

**RF EXPOSURE  
CLASS II PERMISSIVE CHANGE REPORT**

**Applicant:** Cisco Systems Inc.  
125 West Tasman Dr, Bldg. P, San Jose, California, 95134  
USA

**Manufacturer:** Cisco Systems Inc.  
125 West Tasman Dr, Bldg. P, San Jose, California, 95134  
USA

**Product Name:** FM4500EMB-HW

**Brand Name:** Cisco Fluidmesh FM4500 EMBEDDED

**Model No.:** FM4500EMB

**Model Difference:** N/A

**Report Number:** ER/2021/A0116

**FCC ID** R5SX500E

**Issue Date:** May 19, 2022

**Date of EUT Received:** October 28, 2021

**Approved By** \_\_\_\_\_

**John Yeh**

**We hereby certify that:**

The above equipment was evaluate by SGS Taiwan Ltd. The evaluation in this report is in compliance with FCC Rule Part §2.1091.

The results of this report relate only to the sample identified in this report.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Revision History					
Report Number	Revision	Description	Issue Date	Revised By	Remark
ER/2021/A0116	00	Original.	May 5, 2022	Violetta Tang	*
ER/2021/A0116	01	Revise typo of the product description on page 4	May 19, 2022	Violetta Tang	

**Note:**

- 1、The remark "\*" indicates modification of the report upon requests from certification body.

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# 1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

## 1.1 Product Description

Product Name:	FM4500EMB-HW
Brand Name:	Cisco Fluidmesh FM4500 EMBEDDED
Model No.:	FM4500EMB
Model Difference:	N/A
Hardware Version:	N/A
Firmware Version:	N/A
EUT Series No.:	3500170840 / 3500171248
Class II Permissive Change:	FM4500EMB module INSTALLED IN FM3500, FM4500
Host Information:	<p>Product Name: FM3500ENDO-HW            Brand Name: Cisco Fluidmesh FM3500 ENDO            Model Name: FM3500, FM4500            Model Differences as below.</p> <ol style="list-style-type: none"> <li>1. Some passive components of the DCIN circuit are mounted on PCB in FM4500 model.</li> <li>2. Antenna connectors are different: RPSMA on FM3500, QMA on FM4500.</li> <li>3. Bottom part of FM4500 enclosure has M12 connectors instead of RJ45 ports: M12 DCIN port is added on FM4500.</li> </ol>
Power Supply:	56Vdc
Test Software (Name/Version)	Default

## 1.2 Evaluation site

Laboratory	Site Address	FCC Designation number	ISED Company Number	CAB Identifier
SGS Taiwan Ltd. Central RF Lab. (TAF code 3702)	<input checked="" type="checkbox"/> No. 134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, 24803, Taiwan.	TW0027	4620A	TW3702
	<input type="checkbox"/> No. 2, Keji 1st Rd., Guishan Township, Taoyuan County, 333 Taiwan.	TW0028	4620E	
	<input type="checkbox"/> 1F, No. 8, Alley 15, Lane 120, Sec. 1, Nei Hu Road, Nei Hu District, Taipei City, 222 Taiwan.	TW0029	23862	

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### 1.3 Antenna Information:

#### 1.3.1 WLAN 5GHz

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)	Directional Gain (dBi)
Direction	Fluidmesh	FM-TUBE	5150~5250	14.60	17.61
			5250~5350		
			5470~5725		
			5725~5850		
Omnidirection	Fluidmesh	FM-SHARK-DUAL	5150~5250	13.00	16.01
			5250~5350		
			5470~5725		
			5725~5850		
Direction	Fluidmesh	FM-HORN-90	5150~5250	10.00	13.01
			5250~5350		
			5470~5725		
			5725~5850		
Omnidirection	Fluidmesh	FM-OMNI-5-V	5150~5250	4.00	7.52
			5250~5350		
			5470~5725		
			5725~5850		
Omnidirection	Fluidmesh	FM-OMNI-5-H	5150~5250	5.00	
			5250~5350		
			5470~5725		
			5725~5850		
Omnidirection	MP Antenna LTD.	08-ANT-0985	5150~5250	3.00	6.01
			5250~5350		
			5470~5725		
			5725~5850		

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1.3.2 WLAN 4.9GHz

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak Antenna Gain (dBi)	Directional Gain (dBi)
Direction	Fluidmesh	FM-TUBE	4960~4980	14.60	17.61
Omnidirection	Fluidmesh	FM-SHARK-DUAL	4960~4980	13.00	16.01
Direction	Fluidmesh	FM-HORN-90	4960~4980	10.00	13.01
Omnidirection	Fluidmesh	FM-OMNI-5-V	4960~4980	4.00	7.52
Omnidirection	Fluidmesh	FM-OMNI-5-H	4960~4980	5.00	
Omnidirection	MP Antenna LTD.	08-ANT-0985	4960~4980	3.00	6.01

**Note:** Antenna information is provided by the applicant.

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## 2 FCC MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### 2.1 FCC Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission’s guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100000	/	/	1.0	30

f = frequency in MHz

\* = Plane-wave equipment power density

Prediction of MPE limit at a given distance

$$S = PG / 4\pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

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## 2.2 Power Density Calculation (Worst Case)

### FCC Standalone MPE

Operation Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Max. Output Power Include Tolerance (dBm)	Antenna Gain (dBi)	Max. EIRP (mW)	Power Density (PD) (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Pass / Fail	Power Density / Limit	Collocated MPE
WLAN 5G	5745	40	18.39	17.61	3981.07	0.198	1.000	Pass	0.198	V
WLAN 4.9G	4980	40	23.51	17.61	12941.96	0.644	1.000	Pass	0.644	V

## 2.3 Collocated Power Density Calculation

### FCC Collocated MPE

Operation Mode	Power Density / Limit	$\Sigma$ (Power Density / Limit)
WLAN 5G	0.198	0.842
WLAN 4.9G	0.644	

#### Note:

1.  $\Sigma$ (Power Density / Limit): This is a summation of [(Power Density for each transmitter/antenna included in the simultaneous transmission) / (corresponding MPE limit)].
2. Considering the collocated transmitters, the aggregated (Power Density /limit) is smaller than 1, and MPE of collocated transmitters is compliant

~ End of Report ~

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