

MPE Evaluation Report for FCC

Applicant Name : Micro-Star INT'L CO., LTD.

Applicant Address : No.69, Lide St., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C)

Product Name : Industrial Data Machine

Brand Name : msi

Model Number : MS-C923

FCC ID : I4L-MSC923

Report Number : USSC254288001

Compliant Standards : FCC 47 CFR §2.1091

Sample Received Date : Apr. 23, 2025

Report Issued Date : Jul. 04, 2025

The above equipment has been tested by **Eurofins E&E Wireless Taiwan Co., Ltd.**, and found compliance with the requirement of the above standards. The test record, data evaluation & Device Under Test (DUT) configurations represented herein are true and accurate accounts of the measurements of the sample's characteristics under the conditions specified in this report.

Note:

1. The test results are valid only for samples provided by customers and under the test conditions described in this report.
2. This report shall not be reproduced except in full, without the written approval of Eurofins E&E Wireless Taiwan Co., Ltd.
3. The relevant information is provided by customers in this test report. According to the correctness, appropriateness or completeness of the information provided by the customer, if there is any doubt or error in the information which affects the validity of the test results, the laboratory does not take the responsibility.

Approved By :

Roy Wu / SAR Technical Director



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Revision History

Rev.	Issued Date	Description	Revised by
00	Jul. 04, 2025	Initial Issue	Emma Chao

1. Test Regulations

1.1. Reference Standard and Guidance

The Maximum Permissible Exposure (MPE) evaluation documented in this report were performed in accordance with following FCC published KDB guidance and standard :

47 CFR Part 1.1307

47 CFR Part 1.1310

47 CFR Part 2.1091

KDB Publication 447498 D01 – General RF Exposure Guidance v06

KDB Publication 447498 D04 – Interim General RF Exposure Guidance v01

1.2. RF Exposure Limits

According to 47 CFR §1.1310, for operations within the frequency range of 300 kHz and 6 GHz (inclusive), the limits for maximum permissible exposure (MPE), derived from whole-body SAR limits and listed in below table, may be used instead of whole-body SAR limits to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b), except for portable devices as defined in §2.1093 of this chapter as these evaluations shall be performed according to the SAR provisions in §2.1093. At operating frequencies above 6 GHz, the MPE limits listed in below table shall be used in all cases to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b).

Limits for Maximum Permissible Exposure (MPE) to Radiofrequency Electromagnetic Fields

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
(i) Limits for Occupational / Controlled Exposure				
0.3 – 3.0	614	1.63	*(100)	≤ 6
3.0 – 30	1842 / <i>f</i>	4.89 / <i>f</i>	*(900 / <i>f</i> ²)	< 6
30 – 300	61.4	0.163	1.0	< 6
300 – 1500	N/A	N/A	<i>f</i> / 300	< 6
1500 – 100000	N/A	N/A	5	< 6
(ii) Limits for General Population / Uncontrolled Exposure				
0.3 – 1.34	614	1.63	*(100)	< 30
1.34 – 30	824 / <i>f</i>	2.19 / <i>f</i>	*(180 / <i>f</i> ²)	< 30
30 – 300	27.5	0.073	0.2	< 30
300 – 1500	N/A	N/A	<i>f</i> / 1500	< 30
1500 – 100000	N/A	N/A	1.0	< 30

Notes:

1. *f* = frequency in MHz. * = Plane-wave equivalent power density.

2. **Occupational / Controlled Exposure Limits** apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. The phrase fully aware in the context of applying these exposure limits means that an exposed person has received written and/or verbal information fully explaining the potential for RF exposure resulting from his or her employment. With the exception of transient persons, this phrase also means that an exposed person has received appropriate training regarding work practices relating to controlling or mitigating his or her exposure. In situations when an untrained person is transient through a location where occupational / controlled limits apply, he or she must be made aware of the potential for exposure and be supervised by trained personnel pursuant to §1.1307(b)(2) of this part where use of time averaging is required to ensure compliance with the general population exposure limit. The phrase exercise control means that an exposed person is allowed and also knows how to reduce or avoid exposure by administrative or engineering work practices, such as use of personal protective equipment or time averaging of exposure.
3. **General Population / Uncontrolled Exposure Limits** apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure. For example, RF sources intended for consumer use shall be subject to the limits for general population / uncontrolled exposure in this section.

2. Information of Testing Laboratory

Test Facilities

Company Name: Eurofins E&E Wireless Taiwan Co., Ltd.
Address No.: 140-1, Changan Street, Bade District, Taoyuan City, Taiwan
Website: <https://www.atl.com.tw>
Telephone: +886-3-271-0188
Fax: +886-3-271-0190
E-mail: infoEETW@eurofins.com

Test Site Location

- ☒ No. 140-1, Changan Street, Bade District, Taoyuan City, Taiwan
☐ No. 2, Wuquan 5th Rd. Wugu Dist., New Taipei City, Taiwan

Laboratory Accreditation

Location	TAF	FCC	ISED
No. 140-1, Changan Street, Bade District, Taoyuan City, Taiwan	Accreditation No.: 1330	Designation No.: TW0010	Company No.: 7381A CAB ID: TW1330
No. 2, Wuquan 5th Rd. Wugu Dist., New Taipei City, Taiwan	Accreditation No.: 1330	Designation No.: TW0034	Company No.: 28922 CAB ID: TW1330

3. DUT (Device Under Test) Information

3.1. Device Overview

Product Name	Industrial Data Machine	
Brand Name	msi	
Model Name	MS-C923	
FCC ID	I4L-MS923	
Supported Wireless Technologies	Tx Frequency (MHz)	Operating Mode
	WCDMA Band 2 : 1852.4 ~ 1907.6 Band 4 : 1712.4 ~ 1752.6 Band 5 : 826.4 ~ 846.6	UMTS Rel. 99 (Voice / Data) HSDPA (Rel. 5) HSUPA (Rel. 6) HSPA+ (Rel. 7) DC-HSDPA (Rel. 8)
	LTE Band 2 : 1850.7 ~ 1909.3 Band 4 : 1710.7 ~ 1754.3 Band 5 : 824.7 ~ 848.3 Band 7 : 2502.5 ~ 2567.5 Band 12 : 699.7 ~ 715.3 Band 13 : 779.5 ~ 784.5 Band 14 : 790.5 ~ 795.5 Band 25 : 1850.7 ~ 1914.3 Band 26 : 814.7 ~ 848.3 Band 38 : 2572.5 ~ 2617.5 Band 41 : 2498.5 ~ 2687.5 Band 66 : 1710.7 ~ 1779.3 Band 71 : 665.5 ~ 695.5	QPSK, 16QAM, 64QAM
	WLAN 2.4G : 2412 ~ 2472 5G : 5180 ~ 5240, 5260 ~ 5320, 5500 ~ 5720, 5745 ~ 5825 6G : 5955 ~ 6415, 6435 ~ 6515, 6535 ~ 6875, 6895 ~ 7115	2.4G : 802.11b/g/n/ax 5G : 802.11a/n/ac/ax 6G : 802.11ax
	Bluetooth 2402 ~ 2480	BR, EDR, LE

Note:

The above DUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

4. Maximum Permissible Exposure (MPE) Assessment

4.1. Introduction

According to 47 CFR §2.1091, a mobile 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 a separation distance of at least 20 centimeters is normally maintained between the RF source's radiating structure(s) and the body of the user or nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and is not able to be easily moved to another location while transmitting. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal desktop computer, are considered to be mobile devices if they meet the 20-centimeter separation requirement. The exposure limits to be used for MPE evaluation are specified in §1.1310. All unlicensed personal communications service (PCS) devices and unlicensed NII devices shall be subject to the limits for general population / uncontrolled exposure.

4.2. Determination of Exemption for Low Power Devices

For Single RF Sources, a single RF source is exempt if:

Option A :

The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph §1.1307(b)(3)(ii)(A). Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(ii)(A).

Option B :

The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by:

$$P_{th}(mW) = \begin{cases} ERP_{20\text{ cm}}(d/20\text{ cm})^x & d \leq 20\text{ cm} \\ ERP_{20\text{ cm}} & 20\text{ cm} < d \leq 40\text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20\text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz}$$

and

$$ERP_{20\text{ cm}}(mW) = \begin{cases} 2040f & 0.3\text{ GHz} \leq f < 1.5\text{ GHz} \\ 3060 & 1.5\text{ GHz} \leq f \leq 6\text{ GHz} \end{cases}$$

d = the separation distance (cm).

Option C :

Using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1: Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency (MHz)	Threshold ERP (Watts)
0.3 – 1.34	$1.920 \times R^2$
1.34 – 30	$3.450 \times R^2 / f^2$
30 – 300	$3.83 \times R^2$
300 – 1500	$0.0128 \times R^2 \times f$
1500 – 100000	$19.2 \times R^2$

For Multiple RF Sources, multiple RF sources are exempt if:

Option A :

The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those in §1.1307(b)(3)(i)(A). Medical implant devices may only use this exemption and that in §1.1307(b)(3)(i)(A).

Option B :

In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

Where:

- a** = number of fixed, mobile, or portable RF sources claiming exemption per §1.1307(b)(3)(i)(B) for P_{th} , including existing exempt transmitters and those being added.
- b** = number of fixed, mobile, or portable RF sources claiming exemption per §1.1307(b)(3)(i)(C) for Threshold ERP, including existing exempt transmitters and those being added.
- c** = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.
- P_i** = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).
- $P_{th,i}$** = the exemption threshold power (P_{th}) according to §1.1307(b)(3)(i)(B) for fixed, mobile, or portable RF source i .
- ERP_j** = the ERP of fixed, mobile, or portable RF source j .
- $ERP_{th,j}$** = exemption threshold ERP for fixed, mobile, or portable RF source j , at a distance of at least $\lambda/2\pi$ according to the applicable formula of §1.1307(b)(3)(i)(C).
- $Evaluated_k$** = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.
- $Exposure Limit_k$** = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k , as applicable from §1.1310.

Tx Bands	Frequency (MHz)	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Peak Antenna Gain (dBi)	ERP (mW)	LPE Level in Option A (mW)	LPE Level in Option B (mW)	LPE Level in Option C (mW)	Low-Power Exemption Verdict
WCDMA Band 2	1852.4	25.13	326	2.44	348.34	N/A	3060	768	Pass by Option B
WCDMA Band 4	1712.4	25.00	316	2.97	381.94	N/A	3060	768	Pass by Option B
WCDMA Band 5	826.4	24.91	310	-0.80	157.04	N/A	1686	423	Pass by Option B
LTE B2	1850.7	24.65	292	2.44	311.89	N/A	3060	768	Pass by Option B
LTE B4	1710.7	24.70	295	2.97	356.45	N/A	3060	768	Pass by Option B
LTE B5	824.7	24.75	299	-0.80	151.36	N/A	1682	422	Pass by Option B
LTE B7	2502.5	24.62	290	-0.33	163.68	N/A	3060	768	Pass by Option B
LTE B12	699.7	24.72	296	1.38	248.31	N/A	1427	358	Pass by Option B
LTE B13	779.5	24.73	297	-0.04	179.47	N/A	1590	399	Pass by Option B
LTE B14	790.5	24.79	301	0.00	183.65	N/A	1613	405	Pass by Option B
LTE B25	1850.7	24.77	300	2.44	320.63	N/A	3060	768	Pass by Option B
LTE B26	814.7	24.66	292	-0.52	158.12	N/A	1662	417	Pass by Option B
LTE B38	2572.5	24.61	289	0.82	212.81	N/A	3060	768	Pass by Option B
LTE B41	2498.5	24.60	288	0.82	212.32	N/A	3060	768	Pass by Option B
LTE B66	1710.7	24.75	299	3.38	396.28	N/A	3060	768	Pass by Option B
LTE B71	665.5	24.57	286	1.87	268.53	N/A	1358	341	Pass by Option B

Tx Bands	Frequency (MHz)	Max. Tune-up Power (dBm)	Max. Tune-up Power (mW)	Peak Antenna / Directional Gain (dBi)	ERP (mW)	LPE Level in Option A (mW)	LPE Level in Option B (mW)	LPE Level in Option C (mW)	Low-Power Exemption Verdict
WLAN 2.4 GHz	2412	21.70	148	3.33	194.09	N/A	3060	768	Pass by Option B
WLAN 5.2 GHz	5180	21.31	135	4.32	222.84	N/A	3060	768	Pass by Option B
WLAN 5.3 GHz	5260	21.42	139	4.32	228.56	N/A	3060	768	Pass by Option B
WLAN 5.6 GHz	5500	20.85	122	4.32	200.45	N/A	3060	768	Pass by Option B
WLAN 5.8 GHz	5745	21.05	127	4.32	209.89	N/A	3060	768	Pass by Option B
WLAN 6.2 GHz	5935	10.36	11	4.47	18.54	N/A	3060	768	Pass by Option B
WLAN 6.5 GHz	6425	10.41	11	4.47	18.75	N/A	N/A	768	Pass by Option B
WLAN 6.7 GHz	6525	10.18	10	4.47	17.78	N/A	N/A	768	Pass by Option B
WLAN 7.0 GHz	6875	9.90	10	4.47	16.67	N/A	N/A	768	Pass by Option B
Bluetooth	2402	13.25	21	0.63	14.89	N/A	3060	768	Pass by Option B

Summary:

Since the maximum EIRP of this device is less than the LPE level and this device is qualified for Low Power Exemption under the field reference level exposure exemption limits of §1.1310, the emitted RF fields will be incapable of producing exposures that exceed the exposure limits. Hence, this device complies with the reference levels and a complete MPE evaluation is not required.

4.3. Standalone Maximum Permissible Exposure Evaluation

Maximum Permissible Exposure Assessment Method:

Calculations can be made to predict RF field strength and power density levels around typical RF sources. For example, in the case of a single radiating antenna, a prediction for power density in the far-field of the antenna can be made by use of the general Equations below. This equation is generally accurate in the far-field of an antenna but will over-predict power density in the near field, where they could be used for making a "worst case" or conservative prediction.

$$S_{eq} = \frac{P_{avg} \cdot G}{4 \cdot \pi \cdot R^2}$$

Where:

S_{eq} = Equivalent Plane Wave Power Density in mW/cm².

P_{avg} = Average Power at Antenna Terminals in Watts.

G = Gain of the Transmitting Antenna.

R = Distance from the Transmitting Antenna in meters.

Evaluation for Standalone MPE:

The manufacturer expects that the radiated component of this device will not close to the human body during normal usage and the warning statement was also stated in the user instruction. Since the transmitting antenna will be kept at least **20 cm** away from the human body, the MPE level is calculated based on this condition and the result is listed in below table.

Tx Bands	Frequency (MHz)	EIRP (mW)	Separation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)	MPE Compliance
WCDMA Band 2	1852.4	348.3	20	0.07	1.00	Pass
WCDMA Band 4	1712.4	381.9	20	0.08	1.00	Pass
WCDMA Band 5	826.4	157.0	20	0.03	0.55	Pass
LTE B2	1850.7	311.9	20	0.06	1.00	Pass
LTE B4	1710.7	356.5	20	0.07	1.00	Pass
LTE B5	824.7	151.4	20	0.03	0.55	Pass
LTE B7	2502.5	163.7	20	0.03	1.00	Pass
LTE B12	699.7	248.3	20	0.05	0.47	Pass
LTE B13	779.5	179.5	20	0.04	0.52	Pass
LTE B14	790.5	183.7	20	0.04	0.53	Pass
LTE B25	1850.7	320.6	20	0.06	1.00	Pass
LTE B26	814.7	158.1	20	0.03	0.54	Pass
LTE B38	2572.5	212.8	20	0.04	1.00	Pass
LTE B41	2498.5	212.3	20	0.04	1.00	Pass
LTE B66	1710.7	396.3	20	0.08	1.00	Pass
LTE B71	665.5	268.5	20	0.05	0.44	Pass

Tx Bands	Frequency (MHz)	EIRP (mW)	Separation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)	MPE Compliance
WLAN 2.4 GHz	2412	194.1	20	0.039	1.00	Pass
WLAN 5.2 GHz	5180	222.8	20	0.044	1.00	Pass
WLAN 5.3 GHz	5260	228.6	20	0.045	1.00	Pass
WLAN 5.6 GHz	5500	200.4	20	0.040	1.00	Pass
WLAN 5.8 GHz	5745	209.9	20	0.042	1.00	Pass
WLAN 6.2 GHz	5935	18.5	20	0.004	1.00	Pass
WLAN 6.5 GHz	6425	18.7	20	0.004	1.00	Pass
WLAN 6.7 GHz	6525	17.8	20	0.004	1.00	Pass
WLAN 7.0 GHz	6875	16.7	20	0.003	1.00	Pass
Bluetooth	2402	14.9	20	0.003	1.00	Pass

4.4. Total Exposure Ratio Evaluation for Simultaneous Transmission

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency.

$$\sum_{i=1}^{\infty} \frac{S_{eq,i}}{S_{Limit,i}} \leq 1$$

Where:

$S_{eq,i}$ = Power Density for the source i .

$S_{Limit,i}$ = Power Density Limit for the source i .

Evaluation for Simultaneous Exposure:

Tx Bands	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)	Exposure Ratio
WCDMA Band 2	0.07	1.0	0.069
WCDMA Band 4	0.08	1.0	0.076
WCDMA Band 5	0.03	0.6	0.057
LTE B2	0.06	1.0	0.062
LTE B4	0.07	1.0	0.071
LTE B5	0.03	0.5	0.055
LTE B7	0.03	1.0	0.033
LTE B12	0.05	0.5	0.106
LTE B13	0.04	0.5	0.069
LTE B14	0.04	0.5	0.069
LTE B25	0.06	1.0	0.064
LTE B26	0.03	0.5	0.058
LTE B38	0.04	1.0	0.042
LTE B41	0.04	1.0	0.042
LTE B66	0.08	1.0	0.079
LTE B71	0.05	0.4	0.120

Tx Bands	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)	Exposure Ratio
WLAN 2.4 GHz	0.039	1.0	0.039
WLAN 5.2 GHz	0.044	1.0	0.044
WLAN 5.3 GHz	0.045	1.0	0.045
WLAN 5.6 GHz	0.040	1.0	0.040
WLAN 5.8 GHz	0.042	1.0	0.042
WLAN 6.2 GHz	0.004	1.0	0.004
WLAN 6.5 GHz	0.004	1.0	0.004
WLAN 6.7 GHz	0.004	1.0	0.004
WLAN 7.0 GHz	0.003	1.0	0.003
Bluetooth	0.003	1.0	0.003
Tx 1	Tx 2	Tx 3	Total Exposure Ratio (<= 1)
LTE	WLAN 2.4G	Bluetooth	
0.106	0.039	0.003	0.148

Tx 1	Tx 2	Tx 3	Total Exposure Ratio (<= 1)
LTE	WLAN 5G	Bluetooth	
0.106	0.045	0.003	0.154

Tx 1	Tx 2	Tx 3	Total Exposure Ratio (<= 1)
LTE	WLAN 6G	Bluetooth	
0.106	0.004	0.003	0.113

Conclusion:

The device complies with the FCC RF exposure requirements specified in 47 CFR §1.1310, as both the standalone and simultaneous transmission Maximum Permissible Exposure (MPE) evaluations are below the applicable limits. The summation of the exposure ratios under worst-case conditions also meets the criteria, confirming compliance for simultaneous transmission scenarios.

Note:

The basic calculation formula is a conservative formula used to estimate RF field strength or power density. No uncertainty estimates are required when using these formulas. Determination of MPE compliance is based on calculation results and does not take measurement uncertainty into account.

***** End of Report *****