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URS FCC TEST REPORT

Applicant Name
Microsoft Corporation
One Microsoft Way
Redmond, WA 98052 USA

Date of Testing
07/11/22 – 07/21/22
Test Site/Location
Element, Columbia, MD, USA
Document Serial No:
1M2204040049-22.C3K (Rev2)

FCC ID: **C3K1997**

APPLICANT: **MICROSOFT CORPORATION**

DUT Type: Portable Computing Device
Application Type: Certification
FCC Rule Part(s): 47 CFR §2.1093
Model: 1997

Frequency Evaluated	3 kHz ~ 10 MHz	10 MHz ~ 6 GHz	6 GHz ~ 110 GHz
SAR/RF Exposure Level	< 0.01 W/kg	0.072 W/kg	0.243 W/m^2
Total Exposure Ratio	**< 10% (PASS)**		

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.

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.

RJ Ortanez
Executive Vice President

ACCREDITED
CERT #2041.01

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1. INTRODUCTION

1.1. Unintentional Radiator RF Sources (URS)

An **unintentional radiator** is defined in ANSI 63.4 as "A device that generates radio-frequency (RF) energy for use within the device or that sends RF signals by conduction to associate equipment via connecting wiring, but that is not intended to emit RF energy by radiation or induction."

Unintentional radiators **shall be FCC authorized prior to the "initiation of marketing, pursuant to the procedures for certification or Supplier's Declaration of Conformity (SDoC)"** according to 47CFR 15.101.

A **digital device** is defined in ANSI C63.4 as "an unintentional radiator (device or system) that uses digital techniques and generates and uses timing signals or pulses at a rate in excess of 9000 pulses (cycles) per second, inclusive of telephone equipment that uses digital techniques or any device or system that generates and uses radio-frequency (RF) energy for the purpose of performing data processing functions, such as electronic computations, operations, transformations, recording, filing, sorting, storage, retrieval, or transfer."

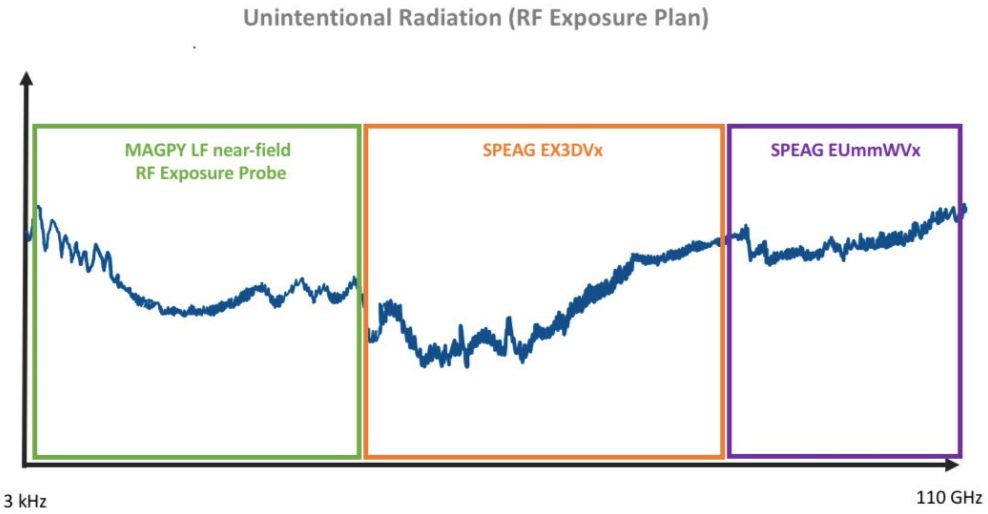
The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices.

Per the **April 2022 TCB Workshop** Unintentional Radiator Compliance Policy (page 33), "a conservative estimate of the total emission power (integrated over the spectrum, as required) shall be provided via well-supported documentation showing analytical/numerical models and/or measurements."

If the Total Exposure Ratio (TER) <= 10% of the FCC limit, no further evaluation for URS is needed. Otherwise, the term shall be added to the contribution of the intentional radiators in the RF Exposure evaluation of the product.

1.2. URS Measurement Methodology

To cover all unintentional radiations, three different near field exposure probes were used to capture the electromagnetic emission from a digital device.



Per the System manufacturer's recommendation, the following settings were configured for the measurement system to produce a conservative measurement over three broad frequency ranges.

- MAPGy:
  - scans were performed at the frequencies within 3dB of the spectral power peak

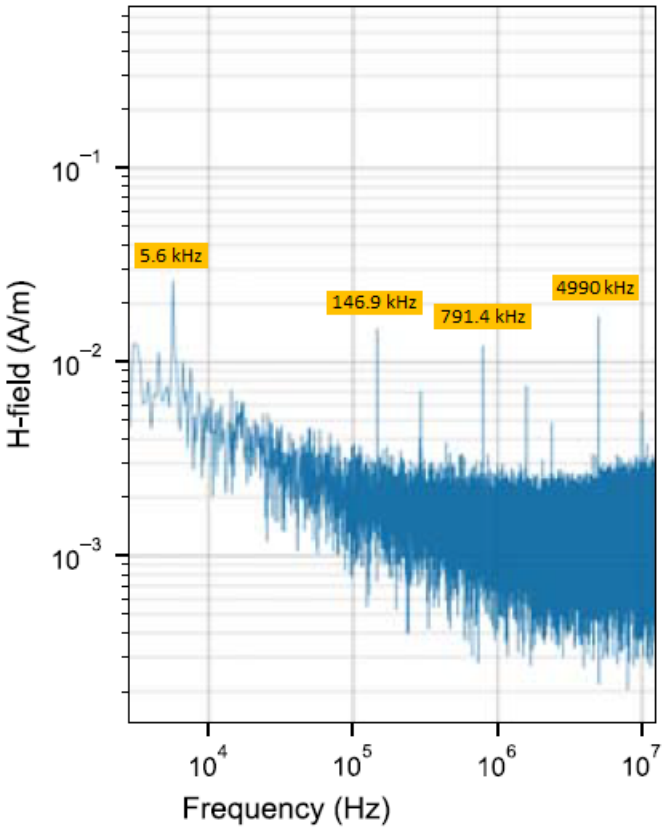


Figure 1-1
Peak Spectrum using MAGPy (tested frequencies are labeled)

- SAR:
  - SAR was measured with the probe configured with the 5.85 GHz ConvF
- mmWave:
  - psPD evaluation used the resolution and settings for PD measurement at 6 GHz

2. DATA SUMMARY

2.1. 3 kHz ~ 10 MHz SAR URS Test Result

Table 2.1
< 10 MHz Unintentional Radiator SAR

MEASUREMENT RESULTS						
FREQUENCY kHz	Mode	Spacing (mm)	Device Serial Number	Side	SAR (1g) (W/kg)	Plot #
5.6	Unintentional	0	0800E	Back	0.000001	C1
146.9	Unintentional	0	0800E	Back	0.000001	C2
791.4	Unintentional	0	0800E	Back	0.000001	C3
4990.0	Unintentional	0	0800E	Back	0.000001	C4
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population			**Body 1.6 W/kg (mW/g) averaged over 1 gram**			

2.2. 10 MHz ~ 6000 MHz SAR URS Test Result

Table 2.2
10 – 6000 MHz Unintentional Radiator SAR

MEASUREMENT RESULTS						
FREQUENCY MHz	Mode	Spacing (mm)	Device Serial Number	Side	SAR (1g) (W/kg)	Plot #
10 - 6000	Unintentional	0	0800E	Back Side, Top-Right Corner	0.072	C5
10 - 6000	Unintentional	0	0800E	Back Side, Top-Left Corner	0.057	
10 - 6000	Unintentional	0	0800E	Back Side, Bottom-Right Corner	0.056	
10 - 6000	Unintentional	0	0800E	Back Side, Bottom-Left Corner	0.055	
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population			**Body 1.6 W/kg (mW/g) averaged over 1 gram**			

2.3. 6 GHz ~ 110 GHz Power Density Result

Table 2.3
6 - 110 GHz Unintentional Radiator Power Density

MEASUREMENT RESULTS								
Frequency (GHz)	Mode	Spacing (mm)	DUT Serial Number	Side	Grid Step (λ)	Normal psPD (W/m²)	Total psPD (W/m²)	Plot #
6 - 110	Unintentional	2	0800E	Back	0.25	0.239	0.243	C6
47 CFR §1.1310 - SAFETY LIMIT Spatial Average Uncontrolled Exposure / General Population			**Power Density 10 W/m² averaged over 4 cm²**					

Test 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 D04 v01
2. Batteries are fully charged at the beginning of the measurements. The DUT was connected to a wall charger via the USB-C port.
3. For the SAR test covering the 4 MHz-6 GHz range, the liquid tissue depth was at least 15.0 cm.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. Power density was calculated by repeated E-field measurements on two measurement planes separated by λ/4.
6. Per April 2022 TCB Workshop Notes, for all f ≤ 6 GHz, SAR limits in § 1.1310(c) can always be applied if available, in place of MPE limits
7. For frequencies 10MHz and below, the MAGPy system was used for testing. The MAGPy system uses a 3-axis H-field sensor comprised of 3 concentric loops to measure the H-field amplitude and gradient. A 3-D scan is used with an MQS solver to compute SAR values within the measured volume.
8. Due to the size of the device, multiple SAR scans were used.

2.4. Total Exposure Ratio

Table 2.4
Unintentional Radiator Total Exposure Ratio

Tx Frequency Range (MHz)	Tx Frequency (MHz)	SAR	PD	TER
		1g (W/kg)	psPD (W/m²)	
0.1 - 10	0.0056	0.000001	N/A	0.069
	0.1469	0.000001		
	0.7914	0.000001		
	4.99	0.000001		
10 - 6000		0.072	N/A	
6000 - 110000		N/A	0.243	
FCC Limit		1.6	10	