



RF Exposure Part 0 Test Report

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Redmond, WA 98052 USA

Date of Testing:
12/15/2024-04/07/2025
Test Site/Location:
Element, Columbia, MD, USA
Document Serial No.:
1M2412090112-02.C3K (Rev2)

FCC ID: C3K2095

APPLICANT: MICROSOFT CORPORATION

Report Type: Part 0 SAR Characterization
DUT Type: Portable Computing Device
Model(s): 2095

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Test results reported herein relate only to the item(s) tested.

Note: This revised test report supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.



RJ Ortanez
Executive Vice President



FCC ID: C3K2095	PART 0 SAR CHAR REPORT	Approved by: Technical Manager
Document S/N: 1M2412090112-02.C3K (rev2)	DUT Type: Portable Computing Device	Page 1 of 13

REV 1.1
04/08/2022

TABLE OF CONTENTS

1	DEVICE UNDER TEST	3
1.1	Device Overview	3
1.2	Time-Averaging for SAR and Power Density	4
1.3	Nomenclature for Part 0 Report	4
1.4	Bibliography	4
2	SAR AND POWER DENSITY MEASUREMENTS	5
2.1	SAR Definition	5
2.2	SAR Measurement Procedure	5
3	SAR CHARACTERIZATION	7
3.1	DSI and SAR Determination	7
3.2	SAR Design Target	7
3.3	SAR Char	8
4	EQUIPMENT LIST	10
5	MEASUREMENT UNCERTAINTIES	11

FCC ID: C3K2095	PART 0 SAR CHAR REPORT	Approved by: Technical Manager
Document S/N: 1M2412090112-02.C3K (rev2)	DUT Type: Portable Computing Device	Page 2 of 13

REV 1.1
04/08/2022

1 DEVICE UNDER TEST

1.1 Device Overview

This device uses the Qualcomm® FastConnect feature to control and manage transmitting power in real time and to ensure the time-averaged RF exposure is in compliance with the FCC requirement at all times for WLAN operations. Additionally, this device supports BT technologies, but the output power of these modems is not controlled by the Time Averaged SAR (TAS) algorithm.

Band & Mode	Operating Modes	Tx Frequency
2.4 GHz WIFI	Data	2412 - 2472 MHz
5 GHz WIFI	Data	U-NII-1: 5180 - 5240 MHz U-NII-2A: 5260 - 5320 MHz U-NII-2C: 5500 - 5720 MHz U-NII-3: 5745 - 5825 MHz U-NII-4: 5850 - 5925 MHz
6 GHz WIFI	Data	U-NII-5: 5945 - 6415 MHz U-NII-6: 6435 - 6515 MHz U-NII-7: 6535 - 6875 MHz U-NII-8: 6895 - 7115 MHz
2.4 GHz Bluetooth	Data	2402 - 2480 MHz

FCC ID: C3K2095	PART 0 SAR CHAR REPORT	Approved by: Technical Manager
Document S/N: 1M2412090112-02.C3K (rev2)	DUT Type: Portable Computing Device	Page 3 of 13

REV 1.1
04/08/2022

1.2 Time-Averaging for SAR and Power Density

This device is enabled with Qualcomm® FastConnect algorithm to control and manage transmitting power in real time and to ensure that the time-averaged RF exposure from WLAN is in compliance with FCC requirements. This Part 0 report shows SAR characterization of WLAN radios. Characterization is achieved by determining P_{Limit} for WLAN that corresponds to the exposure design targets after accounting for all device design related uncertainties, i.e., SAR_{design_target} (< FCC SAR limit). The SAR characterization is denoted as SAR Char in this report. Section 1.3 includes a nomenclature of the specific terms used in this report.

The compliance test under the static transmission scenario and simultaneous transmission analysis are reported in Part 1 report. The validation of the time-averaging algorithm and compliance under the dynamic (time-varying) transmission scenario for WLAN technologies are reported in Part 2 report (report SN could be found in Section 1.4 – Bibliography).

1.3 Nomenclature for Part 0 Report

Technology	Term	Description
WLAN	P_{limit}	Power level that corresponds to the exposure design target (SAR_{design_target}) after accounting for all device design related uncertainties
	P_{max}	Maximum tune up output power
	SAR_{design_target}	Target SAR level < FCC SAR limit after accounting for all device design related uncertainties
	SAR_{Char}	Table containing P_{limit} for all technologies and bands

1.4 Bibliography

Report Type	Report Serial Number
RF Exposure Part 1 Test Report	1M2412090112-01.C3K
RF Exposure Part 2 Test Report	1M2412090112-03.C3K
RF Exposure Compliance Summary	1M2412090112-04.C3K

FCC ID: C3K2095	PART 0 SAR CHAR REPORT	Approved by: Technical Manager
Document S/N: 1M2412090112-02.C3K (rev2)	DUT Type: Portable Computing Device	Page 4 of 13

2 SAR AND POWER DENSITY MEASUREMENTS

2.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Equation 2-1).

Equation 2-1
SAR Mathematical Equation

$$SAR = \frac{d}{dt} \left(\frac{dU}{dm} \right) = \frac{d}{dt} \left(\frac{dU}{\rho dv} \right)$$

SAR is expressed in units of Watts per Kilogram (W/kg).

$$SAR = \frac{\sigma \cdot E^2}{\rho}$$

where:

σ	=	conductivity of the tissue-simulating material (S/m)
ρ	=	mass density of the tissue-simulating material (kg/m ³)
E	=	Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relation to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

2.2 SAR Measurement Procedure

The evaluation was performed using the following procedure compliant to FCC KDB Publication 865664 D01v01r04 and IEEE 1528-2013:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head and body interface and the horizontal grid resolution was determined per FCC KDB Publication 865664 D01v01r04 (See Table 2-1) and IEEE 1528-2013.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1g/10g cube evaluation. SAR at this fixed point was measured and used as a reference value.
3. Based on the area scan data, the peak of the region with maximum SAR was determined by spline interpolation. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB Publication 865664 D01v01r04 (See Table 2-1) and IEEE 1528-2013. On the

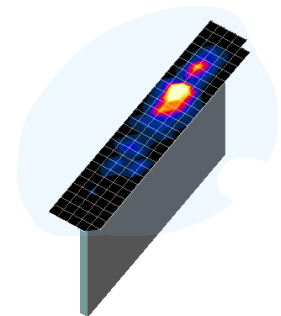


Figure 2-1
Sample SAR Area Scan

FCC ID: C3K2095	PART 0 SAR CHAR REPORT	Approved by: Technical Manager
Document S/N: 1M2412090112-02.C3K (rev2)	DUT Type: Portable Computing Device	Page 5 of 13

REV 1.1
04/08/2022

basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):

- a. SAR values at the inner surface of the phantom are extrapolated from the measured values along the line away from the surface with spacing no greater than that in Table 2-1. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).
 - b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.
 - c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.

Table 2-1
Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04*

Frequency	Maximum Area Scan Resolution (mm) ($\Delta x_{\text{area}}, \Delta y_{\text{area}}$)	Maximum Zoom Scan Resolution (mm) ($\Delta x_{\text{zoom}}, \Delta y_{\text{zoom}}$)	Maximum Zoom Scan Spatial Resolution (mm)			Minimum Zoom Scan Volume (mm) (x,y,z)
			Uniform Grid	Graded Grid		
				$\Delta z_{\text{zoom}}(n)$	$\Delta z_{\text{zoom}}(1)^*$	
≤ 2 GHz	≤ 15	≤ 8	≤ 5	≤ 4	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 30
2-3 GHz	≤ 12	≤ 5	≤ 5	≤ 4	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 30
3-4 GHz	≤ 12	≤ 5	≤ 4	≤ 3	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 28
4-5 GHz	≤ 10	≤ 4	≤ 3	≤ 2.5	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 25
5-6 GHz	≤ 10	≤ 4	≤ 2	≤ 2	≤ 1.5* $\Delta z_{\text{zoom}}(n-1)$	≥ 22

*Also compliant to IEEE 1528-2013 Table 6

FCC ID: C3K2095	PART 0 SAR CHAR REPORT	Approved by: Technical Manager
Document S/N: 1M2412090112-02.C3K (rev2)	DUT Type: Portable Computing Device	Page 6 of 13

3 SAR CHARACTERIZATION

3.1 DSI and SAR Determination

This device uses different Device State Index (DSI) to configure different time averaged power levels based on certain exposure scenarios. Depending on the detection scheme implemented in the device, the worst-case SAR was determined by measurements for the relevant exposure conditions for that DSI. Detailed descriptions of the detection mechanisms are included in the operational description.

When 1g SAR and 10g SAR exposure comparison is needed, the worst-case was determined from SAR normalized to 1g or 10g SAR limit.

The device state index (DSI) conditions used in Table 3-1 represent different exposure scenarios.

Table 3-1
DSI and Corresponding Exposure Scenarios

Scenario	Description	SAR Test Cases
Body (DSI = 0)	▪ Device transmits in DSI = 0	KDB Publication 616217 D04v01r02

3.2 SAR Design Target

SAR_design_target is determined by ensuring that it is less than FCC SAR limit after accounting for total device designed related uncertainties specified by the manufacturer (see Table 3-2).

Table 3-2
***SAR_design_target* Calculations**

<i>SAR_design_target</i>	
$SAR_design_target < SAR_regulatory_limit \times 10^{\frac{-Total\ Uncertainty}{10}}$	
1g SAR (W/kg)	
<i>Total Uncertainty</i>	1.0 dB
<i>SAR_regulatory_limit</i>	1.6 W/kg
<i>SAR_design_target</i>	1.0 W/kg

FCC ID: C3K2095	PART 0 SAR CHAR REPORT	Approved by: Technical Manager
Document S/N: 1M2412090112-02.C3K (rev2)	DUT Type: Portable Computing Device	Page 7 of 13

3.3 SAR Char

SAR test results corresponding to P_{max} for each antenna/technology/band/DSI can be found in RF Exposure Part 1 Test Report.

P_{limit} is calculated by linearly scaling with the measured SAR at the P_{part0} to correspond to the SAR_{design_target} . When $P_{limit} < P_{max}$, P_{part0} was used as P_{limit} in the TAS BDF. When $P_{limit} > P_{max}$ and $P_{part0} = P_{max}$, calculated P_{limit} was used in the TAS BDF. All reported SAR obtained from the P_{part0} SAR tests was less than $SAR_{Design_target} + 1$ dB Uncertainty. The final P_{limit} determination for each exposure scenario corresponding to SAR_{design_target} are shown in Table 3-3.

Table 3-3
 P_{Limit} Determination

Device State Index (DSI)	P_{Limit} Determination Scenarios
0	P_{Limit} is calculated based on 1g Body SAR at 0 mm for bottom edge.

Table 3-4
SAR Characterizations - Plastic

Exposure Scenario		Maximum Tune-Up Output Power*	Body
Averaging Volume			1 g
Spacing			0mm
DSI			0
Technology/Band	Antenna	P _{max}	P _{limit}
2.4 GHz WIFI	R	22.5	17.25
2.4 GHz WIFI	L	22.5	18.0
2.4 GHz WIFI	MIMO	22.5	18.0
5 GHz WIFI	R	20.5	16.0
5 GHz WIFI	L	20.5	16.0
5 GHz WIFI	MIMO	20.5	16.0
6 GHz WIFI	R	18.0	12.0
6 GHz WIFI	L	18.0	11.75
6 GHz WIFI	MIMO	18.0	12.0

FCC ID: C3K2095	PART 0 SAR CHAR REPORT	Approved by: Technical Manager
Document S/N: 1M2412090112-02.C3K (rev2)	DUT Type: Portable Computing Device	Page 8 of 13

Table 3-5
SAR Characterizations - Metal

Exposure Scenario		Maximum Tune-Up Output Power*	Body
Averaging Volume			1 g
Spacing			0mm
DSI			0
Technology/Band	Antenna	P _{max}	P _{limit}
2.4 GHz WIFI	R	22.5	17.25
2.4 GHz WIFI	L	22.5	18.0
2.4 GHz WIFI	MIMO	22.5	18.0
5 GHz WIFI	R	20.5	16.0
5 GHz WIFI	L	20.5	16.0
5 GHz WIFI	MIMO	20.5	16.0
6 GHz WIFI	R	18.0	12.0
6 GHz WIFI	L	18.0	11.75
6 GHz WIFI	MIMO	18.0	12.0

Notes:

1. When $P_{max} < P_{limit}$, the DUT will operate at a power level up to P_{max} .
2. All MIMO Pmax and Plimit. are defined per antenna chain.
3. All Plimit and maximum tune up output power Pmax levels entered in above Table correspond to average power levels after accounting for duty cycle in the case of OFDM modulation schemes.

FCC ID: C3K2095	PART 0 SAR CHAR REPORT	Approved by: Technical Manager
Document S/N: 1M2412090112-02.C3K (rev2)	DUT Type: Portable Computing Device	Page 9 of 13

REV 1.1
04/08/2022

4 EQUIPMENT LIST

For SAR measurements

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	E4404B	Spectrum Analyzer	N/A	N/A	N/A	MY45113242
Agilent	E4438C	ESG Vector Signal Generator	10/23/2024	Annual	10/23/2025	MY45093852
Agilent	E4438C	ESG Vector Signal Generator	3/25/2024	Annual	3/25/2025	MY47270002
Agilent	N5182A	MXG Vector Signal Generator	7/9/2024	Annual	7/9/2025	MY48180366
Agilent	N5182A	MXG Vector Signal Generator	3/7/2024	Annual	3/7/2025	MY47420603
Agilent	8753ES	S-Parameter Vector Network Analyzer	9/25/2024	Annual	9/25/2025	MY40003841
Agilent	8753ES	S-Parameter Vector Network Analyzer	9/25/2024	Annual	9/25/2025	US39170118
Agilent	E5515C	Wireless Communications Test Set	CBT	N/A	CBT	GB46310798
Agilent	E5515C	Wireless Communications Test Set	CBT	N/A	CBT	US41140256
Agilent	N4010A	Wireless Connectivity Test Set	N/A	N/A	N/A	GB46170464
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433973
Amplifier Research	15S1G6	Amplifier	CBT	N/A	CBT	433974
Amplifier Research	150A100C	Amplifier	CBT	N/A	CBT	350132
Anritsu	ML2496A	Power Meter	7/15/2024	Annual	7/15/2025	1138001
Anritsu	ML2496A	Power Meter	6/24/2024	Annual	6/24/2025	1840005
Anritsu	MA2411B	Pulse Power Sensor	9/5/2024	Annual	9/5/2025	1726262
Anritsu	MA2411B	Pulse Power Sensor	10/21/2024	Annual	10/21/2025	1027293
Anritsu	MA24106A	USB Power Sensor	7/10/2024	Annual	7/10/2025	1827530
Anritsu	MA24106A	USB Power Sensor	4/15/2024	Annual	4/15/2025	1827528
Mini-Circuits	PWR-4GHS	USB Power Sensor	6/12/2024	Annual	6/12/2025	12001070013
Control Company	4052	Long Stem Thermometer	2/27/2024	Biennial	2/27/2026	240174346
Control Company	4052	Long Stem Thermometer	2/27/2024	Biennial	2/27/2026	240171096
Control Company	4052	Long Stem Thermometer	2/27/2024	Biennial	2/27/2026	240171059
Control Company	4040	Therm./ Clock/ Humidity Monitor	4/15/2024	Biennial	4/15/2026	240310280
Control Company	4040	Therm./ Clock/ Humidity Monitor	4/15/2024	Biennial	4/15/2026	240310282
Control Company	S66279	Therm./ Clock/ Humidity Monitor	2/16/2024	Biennial	2/16/2026	240140051
Mitutoyo	500-196-30	CD-6"ASX 6inch Digital Caliper	2/16/2022	Triennial	2/16/2025	A20238413
Keysight Technologies	N9020A	MXA Signal Analyzer	7/8/2024	Annual	7/8/2025	MY48010233
Agilent	N9020A	MXA Signal Analyzer	6/14/2024	Annual	6/14/2025	MY56470202
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
Mini-Circuits	VLF-6000+	Low Pass Filter DC to 6000 MHz	7/10/2024	Annual	7/10/2025	31634
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5	Power Attenuator	CBT	N/A	CBT	1226
Mini-Circuits	ZUDC10-83-S+	Directional Coupler	CBT	N/A	CBT	2050
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Seekonk	NC-100	Torque Wrench	CBT	N/A	CBT	22217
Seekonk	NC-100	Torque Wrench	4/2/2024	Biennial	4/2/2026	1262
SPEAG	DAK-3.5	Dielectric Assessment Kit	11/5/2024	Annual	11/5/2025	1277
SPEAG	DAKS-3.5	Portable Dielectric Assessment Kit	8/7/2024	Annual	8/7/2025	1041
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1237
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1331
SPEAG	MAIA	Modulation and Audio Interference Analyzer	N/A	N/A	N/A	1390
SPEAG	D2450V2	2450 MHz Sar Dipole	11/15/2022	Biennial	3/21/2025	797
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/17/2024	Annual	1/17/2025	1191
SPEAG	D6.5GHzV2	6 GHz SAR Dipole	2/22/2024	Annual	2/22/2025	1111
SPEAG	5G Verification Source 10GHz	10GHz System Verification Antenna	3/5/2024	Annual	3/5/2025	1002
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/8/2024	Annual	7/8/2025	1677
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/12/2024	Annual	3/12/2025	1272
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/8/2024	Annual	7/8/2025	1583
SPEAG	DAE4	Dasy Data Acquisition Electronics	9/10/2024	Annual	9/10/2025	1449
SPEAG	EX3DV4	SAR Probe	6/28/2024	Annual	6/28/2025	7803
SPEAG	EX3DV4	SAR Probe	7/5/2024	Annual	7/5/2025	7406
SPEAG	EX3DV4	SAR Probe	3/8/2024	Annual	3/8/2025	7527
SPEAG	EUMmVW4	EUMmVW4 Probe	2/2/2024	Annual	2/2/2025	9622

Note:

1. CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, amplifier, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.
2. Each equipment item was used solely within its respective calibration period.

FCC ID: C3K2095	PART 0 SAR CHAR REPORT	Approved by: Technical Manager
Document S/N: 1M2412090112-02.C3K (rev2)	DUT Type: Portable Computing Device	Page 10 of 13

5 MEASUREMENT UNCERTAINTIES

For SAR Measurements

Applicable for SAR Measurements < 6 GHz:

				f(d,k)			c x f/e	c x g/e	
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i
Measurement System									
Probe Calibration	E.2.1	7	N	1	1	1	7.0	7.0	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	0.7	0.7	0.9	0.9	∞
Boundary Effect	E.2.3	2	R	1.73	1	1	1.2	1.2	∞
Linearity	E.2.4	0.3	N	1	1	1	0.3	0.3	∞
System Detection Limits	E.2.4	0.25	R	1.73	1	1	0.1	0.1	∞
Modulation Response	E.2.5	4.8	R	1.73	1	1	2.8	2.8	∞
Readout Electronics	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1	1	1.5	1.5	∞
RF Ambient Conditions - Noise	E.6.1	3	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	3	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.8	R	1.73	1	1	0.5	0.5	∞
Probe Positioning w/ respect to Phantom	E.6.3	6.7	R	1.73	1	1	3.9	3.9	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	4	R	1.73	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning	E.4.2	3.12	N	1	1	1	3.1	3.1	35
Device Holder Uncertainty	E.4.1	1.67	N	1	1	1	1.7	1.7	5
Output Power Variation - SAR drift measurement	E.2.9	5	R	1.73	1	1	2.9	2.9	∞
SAR Scaling	E.6.5	0	R	1.73	1	1	0.0	0.0	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	7.6	R	1.73	1.0	1.0	4.4	4.4	∞
Liquid Conductivity - measurement uncertainty	E.3.3	4.3	N	1	0.78	0.71	3.3	3.0	76
Liquid Permittivity - measurement uncertainty	E.3.3	4.2	N	1	0.23	0.26	1.0	1.1	75
Liquid Conductivity - Temperature Uncertainty	E.3.4	3.4	R	1.73	0.78	0.71	1.5	1.4	∞
Liquid Permittivity - Temperature Uncertainty	E.3.4	0.6	R	1.73	0.23	0.26	0.1	0.1	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Combined Standard Uncertainty (k=1)							RSS	12.2	12.0
Expanded Uncertainty							k=2	24.4	24.0
(95% CONFIDENCE LEVEL)									

The above measurement uncertainties are according to IEEE Std. 1528-2013

FCC ID: C3K2095	PART 0 SAR CHAR REPORT	Approved by: Technical Manager
Document S/N: 1M2412090112-02.C3K (rev2)	DUT Type: Portable Computing Device	Page 11 of 13

REV 1.1
04/08/2022

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Applicable for SAR Measurements > 6 GHz:

				f(d,k)			c x f/e	c x g/e	
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c _i 1gm	c _i 10 gms	1gm u _i (± %)	10gms u _i (± %)	v _i
Measurement System									
Probe Calibration	E.2.1	9.3	N	1	1	1	9.3	9.3	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	0.7	0.7	0.9	0.9	∞
Boundary Effect	E.2.3	2	R	1.73	1	1	1.2	1.2	∞
Linearity	E.2.4	0.3	N	1	1	1	0.3	0.3	∞
System Detection Limits	E.2.4	0.25	R	1.73	1	1	0.1	0.1	∞
Modulation Response	E.2.5	4.8	R	1.73	1	1	2.8	2.8	∞
Readout Electronics	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time	E.2.7	0.8	R	1.73	1	1	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1	1	1.5	1.5	∞
RF Ambient Conditions - Noise	E.6.1	3	R	1.73	1	1	1.7	1.7	∞
RF Ambient Conditions - Reflections	E.6.1	3	R	1.73	1	1	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.8	R	1.73	1	1	0.5	0.5	∞
Probe Positioning w/ respect to Phantom	E.6.3	6.7	R	1.73	1	1	3.9	3.9	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	4	R	1.73	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning	E.4.2	3.12	N	1	1	1	3.1	3.1	35
Device Holder Uncertainty	E.4.1	1.67	N	1	1	1	1.7	1.7	5
Output Power Variation - SAR drift measurement	E.2.9	5	R	1.73	1	1	2.9	2.9	∞
SAR Scaling	E.6.5	0	R	1.73	1	1	0.0	0.0	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	7.6	R	1.73	1.0	1.0	4.4	4.4	∞
Liquid Conductivity - measurement uncertainty	E.3.3	4.3	N	1	0.78	0.71	3.3	3.0	76
Liquid Permittivity - measurement uncertainty	E.3.3	4.2	N	1	0.23	0.26	1.0	1.1	75
Liquid Conductivity - Temperature Uncertainty	E.3.4	3.4	R	1.73	0.78	0.71	1.5	1.4	∞
Liquid Permittivity - Temperature Uncertainty	E.3.4	0.6	R	1.73	0.23	0.26	0.1	0.1	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Combined Standard Uncertainty (k=1)							RSS	13.8	13.6
Expanded Uncertainty (95% CONFIDENCE LEVEL)							k=2	27.6	27.1

The above measurement uncertainties are according to IEEE Std. 1528-2013

FCC ID: C3K2095	PART 0 SAR CHAR REPORT	Approved by: Technical Manager
Document S/N: 1M2412090112-02.C3K (rev2)	DUT Type: Portable Computing Device	Page 12 of 13

Applicable for Power Density Measurements:

a	b	c	d	e	f = c x f/e	g
Uncertainty Component	Unc. (± dB)	Prob. Dist.	Div.	c _i	u _i (± dB)	v _i
Measurement System						
Calibration	0.49	N	1	1	0.49	∞
Probe Correction	0.00	R	1.73	1	0.00	∞
Frequency Response	0.20	R	1.73	1	0.12	∞
Sensor Cross Coupling	0.00	R	1.73	1	0.00	∞
Isotropy	0.50	R	1.73	1	0.29	∞
Linearity	0.20	R	1.73	1	0.12	∞
Probe Scattering	0.00	R	1.73	1	0.00	∞
Probe Positioning offset	0.30	R	1.73	1	0.17	∞
Probe Positioning Repeatability	0.04	R	1.73	1	0.02	∞
Sensor Mechanical Offset	0.00	R	1.73	1	0.00	∞
Probe Spatial Resolution	0.00	R	1.73	1	0.00	∞
Field Impedance Dependence	0.00	R	1.73	1	0.00	∞
Amplitude and Phase Drift	0.00	R	1.73	1	0.00	∞
Amplitude and Phase Noise	0.04	R	1.73	1	0.02	∞
Measurement Area Truncation	0.00	R	1.73	1	0.00	∞
Data Acquisition	0.03	N	1	1	0.03	∞
Sampling	0.00	R	1.73	1	0.00	∞
Field Reconstruction	2.00	R	1.73	1	1.15	∞
Forward Transformation	0.00	R	1.73	1	0.00	∞
Power Density Scaling	0.00	R	1.73	1	0.00	∞
Spatial Averaging	0.10	R	1.73	1	0.06	∞
System Detection Limit	0.04	R	1.73	1	0.02	∞
Test Sample Related						
Probe Coupling with DUT	0.00	R	1.73	1	0.00	∞
Modulation Response	0.40	R	1.73	1	0.23	∞
Integration Time	0.00	R	1.73	1	0.00	∞
Response Time	0.00	R	1.73	1	0.00	∞
Device Holder Influence	0.10	R	1.73	1	0.06	∞
DUT alignment	0.00	R	1.73	1	0.00	∞
RF Ambient Conditions	0.04	R	1.73	1	0.02	∞
Ambient Reflections	0.04	R	1.73	1	0.02	∞
Immunity/Secondary Reception	0.00	R	1.73	1	0.00	∞
Drift of DUT	0.21	R	1.73	1	0.12	∞
Combined Standard Uncertainty (k=1)					RSS	1.34
Expanded Uncertainty (95% CONFIDENCE LEVEL)					k=2	

FCC ID: C3K2095	PART 0 SAR CHAR REPORT	Approved by: Technical Manager
Document S/N: 1M2412090112-02.C3K (rev2)	DUT Type: Portable Computing Device	Page 13 of 13

REV 1.1
04/08/2022