



RADIO EXPOSURE TEST REPORT

FCC ID : 2A74O-8A7DD6

Equipment : Wi-Fi Halow Module

Brand Name : Morse Micro

Model Name : MM6108-MF08251, MM6108-MF08551

Applicant : Morse Micro Pty Ltd
Level 8, 10-14 Waterloo Street, Surry Hills, NSW 2010

Manufacturer : Morse Micro Pty Ltd
Level 8, 10-14 Waterloo Street, Surry Hills, NSW 2010

Standard : 47 CFR Part 2.1091

The product was received on Jun. 22, 2022, and testing was started from Jul. 09, 2022 and completed on Jul. 27, 2022. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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Photographs of EUT v01



TEL : 886-3-656-9065
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Report Template No.: CB-A1_1 Ver1.1



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the chapter "Measurement Uncertainty".

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: **Sam Chen**

Report Producer: **Sandy Chuang**



1 General Description

1.1 EUT General Information

RF General Information				
Frequency Range (MHz)	Modulation Type	Ch. Frequency (MHz)	Channel Spacing (MHz)	Channel Number
902-928	OFDM	903.5-927.5	1	25
		905-927	2	12
		906-926	4	6
		908-924	8	3

1.2 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	PulseLarsen	W1063	Dipole	Reversed-SMA	1

Note: The above information was declared by manufacturer.

1.3 Accessories

N/A

1.4 Table for Multiple Listing

EUT	Model Name	Description
1	MM6108-MF08251	The difference between these two models as below. The modification is based on the original model (MM6108-MF08251) (1. Add 1x 10k Ohm resistor (Panasonic ERJ-1GNF1002C) (2. Add 1x 0R resistor (Panasonic ERJ-1GE0R00C) (3. Add 1x RF Switch (Richwave RTC6608OU) (4. Add 2x 100pF Capacitors (Murata GRM0335C1H101GA01D) (5. Move the components (resistance) that near the antenna to back side of the board.
2	MM6108-MF08551	

Note 1: From the above models, EUT 2 (Model Name: MM6108-MF08551) was selected as representative model for the test and its data was recorded in this report.

Note 2: The above information was declared by manufacturer.

1.5 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA262109-01.

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
Adding the second source for EUT 2 (Model Name: MM6108-MF08551): (1. Add 1x 10k Ohm resistor (Panasonic ERJ-1GNF1002C) (2. Add 1x 0R resistor (Panasonic ERJ-1GE0R00C) (3. Add 1x RF Switch (Richwave RTC6608OU) (4. Add 2x 100pF Capacitors (Murata GRM0335C1H101GA01D) (5. Move the components (resistance) that near the antenna to back side of the board. Please refer to section 1.1.4 for EUT information.	After evaluation, the test results don't be affected

Note: All test results are based on original test report.



1.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2.1091
- ♦ KDB 447498 D04 Interim General RF Exposure Guidance v01

The following reference test guidance is not within the scope of accreditation of TAF.

- ♦ 47 CFR Part 1.1307
- ♦ 47 CFR Part 1.1310

1.7 Testing Location

Testing Location Information	
Test Lab. : Sporton International Inc. Hsinchu Laboratory	
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)
(TAF: 3787)	TEL: 886-3-656-9065 FAX: 886-3-656-9085
	Test site Designation No. TW3787 with FCC.
	Conformity Assessment Body Identifier (CABID) TW3787 with ISED.



2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	*(100)	<6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1500	-	-	f/300	<6
1500-100,000	-	-	5	<6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1500	-	-	f/1500	<30
1500-100,000	-	-	1.0	<30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



2.3 MPE Exemption

Option (A): 1.1307(b)(3)(i)(A): Available maximum time-averaged power is < 1 mW

Option (B): 1.1307(b)(3)(i)(B): Device operates between 300 MHz and 6 GHz and the maximum time-averaged power or effective radiated power (ERP), whichever is greater, <= P_{th}.

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

Where

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

and

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

d = the separation distance (cm);

Option (C): 1.1307(b)(3)(i)(C): ERP is below a threshold calculated based on the distance

R between the person and the antenna / radiating structure, where $R > \lambda / 2 \pi$.

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$.
1.34-30	$3,450 R^2/f^2$.
30-300	$3.83 R^2$.
300-1,500	$0.0128 R^2 f$.
1,500-100,000	$19.2 R^2$.
Note: R is in meters, f is in MHz.	



2.4 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

<For EUT 1>

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
0.9G	1.00	20.87	21.87	0.50	22.37	0.17258	20	0.03433	0.61667

Note: The above antenna gain was declared by manufacturer.

MPE Exemption Option B						
Frequency (MHz)	R (m)	Tune-up EIRP (dBm)	Tune-up ERP (dBm)	Tune-up ERP (W)	ERP Threshold (W)	MPE Exemption
915	0.2	22.37	20.22	0.105	1.867	Complies



————THE END————