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RF EXPOSURE EVALUATION
Maximum Permissible Exposure (MPE)

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

Date of Testing:
01/03/2024 - 03/11/2024
Test Report Issue Date:
03/19/2024
Test Site/Location:
Element Lab. Columbia, MD, USA
Test Report Serial No.:
1M2311170118-17.C3K

FCC ID:	**C3K2085**
APPLICANT:	**Microsoft Corporation**

EUT Type:	Portable Computing Device
FCC Classification:	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

ACCREDITED
CERT #2041.01

TABLE OF CONTENTS

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^2)	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: C3K2085** is a Portable Computing Device containing 2.4GHz transmit output ports, 5GHz, and 6GHz transmit output ports capable for transmitting 802.11a/b/g/n/ac/ax/be modes 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: C3K2085

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

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^2) $\pi = 3.1416$
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.

The following power densities are calculated for each individual transmitter by frequency at 20cm spacing. This analysis considers the RF exposure for the mobile condition where no motion is detected and the output power levels may exceed the levels measured for SAR in the portable use case.

Frequency	2412	MHz		
Limit	1.000	mW/cm^2		
Distance (cm), R =	20	cm		
Power (dBm), P =	24	dBm	251.19	mW
TX Ant Gain (dBi), G =	4.37	dBi		
Power Density (S) =	**0.137**	mW/cm^2	(at 20cm)	
Minimum Distance =	**7.4**	cm		

Table 1-2. Calculated MPE Data for WIFI 2.4GHz (MIMO)

Frequency:	5180	MHz		
Limit:	1.000	mW/cm^2		
Distance (cm), R =	20	cm		
Power (dBm), P =	23.5	dBm	223.87	mW
TX Ant Gain (dBi), G =	7.77	dBi		
Power Density (S) =	**0.267**	mW/cm^2	(at 20cm)	
Minimum Distance =	**10.3**	cm		

Table 1-3. Calculated MPE Data for WIFI 5GHz (MIMO)

Frequency	5935	MHz		
Limit	1.000	mW/cm^2		
Distance (cm), R =	20	cm		
Power (dBm), P =	23	dBm	199.53	mW
TX Ant Gain (dB), G =	7.88	dBi		
Power Density (S) =	**0.244**	mW/cm^2	(at 20cm)	
Minimum Distance =	**9.9**	cm		

Table 1-4. Calculated MPE Data for WIFI 6GHz (MIMO)

	Power Density (mW/cm^2)	Limit (mW/cm2)	Percent MPE Used (%)
2.4G MIMO	0.137	1.000	13.67
5G MIMO	0.267	1.000	26.65
Total			40.32

Table 1-5. Co-location MPE Data for Simultaneous Transmission

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.