

RF EXPOSURE EVALUATION

Maximum Permissible Exposure (MPE)

Applicant Name:

Microsoft Corporation
One Microsoft Way
Redmond, WA 98052
United States

Date of Testing:

12/3/2024 - 3/7/2025

Test Report Issue Date:

4/29/2025

Test Site/Location:

Element lab., Columbia, MD, USA

Test Report Serial No.:

1M2411190103-08-R2.C3K

FCC ID:**C3K2114****APPLICANT:****Microsoft Corporation****EUT Type:**

Full Modular

FCC Classification:

PCS Licensed Transmitter (PCB), Citizens Band End User Devices (CBE)

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.

This revised Test Report (S/N: 1M2411190103-08-R2.C3K) supersedes and replaces the previously issued test report (S/N: 1M2411190103-08-R1.C3K) 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.



RJ Ortiz
Executive Vice President



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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 and RSS-102 of Industry Canada.

The limit for Maximum Permissible Exposure (MPE), specified in FCC §1.1310, is listed in Table 1-1. According to FCC §1.1310 and RSS-102: 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: C3K2114** is a full modular containing WCDMA, LTE and 5G NR (FR1).

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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/cm²)

π = 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:

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Technology	Band	RF Exposure Limit					RFx Limiter	EIRP Limit		EIRP Limiter				
		Frequency [MHz]	Max Power [dBm]	Max Power [mW]	Distance [cm]	FCC PD Limit [mW/cm^2]	ISED PD Limit [W/m^2]	PD Limit [mW/cm^2]	FCC EIRP Limit [dBm]	ISED EIRP Limit [dBm]	EIRP Limit [dBm]			
NR-FR1	n2	1850	25.5	354.81	20	1.000	4.476	0.448	33.01	33.01	33.01	8.0	7.5	7.5
NR-FR1	n5	824	25.0	316.23	20	0.549	2.576	0.258	40.61	40.61	40.61	6.1	15.6	6.1
NR-FR1	n12	699	25.0	316.23	20	0.466	2.302	0.230	46.92	46.92	46.92	5.6	21.9	5.6
NR-FR1	n14	788	25.0	316.23	20	0.525	N/S	0.525	46.92	N/S	46.92	9.2	21.9	9.2
NR-FR1	n25	1850	25.5	354.81	20	1.000	4.476	0.448	33.01	33.01	33.01	8.0	7.5	7.5
NR-FR1	n26	814	25.0	316.23	20	0.543	N/S	0.543	40.61	N/S	40.61	9.4	15.6	6.1
NR-FR1	n30	2305	24.0	251.19	20	1.000	N/S	1.000	23.98	N/S	23.98	13.0	-0.1	-0.1
NR-FR1	n41 PC2	2496	27.0	501.19	20	1.000	5.493	0.549	33.01	33.01	33.01	7.4	6.0	6.0
NR-FR1	n41 PC3	2496	25.5	354.81	20	1.000	5.493	0.549	33.01	33.01	33.01	8.9	7.5	7.5
NR-FR1	n48	3550	22.0	158.49	20	1.000	N/S	1.000	23.00	N/S	23.00	15.0	1.0	1.0
NR-FR1	n66	1710	25.5	354.81	20	1.000	4.242	0.424	30.00	30.00	30.00	7.8	4.5	4.5
NR-FR1	n71	663	25.0	316.23	20	0.442	2.220	0.222	46.92	46.92	46.92	5.4	21.9	5.4
NR-FR1	n77 PC2	3450	27.0	501.19	20	1.000	N/S	1.000	30.00	N/S	30.00	10.0	3.0	3.0
NR-FR1	n77 PC3	3450	25.0	316.23	20	1.000	N/S	1.000	30.00	N/S	30.00	12.0	5.0	5.0
NR-FR1	n78 PC2	3450	27.0	501.19	20	N/S	6.853	0.685	N/S	30.00	30.00	8.4	3.0	3.0
NR-FR1	n78 PC3	3450	25.0	316.23	20	N/S	6.853	0.685	N/S	30.00	30.00	10.4	5.0	5.0
LTE	2	1850	25.5	354.81	20	1.000	4.476	0.448	33.01	33.01	33.01	8.0	7.5	7.5
LTE	4	1710	25.5	354.81	20	1.000	4.242	0.424	30.00	30.00	30.00	7.8	4.5	4.5
LTE	5	824	25.0	316.23	20	0.549	2.576	0.258	40.61	40.61	40.61	6.1	15.6	6.1
LTE	7	2500	25.5	354.81	20	N/S	5.499	0.550	N/S	33.01	33.01	8.9	7.5	7.5
LTE	12	699	25.0	316.23	20	0.466	2.302	0.230	46.92	46.92	46.92	5.6	21.9	5.6
LTE	13	777	25.0	316.23	20	0.518	2.474	0.247	46.92	46.92	46.92	5.9	21.9	5.9
LTE	14	788	25.0	316.23	20	0.525	N/S	0.525	46.92	N/S	46.92	9.2	21.9	9.2
LTE	25	1850	25.5	354.81	20	1.000	4.476	0.448	33.01	33.01	33.01	8.0	7.5	7.5
LTE	26	814	25.0	316.23	20	0.543	N/S	0.543	40.61	N/S	40.61	9.4	15.6	6.1
LTE	30	2305	24.0	251.19	20	1.000	N/S	1.000	23.98	N/S	23.98	13.0	-0.1	-0.1
LTE	38	2570	25.5	354.81	20	N/S	5.604	0.560	N/S	33.01	33.01	9.0	7.5	7.5
LTE	41 PC2	2496	27.0	501.19	20	1.000	N/S	1.000	33.01	N/S	33.01	10.0	6.0	6.0
LTE	41 PC3	2496	25.5	354.81	20	1.000	N/S	1.000	33.01	N/S	33.01	11.5	7.5	7.5
LTE	48	3550	22.0	158.49	20	1.000	N/S	1.000	23.00	N/S	23.00	15.0	1.0	1.0
LTE	66	1710	25.5	354.81	20	1.000	4.242	0.424	30.00	30.00	30.00	7.8	4.5	4.5
LTE	71	663	25.0	316.23	20	0.442	N/S	0.442	46.92	N/S	46.92	8.4	21.9	8.4
WCDMA	2	1850	25.5	354.81	20	1.000	4.476	0.448	33.01	33.01	33.01	8.0	7.5	7.5
WCDMA	4	1710	25.5	354.81	20	1.000	4.242	0.424	30.00	30.00	30.00	7.8	4.5	4.5
WCDMA	5	824	25.0	316.23	20	0.549	2.576	0.258	40.61	40.61	40.61	6.1	15.6	6.1
NR UL MIMO	n41 PC1.5	2496	30.0	1000.00	20	1.000	5.493	0.549	33.01	33.01	33.01	4.4	3.0	3.0
NR UL MIMO	n48 PC3	3550	22.0	158.49	20	1.000	N/S	1.000	23.00	N/S	23.00	15.0	1.0	1.0
NR UL MIMO	n77 PC1.5	3450	30.0	1000.00	20	1.000	N/S	1.000	30.00	N/S	30.00	7.0	0.0	0.0
NR UL MIMO	n78 PC2	3450	27.0	501.19	20	N/S	6.853	0.685	N/S	30.00	30.00	8.4	3.0	3.0

Table 1-2. Calculated MPE and Antenna Gain Data - Standalone
Notes:

1. For testing and reporting purpose, LTEB5 and B26 Antenna Gain is harmonized, as well as NR n5 and n26.
2. N/S – Not supported.

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Technology	Band	RF Exposure Limit					RFx Limiter	EIRP Limit		EIRP Limiter							
		Frequency [MHz]	EN-DC Combo Max Power [dBm]	Max Power [dBm]	Max Power [mW]	Distance [cm]		FCC PD Limit [mW/cm^2]	ISED PD Limit [W/m^2]		PD Limit [mW/cm^2]	FCC EIRP Limit [dBm]	ISED EIRP Limit [dBm]	EIRP Limit [dBm]	FCC Percentage MPE Used	ISED Percentage MPE Used	Max Gain Based RFx [dBi]
EN-DC, FR1	n2	1850	25.5	22.5	177.83	20	1.000	4.476	0.448	33.01	33.01	33.01	0.224	0.500	8.0	10.5	8.0
EN-DC, FR1	n5	824	25.0	22.0	158.49	20	0.549	2.576	0.258	40.61	40.61	40.61	0.234	0.500	6.1	18.6	6.1
EN-DC, FR1	n12	699	25.0	22.0	158.49	20	0.466	2.302	0.230	46.92	46.92	46.92	0.247	0.500	5.6	24.9	5.6
EN-DC, FR1	n25	1850	25.5	22.5	177.83	20	1.000	4.476	0.448	33.01	33.01	33.01	0.224	0.500	8.0	10.5	8.0
EN-DC, FR1	n30	2305	24.0	21.0	125.89	20	1.000	N/S	1.000	23.98	N/S	23.98	0.049	N/S	13.0	2.9	2.9
EN-DC, FR1	n41 PC3	2496	25.5	22.5	177.83	20	1.000	5.493	0.549	33.01	33.01	33.01	0.275	0.500	8.9	10.5	8.9
EN-DC, FR1	n48	3550	22.0	19.0	79.43	20	1.000	N/S	1.000	23.00	N/S	23.00	0.040	N/S	15.0	4.0	4.0
EN-DC, FR1	n66	1710	25.5	22.5	177.83	20	1.000	4.242	0.424	30.00	30.00	30.00	0.199	0.469	7.8	7.5	7.5
EN-DC, FR1	n71	663	25.0	22.0	158.49	20	0.442	2.220	0.222	46.92	46.92	46.92	0.247	0.492	5.4	24.9	5.4
EN-DC, FR1	n77 PC2	3450	27.0	24.0	251.19	20	1.000	N/S	1.000	30.00	N/S	30.00	0.199	N/S	10.0	6.0	6.0
EN-DC, FR1	n77 PC3	3450	25.0	22.0	158.49	20	1.000	N/S	1.000	30.00	N/S	30.00	0.199	N/S	12.0	8.0	8.0
EN-DC, FR1	n78 PC3	3450	25.0	22.0	158.49	20	N/S	6.853	0.685	N/S	30.00	30.00	N/S	0.290	10.4	8.0	8.0
EN-DC, LTE	B2	1850	27.0	24.0	251.19	20	1.000	4.476	0.448	33.01	33.01	33.01	0.224	0.500	6.5	9.0	6.5
EN-DC, LTE	B4	1710	25.5	22.5	177.83	20	1.000	4.242	0.424	30.00	30.00	30.00	0.199	0.469	7.8	7.5	7.5
EN-DC, LTE	B5	824	27.0	24.0	251.19	20	0.549	2.576	0.258	40.61	40.61	40.61	0.234	0.500	4.1	16.6	4.1
EN-DC, LTE	7	2500	25.0	22.0	158.49	20	N/S	5.499	0.550	N/S	33.01	33.01	N/S	0.500	9.4	11.0	9.4
EN-DC, LTE	12	699	27.0	24.0	251.19	20	0.466	2.302	0.230	46.92	46.92	46.92	0.247	0.500	3.6	22.9	3.6
EN-DC, LTE	13	777	27.0	24.0	251.19	20	0.518	2.474	0.247	46.92	46.92	46.92	0.239	0.500	3.9	22.9	3.9
EN-DC, LTE	14	788	27.0	24.0	251.19	20	0.525	N/S	0.525	46.92	N/S	46.92	0.500	N/S	7.2	22.9	7.2
EN-DC, LTE	25	1850	25.5	22.5	177.83	20	1.000	4.476	0.448	33.01	33.01	33.01	0.224	0.500	8.0	10.5	8.0
EN-DC, LTE	26	814	25.5	22.5	177.83	20	0.543	N/S	0.543	40.61	N/S	40.61	0.168	N/S	8.8	18.1	4.1
EN-DC, LTE	30	2305	27.0	24.0	251.19	20	1.000	N/S	1.000	23.98	N/S	23.98	0.049	N/S	10.0	-0.1	-0.1
EN-DC, LTE	38	2570	25.0	22.0	158.49	20	N/S	5.604	0.560	N/S	33.01	33.01	N/S	0.500	9.5	11.0	9.5
EN-DC, LTE	41 PC3	2496	25.0	22.0	158.49	20	1.000	N/S	1.000	33.01	N/S	33.01	0.398	N/S	12.0	11.0	11.0
EN-DC, LTE	48	3550	25.5	22.0	158.49	20	1.000	N/S	1.000	23.00	N/S	23.00	0.040	N/S	12.0	1.0	1.0
EN-DC, LTE	66	1710	27.0	24.0	251.19	20	1.000	4.242	0.424	30.00	30.00	30.00	0.199	0.469	6.3	6.0	6.0
EN-DC, LTE	71	663	25.0	22.0	158.49	20	0.442	N/S	0.442	46.92	N/S	46.92	0.494	N/S	8.4	24.9	8.4

Table 1-3. Calculated MPE and Antenna Gain Data - EN-DC
Notes:

1. For testing and reporting purpose, LTEB5 and B26 Antenna Gain is harmonized.
2. N/S – Not supported.

EN-DC		Total Power Density LTE + NR (Percent MPE Used)
LTE Power Density (Percent MPE Used)	5G NR Power Density (Percent MPE Used)	
50.00	22.38	72.38

Table 1-4. Calculated MPE – LTE + NR

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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 and Health Canada Safety Code 6. An appropriate RF exposure compliance statement will be placed in the user's manual.

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