



# ELEMENT WASHINGTON DC LLC

7185 Oakland Mills Road, Columbia, MD 21046 USA  
Tel. 410.290.6652 / Fax 410.290.6654  
<http://www.element.com>

## RF EXPOSURE EVALUATION Maximum Permissible Exposure (MPE)

**Applicant Name:**  
Microsoft Corporation  
One Microsoft Way  
Redmond, WA 98052  
United States

**Date of Testing:**  
12/14/2023 - 03/08/2024  
**Test Report Issue Date:**  
03/19/2024  
**Test Site/Location:**  
Element Lab. Columbia, MD, USA  
**Test Report Serial No.:**  
1M2312010120-29.C3K

<b>FCC ID:</b>	<b>C3K2077</b>
<b>APPLICANT:</b>	<b>Microsoft Corporation</b>

**EUT Type:** Portable Computing Device  
**FCC Classification:** PCS Licensed Transmitter (PCB)  
Citizens Band End User Devices (CBE)  
Digital Transmission System (DTS)  
Part 15 Spread Spectrum Transmitter (DSS)  
Unlicensed National Information Infrastructure TX (NII)  
15E 6 GHz Low Power Dual Client (6CD)  
**FCC Rule Part:** FCC Part 1 (§1.1310) and Part 2 (§2.1091)  
**Test Procedure(s):** KDB 447498 D01 v06

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in FCC KDB 447498 D01. Test results reported herein relate only to the item(s) tested.

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.

**RJ Ortanez**  
Executive Vice President



<b>FCC ID:</b> C3K2077	<b>MAXIMUM PERMISSIBLE EXPOSURE REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2312040120-29.C3K	<b>Test Dates:</b> 12/14/2023 - 03/08/2024	<b>EUT Type:</b> Portable Computing Device	Page 1 of 6



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# 1.0 RF EXPOSURE EVALUATION – MAXIMUM PERMISSIBLE EXPOSURE (MPE)

## 1.1 Introduction

This document is prepared to show compliance with the RF Exposure requirements as required in §1.1310 of the FCC Rules and Regulations.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310: the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b).

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time (Minutes)
(A) Limits For Occupational / Control Exposures (f = frequency)				
30-300	61.4	0.163	1.0	6
300-1500	...	...	f/300	6
1500-100,000	...	...	5.0	6
(B) Limits For General Population / Uncontrolled Exposure (f = frequency)				
30-300	27.5	0.073	0.2	30
300-1500	...	...	f/1500	30
1500-100,000	...	...	1.0	30

**Table 1-1. Limits for Maximum Permissible Exposure (MPE)**

## 1.2 EUT Description

The **Microsoft Corporation FCC ID: C3K2077** is a Portable Computing Device 2.4GHz transmit output ports, 5GHz, and 6GHz transmit output ports capable for transmitting 802.11a/b/g/n/ac/ax/be modes and WCDMA/HSPA, and Multi-band LTE, Multi-band 5G NR operation. This MPE evaluation will cover RF Exposure for simultaneous transmission modes of transmitters operating at maximum power.

EUT:

Company Name: Microsoft Corporation

FCC ID: C3K2077

Antenna(s): Please see technical description for list of available antenna options

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### 1.3 Procedure

The procedure used to determine the RF power density was based upon a calculation for determining compliance with the MPE requirements.

The power generated by each transmitter used in this product was initially measured by a power meter or spectrum analyzer and the powers were recorded. Through use of the Friis transmission formula and knowledge of the maximum antenna gain to be used, the power density level is calculated at a distance of 20cm.

#### Friis Transmission Formula

Friis transmission formula:  $P_d = (P_{out} * G) / (4\pi r^2)$

Where,

$P_d$  = Power Density (mW/cm<sup>2</sup>)

$\pi$  = 3.1416

$P_{out}$  = output power to antenna (mW)

$r$  = distance between observation point and center of the radiator (cm)

$G$  = gain of antenna in linear scale

#### Calculated MPE

The power density limit for General Population/Uncontrolled Exposure at each frequency is determined based on the information in Table 1-1.

There is no co-location between the electric fields of any two transmitters therefore following power densities are calculated for each individual transmitter by frequency at 20cm spacing:

<b>Frequency</b>	663 MHz		
<b>Limit</b>	0.442 mW/cm <sup>2</sup>		
<b>Distance (cm), R =</b>	20 cm		
<b>Power (dBm), P =</b>	25 dBm	316.23 mW	
<b>TX Ant Gain (dBi), G =</b>	-2.7 dBi		
<b>Power Density (S) =</b>	<b>0.034</b> mW/cm <sup>2</sup>	(at 20cm)	
<b>Minimum Distance =</b>	<b>5.5</b> cm		

**Table 1-2. Calculated MPE Data for Cellular Band (LTE Band 71)**

<b>Frequency:</b>	663 MHz		
<b>Limit:</b>	0.442 mW/cm <sup>2</sup>		
<b>Distance (cm), R =</b>	20 cm		
<b>Power (dBm), P =</b>	25 dBm	316.23 mW	
<b>TX Ant Gain (dBi), G =</b>	-2.7 dBi		
<b>Power Density (S) =</b>	<b>0.0338</b> mW/cm <sup>2</sup>	(at 20cm)	
<b>Minimum Distance =</b>	<b>5.5</b> cm		

**Table 1-3. Calculated MPE Data for NR Band (n71)**

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Frequency	2412 MHz		
Limit	1.000 mW/cm <sup>2</sup>		
Distance (cm), R =	20 cm		
Power (dBm), P =	24.5 dBm	281.84 mW	
TX Ant Gain (dB), G =	3.36 dBi		
Power Density (S) =	0.122 mW/cm <sup>2</sup>	(at 20cm)	
Minimum Distance =	7.0 cm		

Table 1-4. Calculated MPE Data for WIFI 2.4GHz (MIMO)

Frequency	5180 MHz		
Limit	1.000 mW/cm <sup>2</sup>		
Distance (cm), R =	20 cm		
Power (dBm), P =	24 dBm	251.19 mW	
TX Ant Gain (dB), G =	5.73 dBi		
Power Density (S) =	0.187 mW/cm <sup>2</sup>	(at 20cm)	
Minimum Distance =	8.6 cm		

Table 1-5. Calculated MPE Data for WIFI 5GHz (MIMO)

Frequency	5935 MHz		
Limit	1.000 mW/cm <sup>2</sup>		
Distance (cm), R =	20 cm		
Power (dBm), P =	23 dBm	199.53 mW	
TX Ant Gain (dB), G =	6.44 dBi		
Power Density (S) =	0.175 mW/cm <sup>2</sup>	(at 20cm)	
Minimum Distance =	8.4 cm		

Table 1-6. Calculated MPE Data for WIFI 6GHz (MIMO)

	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Percent MPE Used (%)
LTE B71	0.034	0.442	7.64
NR Band n71	0.034	0.442	7.64
2.4GHz MIMO	0.122	1.000	12.15
5GHz MIMO	0.187	1.000	18.70
<b>Total</b>			<b>46.14</b>

Table 1-7. Co-location MPE Data for Simultaneous Transmission

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## 2.0 CONCLUSION

The device meets the mobile RF exposure limit at a 20cm separation distance as specified in §2.1091 of the FCC Rules and Regulations. An appropriate RF exposure compliance statement will be placed in the user's manual.

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