI/2 BPSK	≤ 3.5 ¹	≤ 0.2 ¹					
DET-S-OFDIVIENZ BESK	≤ 0).5 ²	0 ²				
DFT-s-OFDM QPSK	vi	1	0				
DFT-s-OFDM 16 QAM	vi	2	≤ 1				
DFT-s-OFDM 64 QAM		≤ 2.5					
DFT-s-OFDM 256 QAM							
CP-OFDM QPSK	vi	3	≤ 1.5				
CP-OFDM 16 QAM	vi	3	≤ 2				
CP-OFDM 64 QAM		≤ 3.5					
CP-OFDM 256 QAM		≤ 6.5					
NOTE 1: Applicable for UE							
		2BPSK and if the IE power					
1		used for UL transmission f	or bands n40, n41, n77,				
	e reference power of 0dB						
		or in TDD mode in bands o					
		PSK is set to 0 and if more					
radio frame are u	ised for UL transmission fo	vr bands n40, n41, n77, n7	8 and n/9.				

Table 6.2.2.3-1: Maximum Power Reduction (MPR) for Power 3

The allowed A-MPR values specified below in Table 6.2.3.3.1-1 of 3GPP TS138.521-1 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01"

Table 6.2.3.3.1-1: Additional maximun	power reduction (A-MPR)
---------------------------------------	-------------------------

Network Signalling label	Requirements (subclause)	NR Band	Channel bandwidth (MHz)	Resources Blocks (<i>N</i> RB)	A-MPR (dB)
NS_01		Table 5.2-1	5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100	Table 5.3.2-1	N/A

Uplink RB allocations were used to Table 6.1-1 of the 3GPP TS 138.521-1.

				RB allocation										
Channel Bandwidth	SCS(kHz)	OFDM	Edge_Full_Left	Edge_Full_Right	Edge_1RB_Left	Edge_1RB_Right	Outer_Full	Inner_Full	Inner_1RB_Left	Inner_1RB_Right				
	15	DFT-s CP	2@0	2@23	1@0	1@24	25@0	12@6	1@1	1@23				
5MHz	30	DFT-s	2@0 2@0	2@23 2@9	1@0 1@0	1@24 1@10	25@0 10@0	13@6 5@21	1@1 1@1	1@23 1@9				
	30	CP	2@0	2@9	1@0	1@10	11@0	5@21	1@1	1@9				
	60	DFT-s	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
	00	CP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
	15	DFT-s	2@0	2@50	1@0	1@51	50@0	25@12	1@1	1@50				
		CP	2@0	2@50	1@0	1@51	52@0	26@13	1@1	1@50				
10MHz	30	DFT-s	2@0	2@22	1@0	1@23	24@0	12@6	1@1	1@22				
		CP	2@0	2@22	1@0	1@23	24@0	12@6	1@1	1@22				
	60	DFT-s CP	2@0	2@9	1@0	1@10 1@10	10@0	5@2 ¹ 5@2 ¹	1@1	1@9 1@9				
		DFT-s	2@0 2@0	2@9 2@77	1@0	1@78	11@0 75@0	36@18	1@1 1@1	1@77				
	15	CP	2@0	2@77	1@0	1@78	79@0	39@19 ¹	1@1	1@77				
		DFT-s	2@0	2@36	1@0	1@37	36@0	18@9	1@1	1@36				
15MHz	30	CP	2@0	2@36	1@0	1@37	38@0	19@9	1@1	1@36				
		DFT-s	2@0	2@16	1@0	1@17	18@0	9@4	1@1	1@16				
	60	CP	2@0	2@16	1@0	1@17	18@0	9@4	1@1	1@16				
	15	DFT-s	2@0	2@104	1@0	1@105	100@0	50@25	1@1	1@104				
		CP	2@0	2@104	1@0	1@105	106@0	53@26	1@1	1@104				
20MHz	30	DFT-s	2@0	2@49	1@0	1@50	50@0	25@12	1@1	1@49				
		CP	2@0	2@49	1@0	1@50	51@0	25@121	1@1	1@49				
	60	DFT-s	2@0	2@22	1@0	1@23	24@0	12@6	1@1	1@22				
		CP	2@0	2@22	1@0	1@23	24@0	12@6	1@1	1@22				

SAR test exclusion can be applied for testing overlapping NR bands as follows:

- a) The maximum output power, including tolerance, for the smaller band must be ≤ the larger band to qualify for the SAR test exclusion.
- b) The channel bandwidth and other operating parameters for the smaller band must be fully supported by the larger band.

 \sim

Procedures used to establish power measurement for NR Bands

Switching to NSA mode or SA mode

SYSTem:APPLication[:NAME]

- Click the "Utility" button in the right of Test application screen
- Select "5G NR NSA" in the "TA Mode Switch" for NSA mode
- Select "5G NR Standalone" in the "TA Mode Switch" for SA mode

 Reysigne Coroozoox rese Applica 	don manework - 50 Mit (15.20.4.412	.0				-
		Bm/15kHz -19.8	TDD n78 85 dBm/BW	SA TDD n78 19.85 dBm/BW	NSA TDD n78 -19.85 dBm/BW	Main
OFF BW:	20 MHz 66786 132322 BW: EARFCN: D OFF U	10 MHz 300 18300 OFF Freq:	100 MHz D: 3350.01 U: 3350.01 OFF		BW: 100 MHz Freq: D: 3549.99 OFF U: 3549.99	Cell
Config Identities N	-60.00 dBm/15kHz -29.21	dBm/20MHz	Test Mode 🛛 VE E	Enquiry Incl	Pair UL/DL Freq	Conn
Frequency / Duplex Mode	FDD • 66		requency Setting Method:	EARFCN		Function T
Downlink Bandwidth:	20 MHz	-	Iplink Bandwidth:	20 MHz	· · · · · · · · · · · · · · · · · · ·	NR S-C
Downlink EARFCN:	66786 2145.000000	MHz 🔻 L	lplink EARFCN: Il Cat de: Auto 🔻	132322	1745.000000 MHz 🔻	Aggregat
Simulated Path Loss:		dB	de: Auto ▼			Mob
Reference Signal Power (SIB2):	78.00 18		vclic Prefix:	Normal	•	Resou Allocat
TDD Specific Configuration Frame Configuration:			pecial Subframe Configuration		3 2 Symbols	Link to X-Ap
RF Config DL Antenna Configuration:		pected Input Power Control:	Auto 🔻	RFIO Group 0		Ut
Static Channel Model:						Ар
System Scheduling Cell			BLER/Tput Assisted	Tx Meas		More
BSE:CONFig:LTE[:SELected]:RR	J:PMAXEUTRA:VALue	(E	igure 1-1)		Local Q Search	l
Keysight C8700200A Test Application	ion Framework - 56 NR (15 26 4 412					- 0
NR SA NI SA F	CC n78 5A S	CC n78 N3	SCC n78 NAL SA	SCC n78		Utility
-19.85 - BW: Freq: D: OFF U:	dBm/BW 100 MHz 3350.01 3350.01 0FF U:	100 MHz 3350.01 BW: Freq:	85 dBm/BW 100 MHz D: 3350.01 U: 3350.01			Export / Imp
Config Impairments	Message Summary Error					
Config Mode: Manual 🔻						
5G Cell 1 (P						
Duplex Mode TDD Freq Range / Band FR1 / n78	▼ TDD ▼ TDD ▼ FR1/n78 ▼ FR1/n78					Pre
DL Bandwidth 100 MHz SCS Common 1 (30 kHz)	▼ 100 MHz ▼ 100 MHz ▼ 1 (30 kHz) ▼ 1 (30 kHz					◄ Preference
DL ARFCN 623334 DL Freq (MHz) ▼ JL Power BW ▼ -19.85	∟ 623334 ∟ 623334 3350.01 3350.01 3350.01 -19.85 -19.85	L 623334 L 3350.01 -19.85			TA Mode Switch	Path Lo
Input Power -19.65	-19.85 -19.85 -30	-30				Log Sess
DL MIMO Config Custom (2x2) 🔻 Custom (2x2) 🔻 Custom (2	2x2) ▼ Custom (2x2) ▼			Select the Test Application	Con
) ▼ Custom (2x2) ▼ Custom (2x2) ▼ ▼ Custom (1x1) ▼ Custom (2x2) ▼ Custom (1x1) ▼ Custom (2x2) ▼ Cell On Cell □	Ix1) ▼ Custom (1x1) ▼		Ν	Select the Test Application Mode you want, then click Apply.	TA MO
DL MIMO Config Custom (2x2) UL MIMO Config 1x1	Custom (1x1) Custom (Ix1) ▼ Custom (1x1) ▼	ions:	1 1	Mode you want, then click Apply: Fest Application Mode:	TA Mc Swi
DL MIMO Config Custom (2x2 UL MIMO Config 1x1	Custom (1x1) Custom (Ix1) ▼ Custom (1x1) ▼ On Cell On		5	Aode you want, then click Apply. Fest Application Mode: IG NR NSA v IG NR NSA	TA Mo Swi
DL MIMO Config Custom (2x2 UL MIMO Config 1x1 Cell On	Custom (1x1) Custom (Ix1) ▼ Custom (1x1) ▼ Dn Cell On NR Cell Locat +4	<u>,</u>	5	Mode you want, then click Apply. Fest Application Mode: IG NR NSA v	TA Mc Swi

(Figure 1-2)

CW

NSA Mode

• Select operating band, BW and Channel for LTE (LTE -> Cell -> Config)

Keysight C8700200A Test Application	on Framework – 5G NR (15.26.4.4121)			– 🗆 ×
-60.00 dl BW: EARFCN:D:	DD 66 har/18+ht 20 MHz 66786 132322 OFF U: 18300 OFF	NSA TDD n78 IN2 NSA TDD n -19.85 dBm/BW BW: 19.85 dBm/BV BW: 100 M BW: D: 3350.01 U: 3350.01 OFF U: 3450.00	/ -19.85 dBm/BW HHz BW: 100 MHz 00 Freq: D: 3549.99	Main Cell On
	Cell Reconfig			Connect►
Cell Power: Frequency / Duplex Mode Duplex Mode / Band:	60 00 dBm/15kHz -29.21 dBm/20MHz FDD ▼ 66	Test Mode VE Enquiry Incl Frequency Setting Method: EARFCN	Pair UL/DL Freq	Function Test►
Downlink Bandwidth: Downlink EARFCN:	20 MHz V 66786 2145.000000 MHz V	Uplink Bandwidth: 20 MHz Uplink EARFCN: 132322	▼ 1745.000000 MHz ▼	NR S-Cell Aggregation
		Cell Cat Mode: Auto	MH2 ¥	Mobility►
Simulated Path Loss: Reference Signal Power (SIB2):	78.00 dB 18 dBm	Cyclic Prefix: Normal	•	Resource Allocation
TDD Specific Configuration Frame Configuration:		Special Subframe Configuration: 6	9 3 2 Symbols	Link to X-Apps
RF Config DL Antenna Configuration: Static Channel Model:	1 x 1 V Expected Input Power Cor Static MIMO V	ntrol: Auto 🔻 RFIO Group	0	Utility►
				Apply
System Scheduling Cell BSE:CONFig:LTE[:SELected]:RRC	PHY MAC/RLC/PDCP RRC/NAS UE Info	IMS BLER/Tput Assisted Tx Meas	Local Q. Search	More 1/2►

(Figure 2-1)

• Select operating band, SCS, BW and Channel for NR (NR -> Cell -> Config)

Keysight C8700200A Test A	pplication Framework –	5G NR (15.26.4.4121)						– 🗆 X
	PCC / FDD 66 60.00 dBm/15kHz W: 20 MHz	SCC / FDD 1 -60.00 dBm/15kHz BW: 10 MHz		ISA FDD n5 -28.96 dBm/BW V: 20 MHz	NSA TDD n78 -19.85 dBm/BW BW: 100 MHz	NSA TDD n78 -19.85 dBm/BW BW: 100 MH		Main
		EARFCN: D: 300 OFF U: 18300	OFF Fre	r: 20 MH2 rg: D: 881.50 U: 836.50 OF	BW: 100 MHz Freq: D: 3450.00 F U: 3450.00	OFF U: 3549.99		Cell On
Config Identities	SSB / Broadcast	UE Power Control	UE Power Me	easurements Advance	ed			Connect►
RF Common		_						
Duplex Mode:	FDD 🔻	NR Cell Type:	NSA 🔻	Band:	n5 ▼	Test Channel: Mid	•	Function Test
Frequency Range:	FR1 (sub-6GHz) ▼	/		SCS Common:	0 (15 kHz) ▼			
Downlink				Uplink				NR S-Cell
DL Bandwidth:	20 MHz 🔻			UL Bandwidth:				Aggregation
DL ARFCN:	176300 M	SSB ARFCN:	174770	ULARFCN:	167300			
DL Frequency:	881.5	MHz 🔻		UL Frequency:	836.5 MHz	v		Mobility►
DL Point A:	170720	Offset To Carrie	: 102	UL Point A:	147248	Offset To Carrier: 504		
DL Phase Compensation	: Center Freq 🔻 C			UL Phase Compensation:	Center Freq Custom		•	 Resource Allocation
ss-PBCH-BlockPower:	0 d	iBm		Enable Frequency Shift:				Link to X-Apps
Reference Signal Power:	-60 d	IBm/SCS -28.96	dBm/BW	Expected Input Power:	Auto 🔻 -32	dBm/BW		
DL MIMO Configuration:	1x1 V	DL Antenna Configuration:	1x1 ▼	UL MIMO Configuration:	1x1 T			Utility►
Misc								
RFIO Group:	0	Max AoA:	1	Include UE Cap Enquiry:	Image: A start of the start			
L					<u> </u>			Apply
System Scheduling	Cell PHY Bea	am Mgmt MAC/RLC/PE		S IMS BLER/Tput	CSI Assisted Tx Mea	s		Mara 4/0
BSE:CONFig:NR5G[:SELect	ed]:DL:MIMO:CONFi	ig				Local Q	Search	More 1/2►

(Figure 2-2)

 Select "UL RMC (TX tests, TS 38.521)" for maximum power RB scheduling (NR -> Scheduling -> Quick Config)

🖀 Keysight C8700200A Test A	Application Framework – 5G	NR (15.26.4.4121)						– 🗆 X
A -	PCC / FDD 66 60.00 dBm/15kHz W: 20 MHz RFCN: D: 66786 U: 132322	SCC / FDD 1 -60.00 dBm/15kHz BW: 10 MHz EARFCN: D: 300 FF U: 18300	-28,96 dBr BW: Freq: D:	ND n5 h/BW 20 MHz 381.50 336.50	NSA TDD n78 -19.85 dBm/BW BW: 100 MHz Freq: D: 3450.00 E U: 3450.00		TDD n78 .85 dBm/BW 100 MHz D: 3549.99 U: 3549.99	Main Cell On
	UL-DL Config Sch	eduling Map Slot Conf		UL TDRA	Link Adaptation	Rate Matching	Clear Log	Connect
Scenario: PDSCH - PUSCH Ratio:	UL RMC (TX tests, TS 3 Basic Scheduler DL RMC (RX tests, TS 3				o enabled UESS conf		mat 0_1 and 1_1. Eni	Function Test
SSB Configuration: Direction:	UL RMC (TX tests, TS : Full Throughput		[2021/12/14 01:0	2:17.504] Cell 3: N		igured with DCI Forr	mat 0_1 and 1_1. En; mat 0_1 and 1_1. En; mat 0_1 and 1_1. En;	NR S-Cell Aggregation
BWP ID: Transform Precoding:	0	0 Disabled v	[2021/12/14 01:0	- 2:29.552] Configur	ed basic scheduler. ing scheduling on all l			Mobility►
DCI Format: PRB Allocation Type:	Format_1_1 ▼ TYPE1 ▼	Format_0_1 TYPE1 TYPE1			ed Scheduler success ed basic scheduler.	sfully.		Resource Allocation
Type 0 RBG Allocation: PRB Start / Count:	1FFFF 0 273	1FFFF 0 273						Link to X-Apps
MCS Table: MCS:	64 QAM ▼ 4 - QPSK ▼	64 QAM ▼ 2 - QPSK ▼						Utility►
Auto-apply: III Off	Apply to	all Cells						Apply
System Scheduling BSE:CONFig:NR5G:SCHedu	Cell PHY Beam I	<u> </u>	RRC/NAS MS	BLER/Tput	CSI Assisted Ty	Meas	Q Search	More 1/2►

(Figure 2-3)

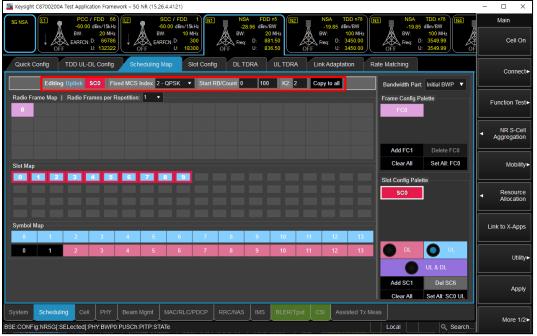
- To set waveform for NR Band (NR -> PHY -> PUSCH)
 - Select highest modulation in the MCS Table and MCS Table Transform Precoder
 - Enable Transform Precoder: DFT-s-OFDM / disable for CP-OFDM
 - Enable pi/2 BPSK TP: DFT-s-OFDM, pi/2 BPSK modulation

Keysight C8700200A Test Application	Framework – 5G NR (15.26.4.	.4121)							– 🗆 ×
EARFCN: D:	/15kHz 20 MHz 66786	C / FDD 1 00 dBm/15kHz 10 MHz N; D: 300	BW: Freg:	FDD n5 96 dBm/BW 20 MHz D: 881.50	NSA -19 BW: Freq: F	25 dBm/BW	-19,85 dE BW: Freq: D: 1	100 MHz 3549.99	Main Cell On
Bandwidth Parts HARQ	PDSCH PDSCH D	U: 18300 MRS PDCCH			F SCH DM		SRS Config		Connect►
Enable PUSCH General Data SCID:	Not signale higher lay			Rate Matching Type:		Bandw Full Buffer	vidth Part: Init	al BWP 🔻	Function Test►
Frequency Hopping Mode: Resource Allocation Config:	No Hopping Type 1	v v		Overhead: MCS Table:		Overhead 0 64 QAM	T T		NR S-Cell ▲ Aggregation
RBG Size Config: Tx Config:	Config 1	• •		MCS Table Transform Enable Transform Pree		r: 64 QAM	•		Mobility►
UL Max Rank: Codebook Subset:	1 Non Coherent	• •		Msg3 Transform Preco Enable П/2 BPSK TP:	oding:	 ✔			Resource Allocation
UCI Over PUSCH: UCI Over PUSCH Scaling:	<mark>✓</mark> 1	•		Π/2 BPSK Power Boos Frequency Hopping O		False	T]	Link to X-Apps
									Utility►
		×							Apply
System Scheduling Cell BSE:CONFig:NR5G[:SELected]:PHY:		AC/RLC/PDCP	RRC/NAS	IMS BLER/Tput	CSI	Assisted Tx Meas	Local	Q Search	More 1/2►

(Figure 2-4)

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• Select Uplink Modulation and RB setting (NR -> Scheduling -> Scheduling Map)



(Figure 2-5)

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- Click "Cell On" button in the right of Test application screen in the LTE tab
- If necessary, turn the Airplane Mode on/off in the DUT

Keysight C8700200A Test Application	Framework – 5G NR (15.26.4.4121)				- 🗆 X
5G NSA		1 NSA FDD n5	NSA TDD n78 -19.85 dBm/BW	TDD n78	Main
BW: 2 EARFCN: D: 0	20 MHz BW: 10 66786	MHz BW: 20 MHz	BW: 100 MHz BW: BW: D0 MHz BW: Freq: D: 3450.00 OFF U: 3450.00	100 MHz D: 3549.99 U: 3549.99 OF	Cell Off
	Cell Reconfig			_	Connect►
L	60.00 dBm/15kHz -29.21	dBm/20MHz Test Mode	UE Enquiry Incl Pair UL/DL Fre	q	
Frequency / Duplex Mode Duplex Mode / Band:		Frequency Setting M	ethod: EARFCN	•	Function Test►
		r requency Setting w			
Downlink Bandwidth: 2		Uplink Bandwidth:		*	 NR S-Cell Aggregation
Downlink EARFCN: 6	2145.00000	MHz V Uplink EARFCN:	132322 1745.000000	MHz 🔻	Aggregation
		Cell Cat Mode: Auto	•		Mobility►
Simulated Path Loss: 7/		dB			
Reference Signal Power (SIB2): 11		dBm Cyclic Prefix:		-	 Resource Allocation
TDD Specific Configuration					
Frame Configuration: 1		Special Subframe Co	onfiguration: 6		Link to X-Apps
				2 Symbols	
RF Config					
DL Antenna Configuration: 1	Ix1 ▼ Expecte	d Input Power Control: Auto	▼ RFIO Group 0		Utility►
Static Channel Model: Static S					
]	Apply
System Scheduling Cell F	PHY MAC/RLC/PDCP RRC	/NAS UE Info IMS BLER/Tput			
BSE:CONFIG[:SELected][:SELected]:	I:ACTive[:STATe]		Local	Q Search	More 1/2►

(Figure 2-6)

- Click "Cell On" button in the right of Test application screen in the NR tab
 - Click "NR S-Cell Aggregation" and "Apply" to aggregate NR band

St NS ECC / FDD 66 (000 dBw/13kt) BW 2000 dBw/13kt) BW 2	🔤 Keysight C8700200A Test Ap	polication Framework	- 56 NR (15										– 🗆 🗙
Strick					_								
WY 0.20 MHz WY 0.20 MHz <td< td=""><td></td><td></td><td>2 🍦</td><td></td><td>N1</td><td></td><td></td><td></td><td>N3</td><td></td><td></td><td>1111</td><td>Main</td></td<>			2 🍦		N1				N3			1111	Main
RF Common Duplex Mode: FDD V NR Cell Type: NSA Band: n5 Test Channet: Mid Function Testi- Frequency Range: FRI (sub-6GHz) V SCS Common: 0 NR S-Cell Aggregation Function Testi- Ownlink DL Bandwidth: 20 MHz V UL Bandwidth: 26 Aggregate Activate Aggregate Activate Aggregation * NR S-Cell Aggregate * Aggregate Activate UL Bandwidth: 26 UL ARFCN: 16 UL Frequency: 83 UL Point A: UL Phase Compensation: Cell 1 Cell 2 Cell 1 Cell 1 </td <td></td> <td>/: 20 MHz FCN: D: 66786</td> <td>↓ Æ&⊾⊧</td> <td>BW: 10 MHz ARFCN: D: 300</td> <td></td> <td>W: 20 MHz req: D: 881.50</td> <td></td> <td>W: 100 MHz reg: D: 3450.00</td> <td></td> <td>BW: Freq: D:</td> <td>100 MHz 3549.99</td> <td>Q₆</td> <td>Cell Off</td>		/: 20 MHz FCN: D: 66786	↓ Æ&⊾⊧	BW: 10 MHz ARFCN: D: 300		W: 20 MHz req: D: 881.50		W: 100 MHz reg: D: 3450.00		BW: Freq: D:	100 MHz 3549.99	Q ₆	Cell Off
RF Common Duplex Mode: FDD V NR Cell Type: NSA Band: n5 V Test Channet: Mid Function Testi- Frequency Range: FRI (sub-6GHz) V SCS Common: 0 NR S-Cell Aggregation Function Testi- Ownilink DL Bandwidth: 20 MHz V UL Bandwidth: 20 Mid NR S-Cell Aggregation * NR S-C	Config Identities	SSB / Broadca	st UE	Power Control	UE Power I	Advan	ced						
Duplex Mode: FDD NR Cell Type: NSA Band: n5 Test Channet: Mid Function Tests Frequency Range: FRI (sub-6GH2) SCS Common: 0 NR S-Cell Aggregation Aggregate Adivate Aggregate Adivate Aggregate Aggregate Adivate NR S-Cell Aggregation NR S-Cell Aggregation NR S-Cell Aggregation Aggregate Adivate Aggregate Adivate Aggregate Adivate Aggregate Mobility- Intervention Tests Interventis Intervention Tests Int												_	Connect►
Duplex Mode: FDD NR Cell Type: NSA Band: n5 Test Channet: Mid Function Tests Frequency Range: FRI (sub-6GH2) SCS Common: 0 NR S-Cell Aggregation Aggregate Adivate Aggregate Adivate Aggregate Aggregate Adivate NR S-Cell Aggregation NR S-Cell Aggregation NR S-Cell Aggregation Aggregate Adivate Aggregate Adivate Aggregate Adivate Aggregate Mobility- Intervention Tests Interventis Intervention Tests Int	- RF Common												
Frequency Range: FR1 (sub-6GHz) Function Test- Frequency Range: FR1 (sub-6GHz) SCS Common: 0 Du Bandwidth: 20 MHz V Uplink UL Bandwidth: 20 DL ARFCN: 176300 M SSB ARFCN: 174770 UL ARFCN: 16 Cell DL UL Aggregate Activate NR S-Cell Aggregation DL Frequency: 881.5 MHz UL Prequency: 83 Cell DL UL Cell 1 Mobility- DL Point A: 170720 Offset To Carrier: 102 UL Point A: 14 Cell 3 Resource Allocation SsPBCH-BlockPower: 0 MHz Expected Input Power: Au Cell 4 Init to X-Apps ULININO Configuration: 0 Max AoA: 1 Include UE Cap Enquiry: Auto NR Aggregation: Utility- System Scheduling Cell PH Beam Mgmt MAC/RLC/PDCP RC/NAS MS BLER/TpdL C Cell Ture to			V N	R Cell Type		Band'	n5	•	Test Cl	hannel	Mid	•	
Prequency Range. PR (dubbork) SS S common. Image: Stress common. Ima							Ë	NE					Function Test►
UL Bandwidth: 20 MHz VL Bandwidth: 20 Aggregation DL Bandwidth: 20 MHz VL Bandwidth: 20 DL ARFCN: 176300 M SSB ARFCN: 174770 UL Bandwidth: 20 DL Frequency: 881.5 MHz UL Frequency: 83 Cell DL UL DL Point A: 170720 Offset To Carrier: 102 UL Point A: 14 Cell 2 Mobility DL Phase Compensation: Center Freq Custom: 0 MHz UL Phase Compensation: Cell 4 Mobility ss-PBCH-BlockPower: 0 dBm Expected Input Power: Au Cell 4 Mobility DL MIMO Configuration: Custom (1x1) D L Antenna Configuration: 1x1 UL MIMO Configuration: Custom (1x1) Appry Misc RFIO Group: 0 Max AoA: 1 Include UE Cap Enquiry: Auto NR Aggregation: System Scheduling Cell PHY Beam Mgmt MAC/RLC/PDCP MS MS BLER/TPdL Cell Muto NR Aggregation:	Frequency Range:					SCS Common:	0 (ggiega	uon	_	
DL Bandwidth: 20 MHz V UL Bandwidth: 20 Cell DL UL Aggregation DL ARFCN: 176300 M SSB ARFCN: 174770 ULARFCN: 16 Cell U Mobility- DL Frequency: 881.5 MHz V UL Frequency: 83 Cell 2 Mobility- DL Point A: 170720 Offset To Carrier: 102 UL Point A: 14 Cell 3 Mobility- DL Phase Compensation: Center Freq Custom: 0 MHz UL Phase Compensation: Cell 4 Image: Cel	Downlink					Uplink			Aggre	egate	Activate		
DL ARFCN: 176300 M SSB ARFCN: 174770 UL ARFCN: 16 Cell Cell Maintain the state of the	DL Bandwidth:					UL Bandwidth:	20	Cell	п				
DL Frequency: 881.5 MHz UL Frequency: 83 DL Point A: 170720 Offset To Carrier: 102 UL Point A: 14 DL Phase Compensation: Center Freq Custom: 0 MHz Image: Center Freq Custom: Cell 4 Image: Center Freq Custom: Resource Allocation Cell 4 Image: Center Freq Custom: Image: Center Freq Custom: Image: Center Freq Custom: Image: Center Freq Custom: Cell 4 Image: Center Freq Custom: Image: Center Freq Custom: Image: Center Freq Custom: Image: Center Freq Custom: Cell 4 Image: Center Freq Custom: <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>00</td> <td></td> <td>_</td> <td></td> <td></td> <td></td>								00		_			
DL Prequency. ool.5 wh2 UL Prequency. ost DL Point A: 170720 Offset To Carrier. 102 UL Point A: 14 DL Phase Compensation: Center Freq Custom: 0 MHz VL Ss-PBCH-BlockPower: 0 dBm Enable Frequency Shift. Cell 4 Cell 4 Reference Signal Power: 60 dBm/SCS 28 96 dBm/BW Expected Input Power: Au DL MIMO Configuration: Custom (1x1) D L Antonna Configuration: 1x1 UL MIMO Configuration: Custom (1x1) Apply Misc RFIO Group: 0 Max AoA: 1 Include UE Cap Enquiry: Auto NR Aggregation: System Scheduling Cell PHY Beam Mgmt MAC/RLC/PDCP RC/NAS MS BLE/T/TpdL C	DL ARFCN:	176300 M		SSB ARFCN:	174770	UL ARFCN:	167	Cell 1	\sim	\sim			
DL Point A: 170720 Offset To Carrier: 102 UL Point A: 144 DL Phase Compensation: Center Freq Custom: 0 MHz VL Phase Compensation: Cell 3 Cell 3 Cell 3 Cell 4	DL Frequency:	881.5	MHz 🔻			UL Frequency:	836						Mobility►
DL Phase Compensation: Center Freq Custom: 0 MHz VL Phase Compensation: Cell 3 Image: Compensation: Cell 3 Image: Cell 4 Imag								Cell 2					
DL Phase Compensation: Center Freq V Custom: 0 MHz V UL Phase Compensation: Cr ss-PBCH-BlockPower: 0 dBm Reference Signal Power: 60 dBm/SCS -28 96 dBm/BW DL MIMO Configuration: Custom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cr Misc RFIO Group: 0 Max AoA: 1 Include UE Cap Enquiry: V System Scheduling Cett PHY Beam Mgmt MAC/RLC/PDCP RC/NAS M/S BLER/Tput C	DL Point A:	170720		Offset To Carrier:	102	UL Point A:	147	Coll 2					D
ss-PBCH-BlockPower: 0 dBm C Enable Frequency Shift Expected Input Power: Au UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: Cutom (1x1) V D	DL Phase Compensation:					UL Phase Compensation	Ce	Cell J		_			
Reference Signal Power: 60 dBm/SCS -28 96 dBm/BW Expected Input Power: Au DL MIMO Configuration: Custom (1x1) * DL Antenna Configuration: 1x1 VLL MIMO Configuration: Custom (1x1) * DL Antenna Configuration: Custom (1x1) * Apply System Scheduling Ceit PHY Beam Mgmit MAC/RLC/PDCP RC/NAS MS BLER/Tput Custom (1x1) * Link to x-Apps Link to x-Apps	·							Cell 4					
Reference Signal Power: 60 dBm/SCS 28 96 dBm/BW Expected Input Power: Au DL MIMO Configuration: Custom (1x1) DL Antenna Configuration: 1x1 UL MIMO Configuration: Custom (1x1) DL Antenna Configuration: Custom (1x1) DL Antenna Configuration: Custom (1x1) UL MIMO Configuration: Custom (1x1) Auto NR Agregation: Custom (1x1) Apply Miac Nax AoA: 1 Include UE Cap Enquiry: Auto NR Agregation: Apply System Scheduling Cell PHY Beam Mgmit MAC/RLC/PDCP RC/NAS MS BLER/Tput C C Control (1x1) Contr	ss-PBCH-BlockPower:	0	dBm			Enable Frequency Shift:			I — I				
DL MIMO Configuration: Custom (1x1) V DL Antenna Configuration: 1x1 V UL MIMO Configuration: C t Misc RFIO Group: 0 Max AoA: 1 Include UE Cap Enquiry: V System Scheduling Cett PHY Beam Mgmt MAC/RLC/PDCP RC/NAS IMS BLER/Tput C													Link to X-Apps
Misc RFIO Group: 0 Max AoA: 1 Include UE Cap Enquiry: System Scheduling Cell PHY Beam Mgmit MAC/RLC/PDCP RRC/NAS IMS BLER/Tput C	Reference Signal Power:	-60	dBm/SCS	-28.96	dBm/BW	Expected Input Power:	Au						
Misc RFIO Group: 0 Max AoA: 1 Include UE Cap Enquiry: Apply System Scheduling Cell PHY Beam Mgmt MAC/RLC/PDCP RRC/NAS IMS BLER/Tput C	DL MIMO Configuration:		DL Antenna	a Configuration:	1x1 V	UL MIMO Configuration:	Cu						
RFIO Group: 0 Max AoA: 1 Include UE Cap Enquiry: Apply System Scheduling Cell PHY Beam Mgmt MAC/RLC/PDCP RRC/NAS IMS BLER/Tput C													Utility►
System Scheduling Cell PHY Beam Mgmtt MAC/RLC/PDCP RRC/NAS IMS BLER/Tput C	Misc												
System Scheduling Cett PHY Beam Mgmt MAC/RLC/PDCP RRC/NAS IMS BLER/Tput C	RFIO Group:	0		Max AoA:		Include UE Cap Enquiry:	\sim						
System Scheduling Cett PHY Beam Mgmt MAC/RLC/PDCP RRC/NAS IMS BLER/Tput C													Apply
								Auto NR Agg	regation:				
Apply Back More 1/2	System Scheduling	Cell PHY B	eam Mgmt			AS IMS BLER/Tput	с	_	_				
BSE:CONFig:NR5G[:SELected]:UL[:PUSCh]:CLPControl:MODE	More 1/2►												

(Figure 2-7)

 Select "All Down Bits" of UL Power control Mode in LTE tab for NR maximum power (LTE -> PHY -> UE Power Control)

Keysight C8700200A Test Application	n Framework – 5G NR (15.26.4.4121)				– 🗆 ×
5G NSA		1 N1 NSA FDD n5	NSA TDD n78 -19.85 dBm/BW	A TDD n78 9.85 dBm/BW	Main
BW: EARFCN: D:	20 MHz BW: 10 I	MHz BW: 20 MHz 300 Freg: D: 881.50	BW: 100 MHz BW: D: 3450.00 OFF U: 3450.00 OFF	100 MHz	Cell Off
General UE Power Control	Boosting				Connect►
UE Power Control Mode:	All Down Bits				
Target Mode		-			Function Test►
PUCCH Target Power:	0.0 dBm				
PUSCH Target Power:	0.0 dBm				NR S-Cell
					Aggregation
					Mobility►
					WODINTy -
					Resource
UL Power Control Parameters					Allocation
P0 (Nominal PUSCH):		dBm Spectrum Emission:	1		
P0 (UE-PUSCH, SRB):		dB			Link to X-Apps
		dB			
🗸 р-Мах: 24	p-maxEUTRA 24	Accumulation E			Utility►
					Apply
System Scheduling Cell	PHY MAC/RLC/PDCP RRC/	/NAS UE Info IMS BLER/Tput	Assisted Tx Meas		
BSE:CONFig:LTE[:SELected]:UL:CL	PControl:MODE		Local	Q Search	More 1/2►

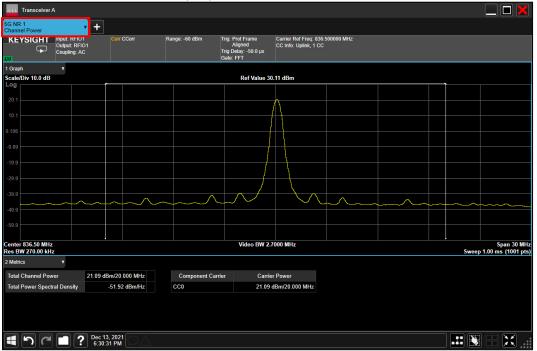
(Figure 2-8)

- Select "All Up Bits" of UL Power control Mode in NR tab for NR maximum power (NR -> Cell -> UE Power Control)
- To read the output power, click the "Link to X-Apps"

Keysight C8700200A Test Application Framework – 5G NR (15.26.4.4121)	- 🗆 X
5G NSA	FDD n5 NSA TDD n78 NSA TDD n78 NSA TDD n78 -19.85 dBm/BW Main
BOW 20 Mit And A Constant A Const	2014/12 2014/12 D: 881.50 U: 836.50 U: 836.50 U: 936.50 U: 9
Config Identities SSB / Broadcast UE Power Control UE Power Meas	
	Bandwidth Part: Initial BWP V
PUSCH UE Power Control	Function Test
UE Power Control Mode: All Up Bits T	he PUSCH will be told to continuously increase power
PUSCH Target Power: 0	egative / Positive Tolerance: 1 1 dB NR S-Cell
PUCCH UE Power Control	Aggregation
	he PUCCH will follow the PUSCH TPC
PUCCH Target Power: 0	egative / Positive Tolerance: 1 1 dB
PUCCH Target Power: 0	egative / Positive Tolerance: 1 dB
UL Power Control Parameters	Resource
Add Spectrum Emission 0 VUSCH Alpha Value:	Alpha 8 v deltaF PUCCH f0: 0 Allocation
PUSCH p0:	0 deltaF PUCCH f1: 0
μ p_NR_FR1: 24 μ p0 Nominal With Grant	-90 deltaF PUCCH f2: 0
PUCCH p0 Nominal	-90 deltaF PUCCH f3: 0 Utility>
PUCCH p0:	0 deltaF PUCCH f4: 0
	Apply
System Scheduling Cell PHY Beam Mgmt MAC/RLC/PDCP RRC/NAS	IMS BLER/Tput CSI Assisted Tx Meas
BSE:CONFig:NR5G[:SELected]:UL[:PUSCh]:CLPControl:MODE	Local Q Search

(Figure 2-9)

• Select "Channel Power" for NR output power



(Figure 2-10)

• Select "Channel Power" for LTE output power

uuu Tr	ansceiver /											
LTE & LT Channel	E-A FDD 1 Power	*	+									
KEYS	Sight F	Input: RFIO8 Output: RFIO1 Coupling: AC		Corr	Range:		Trig: Prot Frame Aligned Gate: FFT	Carrier Ref Freq: 1.745 Avg Hold: 26/200 CC Info: Uplink, 1 CC	5000000 GHz			
1 Graph		•										
Scale/Di	v 10.0 dB						Ref Value 3	0.00 dBm		 _		
20.0												
10.0												
0.00												
-10.0										<u> </u>		
-20.0										1		
										X		
-30.0		~~~										
-40.0												
-50.0												
-60.0												
00.0												
	.74500 GH 270.00 kHz						Video BW 2	.7000 MHz			Swoon	Span 30 MHz 1.00 ms (1001 pts)
2 Metrics		v									Sweep	1.00 ms (1001 pts)
Total	Channel P	ower	22.96 d	IBm/20.000 MHz		Component	Carrier	Carrier Power				
Total	Power Spe	ctral Density		-50.05 dBm/Hz		CC0		22.96 dBm/20.000 MHz				
	29		Dec 13, 6:23:58	2021								
			6:23:58							 _		

(Figure 2-11)

SA Mode

• Select operating band, SCS, BW and Channel for NR (NR -> Cell -> Config)

🚈 Keysight C8700200A Test A						(1117)		Conng	/	- 0	x c
NR SA	33.96 dBm/BW : 20 MHz	N2 S OFF F	-19.85 dBm/BW V: 100 MHz	NB S/ BW OFF Fre	19.85 dBm/BW /: 100 MHz	-19.85 dBr BW: 1 Freq: D: 3	C n78 n/BW 00 MHz 350.01 350.01			Ma	ain Cell On
Config NR Procs	Identities	SSB / Broa	dcast UE Pow	er Control	UE Power Measure	ments Advan	iced				
RF Common Duplex Mode:	FDD	▼ NF	Cell Type: SA	v	Band:	n66 🔻	1	Test Channel:	Mid 🔻		
Frequency Range:	FR1 (sub-6GH:	z) 🔻			SCS Common:	0 (15 kHz) 🔻					
Downlink DL Bandwidth:	20 MHz	•			Uplink UL Bandwidth:	20 MHz	•			Func	tion Test►
DL ARFCN: DL Frequency:	429000 2145	M MHz V	SSB ARFCN: 42	27470	UL ARFCN: UL Frequency:	349000 1745	MHz V				Mobility►
DL Point A:	423420		Offset To Carrier: 10	02	UL Point A:	328948		Offset To Carr	ier: 504		
DL Phase Compensation	: Center Freq	Custom:			UL Phase Compensat	ion: Center Freq	Custom:				Resource
ss-PBCH-BlockPower: Reference Signal Power:	0	dBm	22.00	D (D))/	Enable Frequency Shi	_	▼ -27	dBm/BW		Link to	X-Apps
DL MIMO Configuration:	-65 Custom (1x1)	-		Bm/BW x1 ▼	Expected Input Power			dBm/Bw			Utility►
Misc RFIO Group:	0		Max AoA: 1								
											Apply
System Scheduling	Cell PHY		MAC/RLC/PDCP		SUE Info	BLER/Tput	SI Assist	ed Tx Meas		, I	More 1/2►
BSE:CONFig:NR5G:SCHedu	iling:QCONFig:S	CENario						Local	Q Search		

(Figure 3-1)

 Select "UL RMC (TX tests, TS 38.521)" for maximum power RB scheduling (NR -> Scheduling -> Quick Config)

Keysight C8700200A Test A	Application Framework – 5G	NR (15.26.4.4121)						- 🗆 ×
NR SA	33.96 dBm/BW /: 20 MHz q: D: 2145.00	SA SCC n78 -19.85 dBm/BW BW: 100 MHz Freq: D: 3350.01 FF U: 3350.01	-19.8 BW: Freq:	SCC n78 5 dBm/BW 100 MHz 0: 3350.01 J: 3350.01	-19.85 d BW: Freq: D:	100 MHz		Main Cell On
Quick Config TDD	UL-DL Config Sch	eduling Map Slot Conf	ig RNTI	DL TDRA	UL TDRA	Link Adaptation Ra	ate Matching	
- Scheduling Quick Configur	ation						Clear Log	
Scenario:	UL RMC (TX tests, TS	38.521) 🔻	Log:					
PDSCH - PUSCH Ratio:								
SSB Configuration:	Single SSB	•						
Direction:	Downlink	Uplink						Function Test
BWP ID:	0	0						Mobility
Transform Precoding:		Disabled 🗸						·
DCI Format:	Format_1_1 ▼	Format_0_1 ▼						Resource Allocation
PRB Allocation Type:	TYPE1 🔻	TYPE1 🔻						Allocation
Type 0 RBG Allocation:	1FFFF	1FFFF						Link to X-Apps
PRB Start / Count:	0 273	0 273						
MCS Table:	64 QAM 🔻	64 QAM 🔻						Utility
MCS:	4 - QPSK 🛛 🔻	2 - QPSK 🛛 🔻						
Auto-apply: III Off	Apply to	all Cells						Apply
System Scheduling						CSI Assisted Tx Me		More 1/2
BSE:CONFIG[:SELected][:S	ELected]:ACTive[:STATe	1				Local	Q Search	More 1/2

(Figure 3-2)

- To set waveform for NR Band (NR -> PHY -> PUSCH) •
 - Select highest modulation in the MCS Table and MCS Table Transform Precoder -
 - Enable Transform Precoder: DFT-s-OFDM / disable for CP-OFDM --
 - Enable pi/2 BPSK TP: DFT-s-OFDM, pi/2 BPSK modulation

2 Keysight C8700200A Test Application Framework - 5G NR (15.26.4.4121)											
NR SA MII SA PCC n86 -33.96 dBm/BW -33.96 dBm/BW BW: 20 MHz BW: 20 MHz 0 GFF Freq: 1: 1745.00	Min SN Min SN Min SN -19.85 dBm/BW BW -19.85 dBm/BW BW -19.85 dBm/BW BW -19.85 dBm/BW BW -10.00 Hbz Few Distribution -19.85 dBm/BW BW -10.00 Hbz Few Distribution -10.85 dBm/BW BW -10.00 Hbz Few Distribution -10.00 Hbz										
Bandwidth Parts HARQ PDSCH Enable PUSCH General Data SCID:	PDSCH DMRS PDCCH PF	RACH PUSCH PUSCH DMR		al BWP 🔻							
Frequency Hopping Mode: No Hopp Resource Allocation Config. Type 1	· · · · · · · · · · · · · · · · · · ·	Overhead: MCS Table:	Overhead 0 64 QAM		Function Test►						
RBG Size Config: Config 1 Tx Config: Co	odebook T	MCS Table Transform Precoder: Enable Transform Precoder: Msg3 Transform Precoding:	64 QAM ▼		Mobility►						
Codebook Subset: Non Coh	erent V	Enable П/2 BPSK TP:	False V	J	Resource Allocation						
UCI Over PUSCH Scaling: 1	•	Frequency Hopping Offset Lists:	1 2 3 4		Link to X-Apps						
					Utility►						
System Scheduling Cell PHY Be	eam Mgmt MAC/RLC/PDCP RRC/N	AS IMS BLER/Tput CSI A			Apply						
BSE:CONFig:NR5G:SCHeduling:QCONFig:SCE	ENario		Local	Q Search	More 1/2						

(Figure 3-3)

Select Uplink Modulation and RB setting (NR -> Scheduling -> Scheduling Map)

🧱 Keysight	t C8700200A Te	est Applicati	ion Frame	work – 5G M	VR (15.2	5.4.4121)										– 🗆 ×
NR SA	OFF	-33.96 d BW: Freg: D:	CC n66 IBm/BW 20 MHz 2145.00 1745.00	1 A	BW:	19.85 dBm/BV 100 M	V		SCC n 9.85 dBm/BV 100 N D: 3350. U: 3350.	V 4Hz 01	×	-19.85 d W: irea: D:	ICC n78 IBm/BW 100 MH 3350.01 3350.01	iz 1		Main Cell On
Quick	Config T	DD UL-DL	Config	Sche	duling	Map S	lot Confi	g RNTI	DL T	DRA	UL TDP	AS	Link Ad	aptation Rate M	latching	
- Radio Fr	Editing U			ed MCS In	_		Start F	RB/Count <mark>0</mark>	100	K2: 2	Co	py to all		Bandwidth Pa Frame Config FC0	ırt: Initial BWP ▼ Palette	
														Add FC1	Delete FC0	Function Test►
- Slot Map)													Clear All	Set All: FC0	Mobility►
	1 2	3 4	5	6	7	8 9								Slot Config Pa	lette	
														SC0		Resource Allocation
Symbol	Мар															Link to X-Apps
0	1	2	3	4	5	6	7	8	9	10	11	12	1	3		
0	1	2	3	4	5	6	7	8	9	10	11	12	1	3 DL	O u	Utility►
															UL & DL	
														Add SC1	Del SC6	Apply
														Clear All	Set All: SC0 UL	
System	Scheduling	Cell	PHY	Beam M	Igmt		PDCP	RRC/NAS		IMS	BLER	Tput	csi			More 1/2
BSE:CONF	ig:NR5G:SCH	eduling:Q	CONFig	SCENario	1									Local	Q Search	Mole 1/2

(Figure 3-4)

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- Click "Cell On" button in the right of Test application screen
- If necessary, turn the Airplane Mode on/off in the DUT
- Select "All Up Bits" of UL Power control Mode (Cell -> UE Power Control)
- To read the output power, click the "Link to X-Apps"

Keysight C8700200A Test Application Framework – 56 NR (15.26.4.4121)	– 🗆 ×
NR SA SA PCC - n87 NB SA SCC - n78 19.85 d6m-6W 19.85 d6m-6W 19.85 d6m-6W W 20 MHz 19.85 d6m-6W BW 19.85 d6m-6W CONNECTED 174.80 Corr 0.330.01 Corr 0.330.01 Corr CONNECTED 174.500 Corr 19.85 d5m-6W BW 100 MHz Corr 0.174500 Corr 0.330.01 Corr 0.330.01 Corr Free: 0.3350.01 Corr Corr Corr UF U.330.01 Corr UF UF </th <th>Main Cell Off</th>	Main Cell Off
Config NR Procs Identities SSB / Broadcast UE Power Control UE Power Measurements Advanced	
Bandwidth Part: Initial BWP	1
UE Power Control Mode: All Up Bits The PUSCH will be told to continuously increase power	
PUSCH Target Power: 30 Negative / Positive Tolerance: 1 dB	Function Test►
PUCCH UE Power Control UE Power Control Mode: All Up Bits The PUCCH will be told to continuously increase power	
OL: One Control mode. An op bits The FOCUL must be for a containability increase power PUCCH Target Power. 30 Negative / Positive Tolerance: 1 1 dB	Mobility►
UL Power Control Parameters Add Spectrum Emission 0 VISCH Alpha Value: Alpha 8 V deltaF PUCCH 10: 0	Resource Allocation
✓ p-Max 24 ✓ PUSCH p0: 0 ✓ deltaF PUCCH f1: 0	Link to X-Apps
✓ p_NR_FR1: 24 ✓ p0 Nominal With Grant -90 ✓ deltaF PUCCH f2: 0	
Add p-Max 23 VICCH p0 Nominal -90 VICCH 13: 0	Utility►
V PUCCH p0: -1 V deltaF PUCCH I4: 0	
	Apply
System Scheduling Cell PHY Beam Mgmt MAC/RLC/PDCP RRC/NAS UE Info IMS BLER/Tput CSI Assisted Tx Meas	More 1/2►
RSE-CONFERENCE antarth/ADDLY	more 1/2

(Figure 3-5)

Select "Channel Power"



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NR Band n66 Measured Results

					Maxi	n)			
BW (MHz)	Modulation	Mode	RB Allocation	RB offset	RSI = 0, 1, 2, 3, 4				
					Me	asured Pwr (d	Bm)		Tura
					346000	349000	352000	MPR	Tune-up Limit
					1730 MHz	1745 MHz	1760 MHz		Linnik
			1	1		20.32		0.00	22.00
			1	108		20.54		0.00	22.00
			1	214		20.12		0.00	22.00
		π/2 BPSK	108	0		20.21		0.00	22.00
			108	54		20.68		0.00	22.00
			108	108		20.52		0.00	22.00
			216	0		20.60		0.00	22.00
			1	1		20.20		0.00	22.00
	DFT-s-		1	108		20.75		0.00	22.00
40 MHz	OFDM	QPSK	1	214		20.34		0.00	22.00
		QFON	108	0 54		20.38		0.00	22.00
			108 108	54 108		20.72		0.00	22.00 22.00
			216	0		20.50		0.00	
			1	1		20.04		0.00	
		16QAM	1	108		20.90		0.00	
		10 april	1	214		20.36		0.00	22.00 22.00 22.00 22.00 22.00 22.00
		64QAM	1	1		20.27		0.00	
		256QAM	1	1		18.34		2.00	20.00
	CP-OFDM	QPSK	1	1		20.20		0.50	21.50
					Me	asured Pwr (d	Bm)		
BW	Modulation	Mode	RB	RB	345000.00	349000.00	353000.00	MPR	Tune-up
(MHz)			Allocation	offset	1725 MHz	1745 MHz	1765 MHz		Limit
			1	1		19.95		0.00	22.00
			1	80		20.53		0.00	22.00
			1	158		20.22		0.00	22.00
		π/2 BPSK	80	0		20.24		0.00	22.00
			80	40		20.49		0.00	22.00
			80	80		20.43		0.00	22.00
			160	0		20.44		0.00	22.00
	DFT-s-		1	1		19.94		0.00	22.00
30 MHz	OFDM		1	80		20.53		0.00	22.00
		0.001/	1	158		20.21		0.00	22.00
		QPSK	80	0		20.25		0.00	22.00
			80	40		20.47		0.00	22.00
			80	80		20.43		0.00	22.00
		400414	160	0		20.44		0.00	22.00
		16QAM	1	1		19.98		0.00	22.00
		64QAM	1	1		20.00		0.00	22.00
		256QAM	1	1		18.59		2.00	20.00
	CP-OFDM	QPSK	1	1		19.93		0.50	21.50

Issue Date: 3/15/2024

NR Band n66 Measured Results_(Continued)

						asured Pwr (d	Bm)		-	
BW	Modulation	Mode	RB A lla satism	RB	344500.00	349000.00	353500.00	MPR		
(MHz)			Allocation	offset	1722.5 MHz	1745 MHz	1767.5 MHz		Limit	
			1	1		20.01		0.00	22.00	
			1	67		20.40		0.00	22.00 20.00 20	
			1	131		20.26		0.00	22.00	
		π/2 BPSK	64	0		20.29		0.00	22.00	
			64	35		20.48		0.00	22.00	
			64	69		20.46		0.00	22.00	
			128	0		20.45		0.00	22.00	
	DET .		1	1		20.03		0.00	22.00	
	DFT-s- OFDM		1	67		20.40		0.00	22.00	
25 MHz	OFDIVI		1	131		20.28		0.00	22.00	
		QPSK	64	0		20.30		0.00	22.00	
			64	35		20.49		0.00	22.00	
			64	69		20.45		0.00	22.00	
			128	0		20.45		0.00	22.00	
		16QAM	1	1		19.99		0.00	22.00	
		64QAM	1	1		20.05		0.00	22.00	
		256QAM	1	1		18.56		2.00	20.00	
	CP-OFDM	QPSK	1	1		20.01		0.50	21.50	
BW			RB	RB	Me	asured Pwr (d	Bm)		21.50	
	Modulation	Mode			044000.00	0.40000.00	254000.00	MPR	22.00 20.00 20	
		WDUC	Allocation	offset	344000.00	349000.00	354000.00	IVIER	-	
(MHz)		Wode	Allocation	offset	344000.00 1720 MHz	349000.00 1745 MHz	1770 MHz	IVIETA	-	
(11172)		Wode	Allocation 1	offset 1				0.00	Limit	
(ועורזב)		Wode			1720 MHz	1745 MHz	1770 MHz		Limit 22.00	
			1	1	1720 MHz 20.11	1745 MHz 20.59	1770 MHz 20.20	0.00	Limit 22.00 22.00	
(1/1/1/2)		π/2 BPSK	1	1 53	1720 MHz 20.11 20.61	1745 MHz 20.59 20.93	1770 MHz 20.20 20.34	0.00	Limit 22.00 22.00 22.00	
			1 1 1	1 53 104	1720 MHz 20.11 20.61 20.52	1745 MHz 20.59 20.93 20.76	1770 MHz 20.20 20.34 20.38	0.00 0.00 0.00	Limit 22.00 22.00 22.00 22.00	
			1 1 1 50	1 53 104 0	1720 MHz 20.11 20.61 20.52 20.48	1745 MHz 20.59 20.93 20.76 20.75	1770 MHz 20.20 20.34 20.38 20.25	0.00 0.00 0.00 0.00	Limit 22.00 22.00 22.00 22.00 22.00	
(WITZ)			1 1 1 50 50	1 53 104 0 28	1720 MHz 20.11 20.61 20.52 20.48 20.63	1745 MHz 20.59 20.93 20.76 20.75 20.89	1770 MHz 20.20 20.34 20.38 20.25 20.31	0.00 0.00 0.00 0.00 0.00	Limit 22.00 22.00 22.00 22.00 22.00 22.00	
(19172)			1 1 50 50 50	1 53 104 0 28 56	1720 MHz 20.11 20.61 20.52 20.48 20.63 20.66	1745 MHz 20.59 20.93 20.76 20.75 20.89 20.87	1770 MHz 20.20 20.34 20.38 20.25 20.31 20.34	0.00 0.00 0.00 0.00 0.00 0.00	Limit 22.00 22.00 22.00 22.00 22.00 22.00 22.00	
	DFT-S-		1 1 50 50 50 100	1 53 104 0 28 56 0	1720 MHz 20.11 20.61 20.52 20.48 20.63 20.66 20.61	1745 MHz 20.59 20.93 20.76 20.75 20.89 20.87 20.85	1770 MHz 20.20 20.34 20.38 20.25 20.31 20.34 20.31	0.00 0.00 0.00 0.00 0.00 0.00 0.00	Limit 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00	
20 MHz			1 1 50 50 50 100 1	1 53 104 0 28 56 0 1	1720 MHz 20.11 20.61 20.52 20.48 20.63 20.66 20.61 20.41	1745 MHz 20.59 20.93 20.76 20.75 20.89 20.87 20.85	1770 MHz 20.20 20.34 20.38 20.25 20.31 20.34 20.31 20.31 20.23	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Limit 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00	
	DFT-S-		1 1 50 50 50 100 1 1	1 53 104 0 28 56 0 1 53	1720 MHz 20.11 20.61 20.52 20.48 20.63 20.66 20.61 20.41	1745 MHz 20.59 20.93 20.76 20.75 20.89 20.87 20.55 20.96	1770 MHz 20.20 20.34 20.38 20.25 20.31 20.34 20.33	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Limit 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00	
	DFT-S-	π/2 BPSK	1 1 50 50 50 100 1 1 1	1 53 104 0 28 56 0 1 53 104	1720 MHz 20.11 20.61 20.52 20.48 20.63 20.66 20.61 20.41 20.75 20.55	1745 MHz 20.59 20.93 20.76 20.75 20.89 20.87 20.55 20.96 20.74	1770 MHz 20.20 20.34 20.38 20.25 20.31 20.34 20.31 20.31 20.23 20.38 20.38	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Limit 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00	
	DFT-S-	π/2 BPSK	1 1 50 50 50 100 1 1 1 50	1 53 104 0 28 56 0 1 53 104 0	1720 MHz 20.11 20.61 20.52 20.48 20.63 20.66 20.61 20.41 20.75 20.55 20.49	1745 MHz 20.59 20.76 20.75 20.89 20.87 20.55 20.96 20.774	1770 MHz 20.20 20.34 20.38 20.25 20.31 20.34 20.31 20.23 20.23 20.23 20.38 20.26	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Limit 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00	
	DFT-S-	π/2 BPSK	1 1 50 50 50 100 1 1 1 50 50 50	1 53 104 0 28 56 0 1 53 104 0 28	1720 MHz 20.11 20.61 20.52 20.48 20.63 20.66 20.61 20.41 20.75 20.55 20.49 20.65	1745 MHz 20.59 20.76 20.75 20.89 20.87 20.85 20.93 20.75	1770 MHz 20.20 20.34 20.38 20.25 20.31 20.34 20.31 20.33 20.38 20.38 20.38 20.26 20.33	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Limit 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00	
	DFT-S-	π/2 BPSK	1 1 50 50 50 100 1 1 1 50 50 50 50	1 53 104 0 28 56 0 1 53 104 0 28 56	1720 MHz 20.11 20.61 20.52 20.48 20.63 20.66 20.61 20.41 20.75 20.55 20.49 20.65 20.66	1745 MHz 20.59 20.93 20.76 20.75 20.89 20.87 20.85 20.55 20.96 20.74 20.78 20.88 20.89	1770 MHz 20.20 20.34 20.38 20.25 20.31 20.34 20.31 20.34 20.31 20.23 20.38 20.38 20.26 20.33 20.33	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Limit 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00	
	DFT-S-	π/2 BPSK QPSK	1 1 50 50 50 100 1 1 1 1 50 50 50 50 100	1 53 104 0 28 56 0 1 53 104 0 28 56 0	1720 MHz 20.11 20.61 20.52 20.48 20.63 20.66 20.41 20.75 20.49 20.65 20.66	1745 MHz 20.59 20.93 20.76 20.75 20.89 20.87 20.55 20.96 20.74 20.88 20.89	1770 MHz 20.20 20.34 20.38 20.25 20.31 20.34 20.31 20.34 20.23 20.38 20.26 20.33 20.33 20.33	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Limit 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00	
	DFT-S-	T/2 BPSK QPSK 16QAM	1 1 50 50 50 100 1 1 1 50 50 50 50 100 1 1	1 53 104 0 28 56 0 1 53 104 0 28 56 0 1	1720 MHz 20.11 20.61 20.52 20.48 20.63 20.66 20.61 20.41 20.75 20.55 20.49 20.65 20.66 20.62 20.62	1745 MHz 20.59 20.93 20.76 20.75 20.89 20.87 20.85 20.55 20.96 20.74 20.78 20.88 20.88 20.89 20.87 20.87	1770 MHz 20.20 20.34 20.38 20.25 20.31 20.34 20.31 20.34 20.31 20.23 20.38 20.38 20.26 20.33 20.33 20.30 20.26	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	Limit 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00 22.00	

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NR Band n66 Measured Results_(Continued)

		Wiedsuit				asured Pwr (d	Rm)		i	
BW	Modulation	Mode	RB	RB	343500.00	349000.00	354500.00	MPR	Tune-up	
(MHz)	wouldtion	INDUE	Allocation	offset				IVIEIN	Limit	
					1717.5 MHz	1745 MHz	1772.5 MHz	0.00	00.00	
			1	1	19.99	20.29	20.22	0.00	22.00	
			1	40	20.11	20.42	20.25	0.00	22.00	
		(0. 0.0.0.V	1	77	20.24	20.46	20.38	0.00	22.00	
		π/2 BPSK	36	0	20.05	20.39	20.27	0.00	22.00	
			36	22	20.18	20.48	20.31	0.00	22.00	
			36	43	20.27	20.50	20.32	0.00	22.00	
			75	0	20.17	20.46	20.29	0.00	22.00	
	DFT-s-		1	1	20.00	20.29	20.22	0.00	22.00	
15 MHz	OFDM		1	40	20.09	20.42	20.25	0.00	22.00	
	OI DIVI		1	77	20.27	20.46	20.40	0.00	22.00	
		QPSK	36	0	20.08	20.41	20.27	0.00	22.00	
			36	22	20.19	20.49	20.30	0.00	22.00	
			36	43	20.28	20.51	20.31	0.00	22.00	
			75	0	20.16	20.48	20.29	0.00	22.00	
		16QAM	1	1	19.94	20.25	20.31	0.00	22.00	
		64QAM	1	1	20.02	20.29	20.18	0.00	22.00	
		256QAM	1	1	18.60	18.82	18.79	2.00	20.00	
	CP-OFDM	QPSK	1	1	20.07	20.28	20.27	0.50	21.50	
		QI OI	1	1		asured Pwr (d	-	0.50	21.50	
BW	Modulation	Mode	RB	RB		· · · · ·	· ·) MPR	Tune-up	
(MHz)	wouldtion	INDUE	Allocation	offset	343000.00	349000.00	355000.00	IVIEIN	Limit	
					1715 MHz	1745 MHz	1775 MHz	0.00	00.00	
			1	1	20.08	20.41	20.33	0.00	22.00	
			1	26	20.29	20.57	20.39	0.00	22.00	
			1	50	20.30	20.52	20.44	0.00	22.00	
		π/2 BPSK	25	0	20.11	20.44	20.34	0.00	22.00	
				25	14	20.14	20.49	20.37	0.00	22.00
			25	27	20.19	20.50	20.42	0.00	22.00	
			50	0	20.14	20.47	20.35	0.00	22.00	
			1	1	20.08	20.40	20.32	0.00	22.00	
	DFT-s-		1	26	20.29	20.57	20.41	0.00	22.00	
10 MHz	OFDM		QPSK	1	50	20.30	20.51	20.44	0.00	22.00
				QPSK	QPSK	25	0	20.10	20.42	20.34
			25	14	20.15	20.50	20.37	0.00	22.00	
			25	27	20.20	20.51	20.42	0.00	22.00	
			50	0	20.14	20.48	20.35	0.00	22.00	
		16QAM	1	1	19.96	20.48	20.40	0.00	22.00	
		64QAM	1	1	20.12	20.40	20.40		22.00	
		256QAM	1	1				0.00		
				1	18.54	18.90	18.82	2.00	20.00	
	CP-OFDM	QPSK	1	1	20.09	20.46	20.28	0.50	21.50	
BW			RB	RB		asured Pw r (d			Tune-up	
(MHz)	Modulation	Mode	Allocation	offset	342500.00	349000.00	355500.00	MPR	Limit	
· -/					1712.5 MHz	1745 MHz	1777.5 MHz			
			1	1	19.97	20.46	20.31	0.00	22.00	
			1	13	19.94	20.40	20.29	0.00	22.00	
			1	23	20.06	20.51	20.41	0.00	22.00	
		π/2 BPSK	12	0	20.02	20.45	20.33	0.00	22.00	
			12	7	20.05	20.48	20.38	0.00	22.00	
			12	13	20.05	20.48	20.39	0.00	22.00	
			25	0	20.04	20.47	20.37	0.00	22.00	
	DFT-s-		1	1	19.97	20.47	20.32	0.00	22.00	
5 MHz	OFDM		1	13	19.94	20.42	20.29	0.00	22.00	
			1	23	20.06	20.52	20.40	0.00	22.00	
		QPSK	12	0	20.02	20.46	20.35	0.00	22.00	
		QPSK	12	7	20.05	20.48	20.40	0.00	22.00	
			14		1				22.00	
			12	13	20.05	20.49	20.40	0.00	22.00	
			12		20.05 20.05	20.49 20.48	20.40 20.38	0.00		
		160AM	12 25	0	20.05	20.48	20.38	0.00	22.00	
		16QAM	12 25 1	0 1	20.05 20.02	20.48 20.46	20.38 20.37	0.00 0.00	22.00 22.00	
		64QAM	12 25 1 1	0 1 1	20.05 20.02 20.05	20.48 20.46 20.52	20.38 20.37 20.31	0.00 0.00 0.00	22.00 22.00 22.00	
	CP-OFDM		12 25 1	0 1	20.05 20.02	20.48 20.46	20.38 20.37	0.00 0.00	22.00 22.00	

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10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

- Reported SAR(W/kg) for WWAN= Measured SAR *Tune-up Scaling Factor
- Reported SAR(W/kg) for Wi-Fi and Bluetooth= Measured SAR * Tune-up scaling factor * Duty Cycle scaling factor
- Wi-Fi Duty Cycle scaling factor = 1 / Duty cycle (%)
- BT Duty Cycle scaling factor = Maximum Duty cycle / Duty cycle (%)

KDB 447498 D01 General RF Exposure Guidance:

Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

KDB 648474 D04 Handset SAR:

With headset attached, when the reported SAR for body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

When the separation distance required for body-worn accessory testing is greater than or equal to that tested for hotspot mode, using the same wireless mode test configuration for voice and data, the hotspot SAR data may be used to support body-worn accessory SAR compliance for that particular configuration.

KDB 648474 D04 Handset SAR (Phablet Only):

For smart phones, with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm.

When hotspot mode does not apply, 10-g extremity SAR is required for all surfaces and edges with an antenna located at \leq 25mm From that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg; However, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, Including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold.

Additional 1-g SAR testing at 5 mm is not required when hotspot mode 10-g extremity SAR is not required for the surfaces and edges; since all 1-g reported SAR < 1.2 W/kg.

KDB 941225 D01 SAR test for 3G devices:

When the maximum output power and tune-up tolerance specified for production units in a secondary mode is $\leq \frac{1}{4}$ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

KDB 941225 D05 SAR for LTE Devices:

SAR test reduction is applied using the following criteria:

- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% 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 for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.
- Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are > 0.8 W/kg. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation < 1.45 W/kg.
- Testing for 16-QAM modulation is not required because the reported SAR for QPSK is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.
- Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.
- For LTE bands that do not support at least three non-overlapping channels in certain channel bandwidths, test the available non-overlapping channels instead. When a device supports overlapping channel assignment in a channel bandwidth

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configuration, the middle channel of the group of overlapping channels should be selected for testing; therefore, the requirement for H, M and L channels may not fully apply.

10.1. NR Band n66 (40MHz Bandwidth)

										Pow er	(dBm)	1-g SAF	R (W/kg)	
Antenna	RF Exposure Conditions	Modulation	Mode	Dist. (mm)	Test Position Ch #.	Freq. (MHz)	RB Allocation	RB offest	Tune-up limit	Meas.	Meas.	Scaled	Plot No.	
					Left Touch	349000	1745.0	1	108	22.00	20.54	0.061	0.085	
					Lent Touch	349000	1743.0	108	54	22.00	20.68	0.070	0.095	1
					Left Tilt	349000	1745.0	1	108	22.00	20.54	0.041	0.057	
		DFT-s-	π/2 BPSK	0	Lent Hit	343000	1745.0	108	54	22.00	20.68	0.047	0.064	
	Head	OFDM		U	Right Touch	349000	1745.0	1	108	22.00	20.54	0.049	0.069	
				Right Touch	349000	1745.0	108	54	22.00	20.68	0.044	0.060		
				Right Tilt	349000	1745.0	1	108	22.00	20.54	0.025	0.035		
					Night hit	349000	1745.0	108	54	22.00	20.68	0.026	0.035	
	CP-OFDM	QPSK	0	Left Touch	349000	1745.0	1	1	22.00	20.20	0.061	0.092		
					Rear	349000	00 1745.0	1	108	22.00	20.54	0.117	0.164	2
	Body-worn &	DFT-s-	π/2 BPSK	10	iteai	343000	1745.0	108	54	22.00	20.68	0.119	0.161	
Ant.(B)	Hotspot	OFDM		10	Front	349000	1745.0	1	108	22.00	20.54	0.116	0.162	
	Thotopot				TION	343000	1745.0	108	54	22.00	20.68	0.117	0.159	
		CP-OFDM	QPSK	10	Rear	349000	1745.0	1	1	22.00	20.20	0.101	0.153	
					Rear	349000	1745.0	1	108	22.00	20.54	0.246	0.344	
					iteai	343000	1745.0	108	54	22.00	20.68	0.250	0.339	
					Front	349000	1745.0	1	108	22.00	20.54	0.189	0.265	
		DFT-s-	π/2 BPSK	10	TION	040000	1745.0	108	54	22.00	20.68	0.218	0.295	
	Hotspot	OFDM		10	Left	349000	1745.0	1	108	22.00	20.54	0.160	0.224	
					Lon	040000	11-10.0	108	54	22.00	20.68	0.162	0.220	
					Bottom	349000	1745.0	1	108	22.00	20.54	0.259	0.362	3
					Dottom	545000	1740.0	108	54	22.00	20.68	0.262	0.355	
		CP-OFDM	QPSK	10	Bottom	349000	1745.0	1	1	22.00	20.20	0.222	0.336	

Note(s):

CP-OFDM mode were evaluated at worst configuration of DFT-s-OFDM in each exposure conditions.

11. SAR Measurement Variability

In accordance with published RF Exposure KDB 865664 D01 SAR measurement 100 MHz to 6 GHz. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

- 1) Repeated measurement is not required when the original highest measured SAR is <0.8 or 2 W/kg (1-g or 10-g respectively); steps 2) through 4) do not apply.
- When the original highest measured SAR is ≥ 0.8 or 2 W/kg (1-g or 10-g respectively), repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 or 3.6 W/kg (~ 10% from the 1-g or 10-g respective SAR limit).
- 4) Perform a third repeated measurement only if the original, first, or second repeated measurement is ≥ 1.5 or 3.75 W/kg (1-g or 10-g respectively) and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

All measured SAR results are below 0.8 W/kg. So Repeated SAR test is not required.

12. Simultaneous Transmission SAR Analysis

Simultaneous Transmission Condition

RF Exposure Condition	ltem		Capable Transmit Configurations										
	1	WWAN (ENDC(LTE+NR)	+	DTS									
Head Body-w orn	2	WWAN (ENDC(LTE+NR)	+	NI									
Hotspot	3	WWAN (ENDC(LTE+NR)	+	BT									
riotopot	4	WWAN (ENDC(LTE+NR)	+	NI	+	BT							
	5	WWAN (ENDC(LTE+NR)	+	DTS	+	NFC							
Extremity	6	WWAN (ENDC(LTE+NR)	+	NI	+	NFC							
Extremity	7	WWAN (ENDC(LTE+NR)	+	BT	+	NFC							
	8	WWAN (ENDC(LTE+NR)	+	NI	+	BT	+	NFC					
Notes:													
1. DTS supports Wi-Fi D	irect, Ho	tspot and VolP.											
2. U-NII supports Wi-Fi	Direct, Ho	otspot and VoIP.											
3. LTE, NR supports Hot	spot and	d VolP											
4. U-NII Radio can transi	mit simul	taneously with Bluetooth Rac	lio.										
5. DTS Radio cannot tra	ansmitsi	multaneously with Bluetooth	Radio										
6. NR Radio support to NSA (ENDC) Radio.													
7. BT tethering is considered about each RF exposure conditions.													
Note(s):													

For EN-DC mode, S.LSI Smart Transmit algorithm in WWAN adds directly the time-averaged RF exposure from 4G(LTE) and time-averaged RF exposure from 5G NR. Smart Transmit algorithm controls the total RF exposure from both 4G and 5G NR to not exceed FCC limit. Therefore, simultaneous transmission compliance between 4G+5G NR operation is demonstrated in the Part 2 Report during algorithm validation. In Part 1 Report, simultaneous transmission compliance was evaluated individually with other Radios (WLAN or BT) using one of 4G or 5G NR.

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Simultaneous transmission SAR test exclusion considerations

KDB 447498 D01 General RF Exposure Guidance provides two procedures for determining simultaneous transmission SAR test exclusion: Sum of SAR and SAR to Peak Location Ratio (SPLSR)

Sum of SAR

To qualify for simultaneous transmission SAR test exclusion based upon Sum of SAR the sum of the reported standalone SARs for all simultaneously transmitting antennas shall be below the applicable standalone SAR limit. If the sum of the SARs is above the applicable limit then simultaneous transmission SAR test exclusion may still apply if the requirements of the SAR to Peak Location Ratio (SPLSR) evaluation are met.

12.1. Simultaneous transmission analysis

12.1.1. Sum of the SAR for WWAN ANT B & Wi-Fi & BT

			Standalone	SAR (W/kg)			Sum of S	n of SAR (W/kg)				
RF Exposure	Test Position	WWAN	DTS	UNII	BT	WWAN + DTS	WWAN + UNII	WWAN + BT	WWAN + BT + UNII			
		1	2	3	4	1+2	1+3	1+4	1+3+4			
		Ant B	Ant H	Ant H	Ant H	1+2	1+3	1+4	1+3+4			
	Left Touch	0.095	0.095	0.466	0.034	0.190	0.561	0.129	0.595			
Head	Left Tlit	0.064	0.095	0.466	0.035	0.159	0.530	0.099	0.565			
(1-g SAR)	Right ToucH	0.069	0.095	0.466	0.057	0.164	0.535	0.126	0.592			
	Right Tlit	0.035	0.095	0.390	0.061	0.130	0.425	0.096	0.486			
Body-Worn	Rear	0.164	0.133	0.389	0.017	0.297	0.553	0.181	0.570			
(1-g SAR)	Front	0.162	0.133	0.389	0.006	0.295	0.551	0.168	0.557			
	Rear	0.344	0.339	0.667	0.047	0.683	1.011	0.391	1.058			
	Front	0.295	0.339	0.667	0.011	0.634	0.962	0.306	0.973			
Hotspot	Edge Top		0.339	0.648	0.076				0.724			
(1-g SAR)	Edge Right											
	Edge Bottom	0.362										
	Edge Left	0.224				0.224	0.224	0.224	0.224			

Note(s):

1. Main&WiFi&BT data refer to Original model(14938215-S1V5 FCC Report SAR part 1)..

Conclusion:

Simultaneous Transmission SAR analysis results is satisfied the FCC Limit requirement according to follow procedures with "Sum of SAR"

Appendixes

Refer to separated files for the following appendixes.

4791131433-S1 FCC Report SAR_App A_Photos & Ant. Locations

4791131433-S1 FCC Report SAR_App B_Highest SAR Test Plots

4791131433-S1 FCC Report SAR_App C_System Check Plots

4791131433-S1 FCC Report SAR_App D_SAR Tissue Ingredients

4791131433-S1 FCC Report SAR_App E_Probe Cal. Certificates

4791131433-S1 FCC Report SAR_App F_Dipole Cal. Certificates

END OF REPORT