PART 0 SAR Characterization Report

Test Report No. 14131461H-A-R1

Customer	**Panasonic Corporation of North America**
Description of EUT	**Radio Module** **(Tested inside of Panasonic Personal Computer FZ-40)**
Model Number of EUT	**WW21A**
FCC ID	**ACJ9TGWW21A**
Issue Date	**June 1, 2022**
Remarks	**-**

Representative Test Engineer	Approved By
	
Hisayoshi Sato Engineer	Takayuki Shimada Leader

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Contents

1 Introduction

This device uses Qualcomm® Smart Transmit feature and cannot operate without specific absorption ratio (SAR) and power density (PD) characterization at the device level, beforehand. The parameters obtained from SAR and PD characterization (char) is used as input for Smart Transmit. Both SAR char and PD char will be entered via the Embedded File System (EFS) to enable the Smart Transmit feature.

Part 0 report describes the results for the SAR char and PD char generation and evaluates them on the 5G milli wave (mmW) new radio (NR) enabled equipment under test (EUT).

This description is an overview for STx and test results may not include both sub6 (SAR) and mmW (PD).

2 Customer information

Company Name	Panasonic Corporation of North America
Address	Two Riverfront Plaza, 9th Floor Newark, NEW JERSEY, 07102-5940, USA
Telephone Number	+1-201-348-7760
Contact Person	Ben Botros

The information provided from the customer is as follows.
- Customer, Description of EUT, Model No. FCC ID on the cover and other relevant pages
- Operating / Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 2: Customer information
- SECTION 3: Equipment under test (EUT) other than the receipt date
- SECTION 8: SAR device uncertainty, SAR design target, SAR char generation (P_{limit} and P_{max} (Tune up limit))

* The laboratory is exempted from liability of any test results affected from the above information in section 3.

3 Equipment under test (EUT)

3.1 Identification of EUT

Description	Radio Module
Model Number	WW21A
Serial number	1LTSA00156 (Used for the test below 1900 MHz) 1LTSA00153 (Used for the test above 1900 MHz)
Rating	DC 3.0 to 3.6 V
Condition	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab.
Receipt Date	February 4, 2022
Test Date	February 9 to 14, 2022

<Information of Host device>

Type	Personal Computer FZ-40 Intel Core i7-1185G7 (1.20 GHz Max 4.8 GHz), 4 core / 8 thread 14-inch LCD (1920 x 1080)

3.2 Product description

Model: WW21A (referred to as the EUT in this report) is a Radio Module.

Wireless technologies	Dup.	Band	Mode
WCDMA	FDD	2	UMTS Rel. 99 (Data) HSDPA (Rel. 5)
	FDD	4	HSUPA (Rel. 6), HSPA+ (Rel. 7), DC-HSDPA (Rel. 8)
	FDD	5	
LTE	FDD	2	QPSK, 16QAM, 64AQM, 256QAM
	FDD	4	
	FDD	5	Downlink MIMO Support: Yes(2x2, 4x4)
*B42: not used in US (FCC)	FDD	7	Supported band : B2, B4, B7, B25, B38, B41, B42, B48, B66
	FDD	12	
*B48: not used in	FDD	13	Uplink MIMO Support: No
Canada(ISED)	FDD	14	Uplink transmission is limited to a single output stream.
	FDD	17	
	FDD	25	
	FDD	26	
	FDD(Rx only)	29	
	TDD	38	
	TDD	41	
	TDD	42	
	TDD(Rx only)	46	
	TDD	48	
	FDD	66	
	FDD	71	

	Downlink	Uplink
LTE CA		*B42: not used in US (FCC) / B48: not used in Canada(ISED)
	Maximum 7 carriers	Maximum 2 carriers Supported combination: <Inrta-band contiguous> 7C, 41C, 42C, 48C <Inter-band>2A-5A, 2A-12A, 2A-13A, 4A-5A, 4A-12A, 4A-13A, 5A-7A,5A-66A, 12A-66A, 13A-66A

5G NR (FR1)	FDD	15 kHz	n2	Pi/2 BPSK (DFT-s-OFDM),
	FDD	15 kHz	n5	QPSK (CP-OFDM/DFT-s-OFDM),
*n77, n78: not used in US	TDD	15 kHz	n41	16QAM (CP-OFDM/DFT-s-OFDM),
(FCC)	FDD	15 kHz	n66	64QAM (CP-OFDM/DFT-s-OFDM),
	FDD	15 kHz	n71	256QAM (CP-OFDM/DFT-s-OFDM)
	TDD	30 kHz	n77	Downlink MIMO Support: Yes(2x2, 4x4)
	TDD	30 kHz	n78	Supported band : n2, n41, n66, n77, n78
	-	-	-	Uplink MIMO Support: No
	-	-	-	Uplink transmission is limited to a single output stream.

EN-DC(LTE-FR1 Sub6)	Supported combination	*n77, n78: not used in US (FCC)
(NSA mode only)	LTE Anchor Bands for NR band n2	LTE Band 5/12/13
	LTE Anchor Bands for NR band n5	LTE Band 2/7/66
	LTE Anchor Bands for NR band n41	LTE Band 2/25/26/66
	LTE Anchor Bands for NR band n66	LTE Band 5/12/13/14/71
	LTE Anchor Bands for NR band n71	LTE Band 2/7/66
	LTE Anchor Bands for NR band n77*	LTE Band 41
	LTE Anchor Bands for NR band n78*	LTE Band 2/5/7/12/38/66

Downlink CA combination is listed PART 1 report.

Wireless module (Tested inside of Panasonic Personal Computer FZ-40)
Model: WL20B (FCC ID ACJ9TGWL20B / ISED certification number 216H-CFWL20B)

Wireless technologies	Dup.	Band		Mode
WLAN	TDD	2.4GHz	2412-2472	802.11b
			for US	802.11g
			2412-2462	802.11n(20,40)
			for Canada	802.11ax(20,40)
	TDD	5GHz	5180-5240	802.11a
			5260-5320	802.11n(20,40)
			5500-5720	802.11ac(20,40.80.160)
			5745-5825	802.11ax(20,40.80.160)
Bluetooth	TDD	2.4GHz	2402-2480	BR/EDR/LE

4 Location

UL Japan, Inc. Ise EMC Lab.
Shielded room for SAR testings
A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919
ISED SAR Lab Company Number: 2973C / CAB identifier: JP0002
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81-596-24-8999

5 References

Federal Communications Commission. (October 23, 2015). *447498 D01 General RF Exposure Guidance v06.*
International Electrotechnical Commission. (2018). *IEC TR 63170:2018.*
SPEAG. (August 2018). *5G Module V1.2 Application Note: 5G Compliance Testing.*

6 Time averaging for SAR and PD

The Qualcomm® Smart Transmit algorithm controls and manages the instantaneous Tx power to maintain the time-averaged Tx power (in turn, time-averaged RF exposure) is in compliance with regulatory limits.

7 Definitions, symbols, and abbreviations

7.1 Definitions

SAR_design_target : Target value to use STx and also this shall be less than regulatory SAR limit (i.e., 1gSAR limit for FCC) after accounting for all device design related uncertainties.

SAR_design_target_extremity : SAR_design_target for limbs

Tx_power_at_SAR_design_target : Transmit level that matches SAR_design_target

Δ min : housing material influence

PD_design_target : The design target for PD compliance. It should be less than regulatory power density limit to account for all device design related uncertainties

input.power.limit : For a PD characterized wireless device, the input power level at antenna port(s) for each beam corresponding to PD_design_target.

PD char : The table that contains input.power.limit fed to antenna port(s) for all supported beams.

N beams : The mmW device supports total N beams, where M out of N are single beams and the rest of (N-M) are beam pairs (where 2 single beams are excited at the same time).

power density (PD) or S_{av} : Energy per unit time and unit area crossing a surface of area *A* characterized by the normal unit vector $\hat{\mathbf{n}}$ and averaging time.

$$S_{av} = \frac{1}{AT}\int\int(\mathbf{E}\times\mathbf{H})\cdot\hat{\boldsymbol{n}}\,dA\,dT$$

Specific Absorption Rate (SAR): : The time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ), as shown in the following equation:

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

7.2 Symbols

Symbol	**Quantity**	**Unit**	**Dimensions**
E	Electric field	volt per meter	V / m
f	Frequency	hertz	Hz
H	Magnetic field	ampere per meter	A / m
λ	Wavelength	meter	m
S	Local power density	watt per square meter	W / m^2
PD or S_{av}	Spatial-average power density	watt per square meter	W / m^2 (mW / cm^2)
SAR	Specific Absorption Rate	watt per kilo gram	W / kg

7.3 Abbreviations

DSI	: device state index
KDB	: knowledge data base from Federal communication committee (FCC)
BS or BSE	: base station or base station emulator
CW	: continuous wave
DUT	: device under test
NR	: new radio
PD	: power density
RF	: radio frequency
TER	: total exposure ratio
S_n	: surface number
S_{tot} or S_{total}	: total propagating power flux density into the phantom
S_n or S_{norm}	: surface normal propagating power flux density into the phantom or in normed vector space
Ant	: antenna
nG	: n generation (e.g. 3G, 4G and 5G)
☒	: applicable.
☐	: NOT applicable.

8 SAR char generation

8.1 Usage scenarios in SAR evaluation and DSI determination

applicable	Scenario	Description	Position example
☐	Head	Device positioned next to head	SAR_{head} = max{SAR_{LC}, SAR_{LT}, SAR_{RC}, SAR_{RT}}
☒	Body	Device positioned next to body with or without a body-worn accessory	SAR_{body} max{SAR_{s1}, SAR_{s2}, SAR_{s3}, SAR_{s4}, SAR_{s5}, SAR_{s6}}
☐	Hotspot mode	Device transmitting in hotspot mode and assumed to be located next to human body	$SAR_{hotspot}$ = max{SAR_{s1}, SAR_{s2}, SAR_{s3}, SAR_{s4}, SAR_{s5}, SAR_{s6}}
☒	Extremity SAR (10g)	10gSAR is evaluated for all applicable surfaces of the device against the flat phantom with 0 mm separation distance	$10gSAR_{extremity}$ = max{$10gSAR_{s1}$, $10gSAR_{s2}$,$10gSAR_{s3}$,$10gSAR_{s4}$, $10gSAR_{s5}$, $10gSAR_{s6}$}

L/R: Left/Right, C/T: Cheek/Tilt, S: Surface

Table 8-A summary of Usage/Exposure Scenario for this EUT

DSI	State
0	Full power operation

8.2 SAR device uncertainty

Table 8-B device uncertainty

Item	Uncertainty dB
Total uncertainty	1.0

k=2

8.3 SAR design target

To account for the total uncertainty, *SAR_design_target* needs to:

$$SAR\_design\_target \;<\; SAR_{regulaory\_limit} \times 10^{\frac{-\,total\ uncertainty}{10}}$$

the *SAR_design_target* for the EUT is determined as: < 1.27 W / kg
FCC

DSI	*SAR_design_target* [W / kg]
0	1.0 All band

8.4 SAR char generation

Even though FCC doesn't require the bystander position, P_{limit} calculation is from bystander position which is 25 mm separation distance same as ISED because it is a conservative. The bystander position is only for calculation to the P_{limit}.
Other position is based on KDB 447498.

Table 8-C Summary of P_{limit}

RAT	Band	P_{max}[dBm]	P_{limit}[dBm]
WCDMA	2	24.5	24.5
WCDMA	4	24.5	24.5
WCDMA	5	24.5	24.5
LTE	2	24.0	24.0
LTE	4	24.0	24.0
LTE	5	24.0	24.0
LTE	7	24.0	24.0
LTE	12	24.0	24.0
LTE	13	24.0	24.0
LTE	14	24.0	24.0
LTE	17	24.0	24.0
LTE	25	24.0	24.0
LTE	26	24.0	24.0
LTE	38	24.0	24.0
LTE	41	24.0	24.0
LTE	48	12.3	12.3
LTE	66	24.0	24.0
LTE	71	24.0	24.0
NR	n2	24.5	24.5
NR	n5	24.5	24.5
NR	n41	24.5	24.5
NR	n66	24.5	24.5
NR	n71	24.5	24.5

Limbs P_{limit} is also less than target SAR so same value is applied.
P_{max} (Tune up limit) is specified as Burst power Average
For LTE B48

Uplink Downlink config (UDC)	Special sub frame (SSF)	Burst ave tune up DSI=0 [dBm]	P_{max} burst ave [dBm]	Time ave DSI=0 [dBm]
0	0 to 7	12.3	11.09	9.4
1	0 to 7	13.8	12.66	9.4
2	0 to 7	16.6	15.57	9.4
3	0 to 7	15.3	14.10	9.4
4	0 to 7	16.8	15.69	9.4
5	0 to 7	19.7	18.56	9.4
6	0 to 7	12.9	11.64	9.4

LTE band 48 doesn't have a same burst tune up for UDC/SSF but has same time average tune up limit.

Appendix A SAR result

Calc. P_{limit} = measured power + 10log (target SAR / measured SAR value)
ex P_{limit} for WCDMA band 2 = 23.59 + 10 log(1.00/0.294) = 28.9 dBm

A.1 W-CDMA B2

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Note	Calc. Plimit
					Tune-up limit	Meas.	Meas.	Scaled		
Bystander	25	Rel 99 RMC 12.2 kbps	9262	1852.4	24.5	23.50				
			9400	1880.0	24.5	23.59	***0.294***	**0.363**		28.9
			9538	1907.6	24.5	23.58				

A.2 W-CDMA B4

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Note	Calc. Plimit
					Tune-up limit	Meas.	Meas.	Scaled		
Bystander	25	Rel 99 RMC 12.2 kbps	1312	1712.4	24.5	23.51				
			1413	1732.6	24.5	23.52	***0.346***	**0.434**		28.1
			1513	1752.6	24.5	23.74				

A.3 W-CDMA-B5

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Note	Calc. Plimit
					Tune-up limit	Meas.	Meas.	Scaled		
Bystander	25	Rel 99 RMC 12.2 kbps	4132	826.4	24.5	23.53				
			4183	836.6	24.5	23.77	***0.256***	**0.303**		29.7
			4233	846.6	24.5	23.91				

A.4 LTE B2

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm)		1-g SAR (W/kg)		Note	Calc. Plimit
							Tune-up	Meas. Avg	Meas.	Scaled		
Bystander	25	QPSK	18700	1860	1	0	24.0	22.92				
			18900	1880	1	99	24.0	22.99				
			19100	1900	1	0	24.0	23.01	***0.300***	***0.377***		28.2
			18700	1860	50	50	23.0	21.97				
			18900	1880	50	50	23.0	22.03				
			19100	1900	50	24	23.0	22.08	0.252	0.311		28.1
			18700	1860	100	0	23.0	21.95				

A.5 LTE B4

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm)		1-g SAR (W/kg)		Note	Calc. Plimit
							Tune-up	Meas. Avg	Meas.	Scaled		
Bystander	25	QPSK	20050	1720	-	-	24.0	-				
			20175	1732.5	1	0	24.0	22.99	***0.400***	***0.505***		27.0
			20300	1745	-	-	24.0	-				
			20050	1720	-	-	23.0	-				
			20175	1732.5	50	0	23.0	21.95	0.324	0.413		26.8
			20300	1745	-	-	23.0	-				
			20175	1732.5	100	0	23.0	21.95				

A.6 LTE B5

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	QPSK	-	-	-	-	24.0	-				
			20525	836.5	1	49	24.0	23.01	***0.247***	***0.310***		29.1
			-	-	-	-	24.0	-				
			-	-	-	-	23.0	-				
			20525	836.5	25	12	23.0	22.10	0.191	0.235		29.3
			-	-	-	-	23.0	-				
			20525	836.5	50	0	23.0	22.07				

A.7 LTE B7

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	QPSK	20850	2510	1	99	24.0	22.98				
			21100	2535	1	99	24.0	23.09				
			21350	2560	1	99	24.0	23.13	***0.262***	***0.320***		28.9
			20850	2510	50	24	23.0	22.08				
			21100	2535	50	50	23.0	22.11				
			21350	2560	50	24	23.0	22.19	0.220	0.265		28.8
			21100	2535	100	0	23.0	22.11				

A.8 LTE B12

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	QPSK	-	-	-	-	24.0	-				
			23095	707.5	1	0	24.0	22.68	***0.179***	***0.243***		30.2
			-	-	-	-	24.0	-				
			-	-	-	-	23.0	-				
			23095	707.5	25	12	23.0	21.82	0.145	0.190		30.2
			-	-	-	-	23.0	-				
			23095	707.5	50	0	23.0	21.82				

A.9 LTE B13

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	QPSK	-	-	-	-	24.0	-				
			23230	782	1	24	24.0	23.14	***0.201***	***0.245***		30.1
			-	-	-	-	24.0	-				
			-	-	-	-	23.0	-				
			23230	782	25	25	23.0	22.23	0.168	0.201		30.0
			-	-	-	-	23.0	-				
			23230	782	50	0	23.0	22.22				

A.10 LTE B14

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	QPSK	-	-	-	-	24.0	-				
			23330	793	1	0	24.0	23.11	***0.210***	***0.258***		29.9
			-	-	-	-	24.0	-				
			-	-	-	-	23.0	-				
			23330	793	25	12	23.0	22.10	0.169	0.208		29.8
			-	-	-	-	23.0	-				
			23330	793	50	0	23.0	22.10				

A.11 LTE B17

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	QPSK	-	-	-	-	24.0	-				
			23790	710	1	0	24.0	22.55	***0.174***	***0.243***		30.1
			-	-	-	-	24.0	-				
			-	-	-	-	23.0	-				
			23790	710	25	25	23.0	21.76	0.145	0.193		30.1
			-	-	-	-	23.0	-				
			23790	710	50	0	23.0	21.76				

A.12 LTE B25

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	QPSK	26140	1860	1	49	24.0	22.86				
			26365	1882.5	1	99	24.0	22.95				
			26590	1905	1	0	24.0	22.98	***0.318***	***0.402***		28.0
			26140	1860	50	24	23.0	22.03				
			26365	1882.5	50	50	23.0	22.05				
			26590	1905	50	50	23.0	22.08	0.263	0.325		27.9
			26365	1882.5	100	0	23.0	22.03				

A.13 LTE B26

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	QPSK	-	-	-	-	24.0	-				
			26865	831.5	1	74	24.0	22.92	***0.237***	***0.304***		29.2
			-	-	-	-	24.0	-				
			-	-	-	-	23.0	-				
			26865	831.5	36	39	23.0	22.00	0.191	0.240		29.2
			-	-	-	-	23.0	-				
			26865	831.5	75	0	23.0	21.94				

A.14 LTE B38

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	QPSK	-	-	-	-	24.0	-				
			38000	2595	1	0	24.0	23.08	***0.159***	***0.197***		31.1
			-	-	-	-	24.0	-				
			-	-	-	-	23.0	-				
			38000	2595	50	50	23.0	22.21	0.127	0.152		31.2
			-	-	-	-	23.0	-				
			38000	2595	100	0	23.0	22.13				

A.15 LTE B41

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up limit	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	QPSK	39790	2510	1	0	24.0	22.92				
			40185	2549.5	1	0	24.0	22.89				
			40620	2593	1	0	24.0	23.12	***0.158***	***0.193***		31.1
			41055	2636.5	1	0	24.0	23.02				
			41490	2680	1	0	24.0	22.99				
			39790	2510	50	24	23.0	22.07				
			40185	2549.5	50	24	23.0	22.11				
			40620	2593	50	24	23.0	22.14	0.124	0.151		31.2
			41055	2636.5	50	0	23.0	22.10				
			41490	2680	50	50	23.0	22.03				
			40185	2549.5	100	0	23.0	22.11				

A.16 LTE B48

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up limit	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	QPSK	55340	3560	1	99	12.3	11.44	0.016	0.019		29.5
			55773	3603.3	1	99	12.3	11.43				
			56207	3646.7	1	0	12.3	11.37				
			56640	3690	1	0	12.3	11.30				
			55340	3560	50	24	12.3	11.53	***0.030***	***0.036***		26.8
			55773	3603.3	50	24	12.3	11.45				
			56207	3646.7	50	0	12.3	11.45				
			56640	3690	50	0	12.3	11.37				
			55773	3603.3	100	0	12.3	11.43				

A.17 LTE B66

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	QPSK	132072	1720	1	99	24.0	22.73				
			132322	1745	1	99	24.0	22.83				
			132572	1770	1	0	24.0	22.88	***0.387***	***0.501***		27.0
			132072	1720	50	24	23.0	21.81				
			132322	1745	50	49	23.0	21.86				
			132572	1770	50	49	23.0	21.87	0.304	0.394		27.0
			132572	1770	100	0	23.0	21.81				

A.18 LTE B71

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	QPSK	-	-	-	-	24.0	-				
			133297	680.5	1	49	24.0	23.07	***0.185***	***0.229***		30.4
			-	-	-	-	24.0	-				
			-	-	-	-	23.0	-				
			133297	680.5	50	0	23.0	22.06	0.150	0.186		30.3
			-	-	-	-	23.0	-				
			133297	680.5	100	0	23.0	22.01				

A.19 NR n2

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	BPSK	372000	1860	1	1	24.5	23.17	***0.282***	***0.383***		28.7
			376000	1880	1	53	24.5	23.16				
			380000	1900	1	53	24.5	23.09				
			372000	1860	50	28	24.0	23.00				
			376000	1880	50	28	24.0	23.09	0.272	0.335		28.7
			380000	1900	50	28	24.0	23.03				
			376000	1880	100	0	24.0	22.60				

A.20 NR n5

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	BPSK	-	-	-	-	24.5	-				
			167300	836.5	1	1	24.5	23.03	0.277	***0.389***		28.6
			-	-	-	-	24.5	-				
			-	-	-	-	24.0	-				
			167300	836.5	50	28	24.0	23.00	***0.283***	0.356		28.5
			-	-	-	-	24.0	-				
			167300	836.5	100	0	24.0	22.52				

A.21 NR n41

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	BPSK	-	-	-	-	24.5	-				
			518600	2593	1	1	24.5	23.23	***0.184***	***0.247***		30.6
			-	-	-	-	24.5	-				
			-	-	-	-	24.0	-				
			518600	2593	135	69	24.0	23.12	0.169	0.207		30.8
			-	-	-	-	24.0	-				
			518600	2593	270	0	24.0	22.67				
Bottom	0	BPSK	-	-	-	-	24.5	-				
			518600	2593	1	1	24.5	23.23	0.041	0.055		37.1
			-	-	-	-	24.5	-				
			-	-	-	-	24.0	-				
			518600	2593	135	69	24.0	23.12	0.022	0.027		39.7
			-	-	-	-	24.0	-				
			518600	2593	270	0	24.0	22.67				

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	10-g SAR (W/kg) Meas.	10-g SAR (W/kg) Scaled	Note	Calc. Plimit
Keyboard Limbs	0	BPSK	-	-	-	-	24.5	-				
			518600	2593	1	1	24.5	23.23	**0.234**	**0.313**		29.5
			-	-	-	-	24.5	-				
			-	-	-	-	24.0	-				
			518600	2593	135	69	24.0	23.12	0.200	0.245		30.1
			-	-	-	-	24.0	-				
			518600	2593	270	0	24.0	22.67				

A.22 NR n66

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	BPSK	344000	1720	1	104	24.5	23.25	0.355	***0.473***		27.7
			349000	1745	1	104	24.5	23.23				
			354000	1770	1	104	24.5	23.22				
			344000	1720	50	28	24.0	23.12				
			349000	1745	50	28	24.0	23.23	***0.356***	0.425		27.7
			354000	1770	50	28	24.0	23.10				
			349000	1745	100	0	24.0	22.72				

A.23 NR n71

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Note	Calc. Plimit
Bystander	25	BPSK	-	-	-	-	24.5	-				
			136100	680.5	1	1	24.5	23.08	0.252	***0.349***		29.1
			-	-	-	-	24.5	-				
			-	-	-	-	24.0	-				
			136100	680.5	50	28	24.0	23.04	***0.264***	0.329		28.8
			-	-	-	-	24.0	-				
			136100	680.5	100	0	24.0	22.49				

Appendix B Measurement uncertainty

B.1 SAR measurement uncertainty

Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std.Unc. (10g)
Measurement System Errors							
Probe Calibration	± 14.00 %	N	2	1	1	±7.0%	±7.0%
Probe Calibration Drift	± 1.7 %	R	√3	1	1	±1.0%	±1.0%
Probe Linearity	± 4.7 %	R	√3	1	1	±2.7%	±2.7%
Broadband Signal	± 2.6 %	R	√3	1	1	±1.5%	±1.5%
Probe Isotropy	± 7.6 %	R	√3	1	1	±4.4%	±4.4%
Data Acquisition	± 0.3 %	N	1	1	1	±0.3%	±0.3%
RF Ambient	± 1.8 %	N	1	1	1	±1.8%	±1.8%
Probe Positioning	± 0.2 %	N	1	0.33	0.33	±0.1%	±0.1%
Data Processing	± 2.3 %	N	1	1	1	±2.3%	±2.3%
Phantom and Device Errors							
Conductivity (meas.)DAK	± 10.0 %	N	1	0.78	0.71	±7.8%	±7.1%
Conductivity (temp.)BB	± 3.4 %	R	√3	0.78	0.71	±1.5%	±1.4%
Phantom Permittivity	± 14.0 %	R	√3	0.25	0.25	±2.0%	±2.0%
Distance DUT - TSL	± 2.0 %	N	1	2	2	±4.0%	±4.0%
Device Positioning (+/- 0.5mm)	± 1.0 %	N	1	1	1	±1.0%	±1.0%
Device Holder	± 3.6 %	N	1	1	1	±3.6%	±3.6%
DUT Modulationm	± 2.4 %	R	√3	1	1	±1.4%	±1.4%
Time-average SAR	± 2.6 %	R	√3	1	1	±1.5%	±1.5%
DUT drift	± 2.5 %	N	1	1	1	±2.5%	±2.5%
Val Antenna Unc.val	± 0.0 %	N	1	1	1	±0.0%	±0.0%
Unc. Input Powerval	± 0.0 %	N	1	1	1	±0.0%	±0.0%
Correction to the SAR results							
Deviation to Target	± 1.9 %	N	1	1	0.84	±1.9%	±1.6%
SAR scalingp	± 0.0 %	R	√3	1	1	±0.0%	±0.0%
Combined Std. Uncertainty						±14.1%	±13.7%
Expanded STD Uncertainty (κ =2)						±28.2%	±27.4%

Appendix C Revision History

Original Test Report No.: 14131461H-A

This report is a revised version of 14131461H-A. 14131461H-A is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14131461H-A	May 9, 2022	-
1	14131461H-A-R1	June 1, 2022	Clause 3.2 Corrected the table for Model: WW21A

End of Report