



**RF SAFETY
LAB**

A NEXT GENERATION
TEST LABORATORY™

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SAR EVALUATION REPORT

FCC ID:	C3K2149
IC:	3048A-2149
Model/HVIN/PMN:	2149
Device Type:	Portable Tablet
Report Issue Date:	June 27, 2026

Microsoft Corporation

One Microsoft Way,
Redmond, WA 98052, United States

Certification

FCC Equipment Class	Body SAR [W/kg]	1g Simultaneous Tx SAR [W/kg]
DXX	< 0.10	1.60
FCC Limit	1.6	1.6

Exposure Condition	Body SAR [W/kg]	TER
Overall Worst Case	0.00	0.75
ISED Limits	1.6	1.0

The measurement evaluations presented in this report are based on the maximum performance of the tested device(s), which has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/ general population exposure federal limits in 47CFR § 1.1310 and has been tested in accordance with the measurement procedures specified within this report.

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Steve Liu
President



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1. DUT Specifics

1.1. Device under Test

The device under test is a wireless device, incorporating NFC WPT and NFC reader with a WLAN/BT module. This report evaluates RF exposure for NFC WPT and NFC reader. WLAN/BT module RF exposure evaluation and simultaneous transmission analysis can be found in reports SN: 2026.030.06 and SN: 2026.030.07. The manufacturer has confirmed that the device is within operational tolerances expected for production units and has the same physical, mechanical, and thermal characteristics expected for production units. The serial number of the device used for each test is indicated alongside the results.

1.2. Test Guidance Applied

- IEEE 1528-2013 (FCC)
- IEC/IEEE 62209-1528:2020 (ISED)
- RSS-102 Issue 6 (ISED)
- RSS-102.SAR.MEAS (ISED)
- Health Canada Safety Code 6 (ISED)
- FCC KDB Publication 248227 D01v02r02 (SAR Considerations for 802.11 Devices) (FCC/ISED)
- FCC KDB Publication 447498 D04v01 (General SAR Guidance) (FCC/ISED)
- FCC KDB Publication 865664 D01v01r04, D02v01r02 (SAR Measurements up to 6 GHz) (FCC)
- FCC KDB Publication 616217 D04 (SAR for laptop and tablets) (FCC/ISED)

2. DUT SAR Test Results

2.1. NFC WPT SAR Data

Exposure Condition	Band/Mode	Antenna	Additional Information	DUT SN	Power Drift [dB]	Frequency [MHz]	Data Rate (Mbps)	RB Offset	Separation Distance [mm]	Position	Measured 1g SAR [W/kg]	Reported 1g SAR [W/kg]	Test Plot
Body	NFC WPT	WPT	2149	R7B26	0.11	13.56	106k	Type B	0	Back	0.000	0.000	1
Body	NFC WPT	WPT	2149 - Keyboard attached	R7B26	0.20	13.56	106k	Type B	0	Back	0.000	0.000	-
Body	NFC WPT	WPT	2149	R7B26	-0.19	13.56	106k	Type B	0	Top	0.000	0.000	-
Body	NFC WPT	WPT	2149	R7B26	-0.20	13.56	106k	Type B	0	Bottom	0.000	0.000	-
Body	NFC WPT	WPT	2149	R7B26	0.20	13.56	106k	Type B	0	Right	0.000	0.000	-
Body	NFC WPT	WPT	2149	R7B26	0.16	13.56	106k	Type B	0	Left	0.000	0.000	-



2.2. NFC Reader SAR Data

Exposure Condition	Band/Mode	Antenna	Additional Information	DUT SN	Power Drift [dB]	Frequency [MHz]	Data Rate (Mbps)	RB Offset	Separation Distance [mm]	Position	Measured 1g SAR [W/kg]	Reported 1g SAR [W/kg]	Test Plot
Body	NFC Reader	NFC	2149	R7B26	0.17	13.56	106k	Type B	0	Back	0.000	0.000	2
Body	NFC Reader	NFC	2149 - Keyboard attached	R7B26	0.15	13.56	106k	Type B	0	Back	0.000	0.000	-
Body	NFC Reader	NFC	2149	R7B26	0.16	13.56	106k	Type B	0	Top	0.000	0.000	-
Body	NFC Reader	NFC	2149	R7B26	-0.20	13.56	106k	Type B	0	Bottom	0.000	0.000	-
Body	NFC Reader	NFC	2149	R7B26	-0.13	13.56	106k	Type B	0	Right	0.000	0.000	-
Body	NFC Reader	NFC	2149	R7B26	0.19	13.56	106k	Type B	0	Left	0.000	0.000	-

2.3. General SAR Testing Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013 and FCC KDB Publication 447498 D04v01 for FCC.
2. The test data reported are the worst-case SAR values according to test procedures specified in IEC/IEEE 62209-1528 and RSS-102.SAR.MEAS for ISED.
3. Per IEC/IEEE 62209-1528, SAR testing was performed using probes calibrated for the modulation specific signal.
4. SAR evaluations were made in accordance with the latest version of RSS-102 Issue 6 and RSS-102.SAR.MEAS, then IEC/IEEE 62209-1528. FCC KDB Publications listed in RSS-102 can be used as supplementary procedures due to limitation of technology specific testing protocols in international standards.
5. Liquid tissue depth was at least 15.0 cm for all frequencies.
6. Batteries are fully charged at the beginning of the SAR measurements.
7. Device with keyboard attached is evaluated on the worst case configuration to ensure compliance.
8. Simultaneous transmission analysis is provided in Appendix E in reports SN: 2026.030.06 and SN: 2026.030.07.

3. DUT SAR Measurement Variability Requirement

Per FCC KDB Publication 865664 D01v01r04, SAR measurement variability was not required since the measured SAR results for a frequency band were less than 0.8 W/kg for 1g SAR and 2.0 W/kg for 10g SAR.

4. General Introduction

Title 47 of the Code of Federal Regulations (CFR) pertains to United States Federal regulation for Telecommunications. The **Federal Communications Commission (FCC)** is the agency responsible for implementing and enforcing these regulations. The rules define a **radiofrequency device** as any device



which in its operation is capable of emitting radiofrequency energy by radiation, conduction, or other means.

47CFR §2.1093(b) states, “A **portable device** is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that the RF source's radiating structure(s) **is/are within 20 centimeters of the body of the user.**”

Also, 47CFR §2.1093(d)(6) states, that General population/uncontrolled exposure limits defined in §1.1310 “apply to portable devices intended for use by consumers or persons who are exposed as a consequence of their employment and may not be fully aware of the potential for exposure or cannot exercise control over their exposure.”

47CFR §2.1093(d)(2) states that evaluation of compliance within FCC’s SAR limits can be demonstrated by laboratory measurements. This test report serves this purpose.

5. Background on Radiofrequency (RF) Exposure Limits

5.1. Controlled Environment

Controlled environments are defined as locations where the RF field intensities have been adequately characterized by means of measurement or calculation and exposure is incurred by persons who are: aware of the potential for RF field exposure, cognizant of the intensity of the RF fields in their environment, aware of the potential health risks associated with RF field exposure and able to control their risk using mitigation strategies. In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

5.2. Uncontrolled Environment

Uncontrolled environments are defined as locations where either insufficient assessment of RF fields have been conducted or where persons who are allowed access to these areas have not received proper RF field awareness/safety training and have no means to assess or, if required, to mitigate their exposure to RF fields. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed, or in which persons who may not be made fully aware of the potential for exposure, or cannot exercise control over their exposure. Members of the general public would fall under



this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

5.3. RF Exposure Limits for 100kHz – 6 GHz

Table 6-1 Human Exposure to RF Radiation Limits in 47 CFR §1.1310 and Health Canada Safety Code 6- SAR
Basic Restrictions for frequencies 100kHz ~ 6 GHz

Environment	Condition	SAR	Averaging volume
Uncontrolled / General Population	Head, Neck Trunk	1.6 W/kg	1g cube
	Extremity	4.0 W/kg	10g cube
Controlled	Head/Trunk	8 W/kg	1g cube
	Extremity / Limbs	20 W/kg	10g cube

5.4. General FCC Policy on Human Exposure to RF

Quoted from the FCC OET [website](#):

The FCC is required by the National Environmental Policy Act of 1969, among other things, to evaluate the effect of emissions from FCC-regulated transmitters on the quality of the human environment. Several organizations, such as the American National Standards Institute (ANSI), the Institute of Electrical and Electronics Engineers, Inc. (IEEE), and the National Council on Radiation Protection and Measurements (NRC) have issued recommendations for human exposure to RF electromagnetic fields.

On August 1, 1996, the Commission adopted the NCRP's recommended Maximum Permissible Exposure limits for field strength and power density for the transmitters operating at frequencies of 300 kHz to 100 GHz. In addition, the Commission adopted the specific absorption rate (SAR) limits for devices operating within close proximity to the body as specified within the ANSI/IEEE C95.1-1992 guidelines. (See [Report and Order, FCC 96-326](#))

The Commission's requirements are detailed in Parts 1 and 2 of the FCC's Rules and Regulations [47 C.F.R. 1.1307(b), 1.1310, 2.1091, 2.1093]. The potential hazards associated with RF electromagnetic fields are discussed in the FCC's [RF Safety FAQ](#).



6. RF Safety Laboratory SAR Measurement System

6.1. SAR Measurement Hardware and Software

Peak spatially averaged SAR (psSAR) measurements are performed using a DASY8 robot system with cDASY8 module SAR software. The DASY8 is made by SPEAG in Switzerland and consists of a 6-axis robot, robot controller, computer, dosimetric probe, probe alignment light beam unit, and various SAR phantoms.

6.2. E-Field Probe

Manufacturer	Schmid & Partner Engineering AG
Model	EX3DV4
Description	Smallest isotropic electric (E-) field probe for high precision specific absorption rate (SAR) measurements
Frequency Range	4 MHz - 10.0 GHz
Dynamic Range	10 μ W/g – >100 mW/g
Overall Length (mm)	337
Body Diameter (mm)	12
Tip Length (mm)	9
Tip Diameter (mm)	2.5
Probe Tip to Sensor X Calibration Point (mm)	1
Probe Tip to Sensor Y Calibration Point (mm)	1
Applications	High precision dosimetric measurements in any exposure scenario (e.g. very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better than 30%
Compatibility	DASY8 robot + cDASY8 module SAR software

6.3. Peak Spatially Averaged SAR (psSAR) Measurements

SAR Evaluations are 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 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 and IEEE 1528:2013. On the 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 the area scan and zoomscan resolutions specified in FCC KDB Publication 865664 D01v01r04 section 2.7.1 and IEEE 1528:2013 table 6. 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.
 - d. The zoom scan is confirmed to meet both of the following parameters if the result is $> 0.1 \text{ W/kg}$. If the result does not meet the below parameters, it is re-measured with a finer resolution scan until the below parameters are met.
 - (1) The smallest horizontal distance from the local SAR peaks to all points 3 dB below the SAR peak shall be larger than the horizontal grid steps in both x- and y-directions.
 - (2) The ratio of the SAR at the second measured point (M2) to the SAR at the closest measured point (M1) at the x-y location of the measured maximum SAR value shall be at least 30%
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.



6.4. Test Positions

6.4.1. Device Holder

The device holder is made out of low-loss POM material having the following dielectric parameters:
relative permittivity $\epsilon = 3$ and loss tangent $\delta = 0.02$.

6.4.2. SAR Testing for Tablet

Per FCC KDB Publication 616217 D04, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. SAR exclusion thresholds in FCC KDB Publication 447498 and RSS-102 can be applied to determine SAR test exclusion for adjacent edge(s).

6.5. RF Safety Laboratory SAR System Measurement Uncertainty

SAR Uncertainty for DUTs According to 62209-1528										
(Frequencies: 4 MHz - 10 GHz)										
Symbol	Input Quantity (Xi) (Source of Uncertainty)	62209-1528 Ref	Unc. (xi)	Prob. Dist. PDFi	Div(qi)	ci (1g)	ci (10g)	Std Unc (1g)	Std. Unc (10g)	vi
Measurement System Errors										
CF	Probe Calibration	8.4.1.1	18.6%	N (k=2)	2	1	1	9.30%	9.3%	∞
CFdrift	Probe Calibration Drift	8.4.1.2	1.7%	R	$\sqrt{3}$	1	1	1.0%	1.0%	∞
LIN	Probe Linearity and Detection Limit	8.4.1.3	4.7%	R	$\sqrt{3}$	1	1	2.7%	2.7%	∞
BBS	Broadband Signal	8.4.1.4	2.8%	R	$\sqrt{3}$	1	1	1.6%	1.6%	∞
ISO	Probe Isotropy	8.4.1.5	7.6%	R	$\sqrt{3}$	1	1	4.4%	4.4%	∞
DAE	Other probe and data acquisition errors	8.4.1.6	2.4%	N	1	1	1	2.4%	2.4%	∞
AMB	RF Ambient and Noise	8.4.1.7	1.8%	N	1	1	1	1.8%	1.8%	∞
Δxyz	Probe Positioning Errors	8.4.1.8	0.005 mm	N	1	0.5	0.5	0.3%	0.3%	
DAT	Data Processing Errors	8.4.1.9	3.5%	N	1	1	1	3.5%	3.5%	∞
Phantom and Device Errors										
LIQ(σ)	Measurement of Phantom Conductivity	8.4.2.1	2.5%	N	1	0.78	0.71	2.0%	1.8%	∞
LIQ(Tc)	Temperature Effects (Medium)	8.4.2.2	5.4%	R	$\sqrt{3}$	0.78	0.71	2.4%	2.2%	∞
EPS	Shell Permittivity	8.4.2.3	14.0%	R	$\sqrt{3}$	0.5	0.5	4.0%	4.0%	∞
DIS	Distance between the radiating element of the DUT and the phantom medium	8.4.2.4	2.0%	N	1	2	2	4.0%	4.0%	∞
Dxyz	Repeatability of Positioning the DUT or source against the phantom	8.4.2.5	1.0%	N	1	1	1	1.0%	1.0%	5
H	Device Holder Effects	8.4.2.6	3.6%	N	1	1	1	3.6%	3.6%	8
MOD	Effect of Operating mode on probe sensitivity	8.4.2.7	2.4%	R	$\sqrt{3}$	1	1	1.4%	1.4%	∞
RFdrift	Variation in SAR due to Drift in output of DUT	8.4.2.9	2.5%	N	1	1	1	2.5%	2.5%	∞
VAL	Validation Antenna Uncertainty (Validation measurement only)	8.4.2.10	0.0%	N	1	1	1	0.0%	0.0%	∞
Pin	Uncertainty in Accepted Power (Validation Measurement only)	8.4.2.11	0.0%	N	1	1	1	0.0%	0.0%	∞
Correction to the SAR Results										
C(ϵ' , σ)	Phantom Deviation from Target (ϵ' , σ)	8.4.3.1	1.9%	N	1	1	0.84	1.9%	1.6%	∞
C(R)	SAR Scaling	8.4.3.2	0.0%	R	$\sqrt{3}$	1	1	0.0%	0.0%	∞
u(Δ SAR)	Combined Uncertainty							14.3%	14.3%	∞
U	Expanded Uncertainty and Effective Degrees of Freedom (k=2)							28.7%	28.5%	



7. Equipment List

Manufacturer	Model	Description	Serial Number	Calibration Date	Calibration Due	CBT
Rohde & Schwarz	SMCV100B	R&S SMCV100B Vector Signal Generator (VSG)	103882	12/30/25	12/30/27	-
SPEAG	Powersource1	Signal Generator	4341	1/6/26	1/6/27	-
Anritsu	MA24118A	Microwave USB Power Sensor (10MHz - 18 GHz)	2123431	1/22/26	1/22/27	-
Anritsu	MA24118A	Microwave USB Power Sensor (10MHz - 18 GHz)	2123500	1/22/26	1/22/27	-
Rohde & Schwarz	NRP85	Power Sensor 10 MHz - 8 GHz	114184	3/12/26	3/12/27	-
Anritsu	S820E	Vector Network Analyzer	2348026	1/13/26	1/13/28	-
Control Company	4040	Ambient Thermometer	250440190	7/17/25	7/17/27	-
Control Company	4352	Long Stem Liquid Thermometer	250257657	4/23/25	4/23/27	-
Micro-Coax	UFB205A-0-0240-30x30	SMA M-F RF test Cable (DC - 18 GHz)	-	-	-	✓
Mini-Circuits	BW-N20W20+	20dB RF Fixed Attenuator (DC - 18 GHz)	-	-	-	✓
Mini-Circuits	BW-S3W2+	3dB RF Fixed Attenuator (DC - 18 GHz)	-	-	-	✓
Mini-Circuits	CBL-6FT-SMNM+	Precision Test Cable SMA/N (DC - 18 GHz)	3318	-	-	✓
Mini-Circuits	CBL-6FT-SMNM+	Precision Test Cable SMA/N (DC - 18 GHz)	3335	-	-	✓
Mini-Circuits	CBL-6FT-SMNM+	Precision Test Cable SMA/N (DC - 18 GHz)	3329	-	-	✓
Mini-Circuits	NF-SF50+	RF Adapter N Male to SMA Female (DC - 18 GHz)	-	-	-	✓
Narda	24785-20	20 dB SMA Fixed Attenuator (DC - 4.0 GHz)	-	-	-	✓
Narda	4226-20 (26733)	20 dB SMA Directional Coupler (0.5 - 18 GHz)	201	-	-	✓
Mitutoyo	CD-4"AX	Digital Caliper	B23243217	8/28/25	8/28/27	-
SPEAG	DAK-12	DAK-12 Dielectric Probe	1194	10/10/25	10/10/26	-
SPEAG	CLA13	13 MHz System Validation Source	1041	10/11/24	10/11/26	-
SPEAG	DAE4ip	Data Acquisition Electronics with Integ. Power	1843	7/30/25	7/30/26	-
SPEAG	EX3DV4	SAR Measurement Probe	7872	8/8/25	8/8/26	-
SPEAG	SE UMS 171 E	MAIA Modulation and Interference Analyzer	1814	-	-	-
SPEAG	SE UMS 176 C	ANT Wideband Communication Antenna	1579	-	-	-

✓Note: Components calibrated before testing. Prior to testing, the measurement paths containing a cable, attenuator, coupler or filter were connected to a calibrated source (i.e. a signal generator, power sensor, or VNA) 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.



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8. Conclusion

The SAR evaluation indicates that the DUT is capable of compliance with the RF radiation exposure limits of the FCC and Health Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.