



FCC §2.1091, LP0002-2018 §5.20.2,  
ISED RSS-102  
RF EXPOSURE REPORT


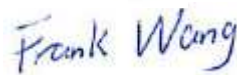
For

**Cisco Systems, Inc.**

125 W Tasman Drive  
San Jose, CA 95134, USA

**FCC ID: LDKEDAC92157**  
**IC: 2461N-EDAC92157**

C9120AXE-X  
(X=A, B, and T)  
2400-2483.5 MHz, 5150-5250 MHz  
5250-5350 MHz, 5470-5725 MHz, 5725-5850 MHz

<b>Product Type:</b> Cisco Catalyst 9120AX Series	
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# 1 FCC §2.1091, §15.247(i) & ISED RSS-102 & LP0002– RF Exposure

## 1.1 Applicable Standards

According to FCC §15.407(f), §1.1307(b)(1) and LP0002 5.20.2.2, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

### Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minutes)
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
1500-100,000	/	/	1.0	30

f = frequency in MHz

\* = Plane-wave equivalent power density

According to ISED RSS-102 Issue 5:

## 2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz<sup>6</sup> and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $4.49/f^{0.5}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

## 1.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

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

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

## 1.3 MPE Results for FCC

### 2.4 GHz Wi-Fi Aux

<u>Maximum output power at antenna input terminal (dBm):</u>	<u>13.4</u>
<u>Maximum output power at antenna input terminal (mW):</u>	<u>21.88</u>
<u>Prediction distance (cm):</u>	<u>30</u>
<u>Prediction frequency (MHz):</u>	<u>2437</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>6</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>3.98</u>
<u>Power density of prediction frequency at 30.0 cm (mW/cm<sup>2</sup>):</u>	<u>0.008</u>
<u>FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u>	<u>1.0</u>

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 30 cm is 0.008 mW/cm<sup>2</sup>. Limit is 1.0 mW/cm<sup>2</sup>.

### 2.4 GHz Wi-Fi

<u>Maximum output power at antenna input terminal (dBm):</u>	<u>23.1</u>
<u>Maximum output power at antenna input terminal (mW):</u>	<u>204.17</u>
<u>Prediction distance (cm):</u>	<u>30</u>
<u>Prediction frequency (MHz):</u>	<u>2437</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>12</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>15.85</u>
<u>Power density of prediction frequency at 30.0 cm (mW/cm<sup>2</sup>):</u>	<u>0.286</u>
<u>FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u>	<u>1.0</u>

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 30 cm is 0.286 mW/cm<sup>2</sup>. Limit is 1.0 mW/cm<sup>2</sup>.

**2.4 GHz BLE**

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>2.88</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>1.94</u>
<u>Prediction distance (cm):</u>	<u>30</u>
<u>Prediction frequency (MHz):</u>	<u>2426</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>6</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>3.98</u>
<u>Power density of prediction frequency at 30.0 cm (mW/cm<sup>2</sup>):</u>	<u>0.001</u>
<u>FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u>	<u>1.0</u>

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 30 cm is 0.001 mW/cm<sup>2</sup>. Limit is 1.0 mW/cm<sup>2</sup>.

**5 GHz Wi-Fi Aux**

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>13.9</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>24.55</u>
<u>Prediction distance (cm):</u>	<u>30</u>
<u>Prediction frequency (MHz):</u>	<u>5825</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>6</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>3.98</u>
<u>Power density of prediction frequency at 30.0 cm (mW/cm<sup>2</sup>):</u>	<u>0.0086</u>
<u>FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u>	<u>1</u>

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 30 cm is 0.0089 mW/cm<sup>2</sup>. Limit is 1.0 mW/cm<sup>2</sup>.

**5 GHz Wi-Fi XOR**

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>22.7</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>186.21</u>
<u>Prediction distance (cm):</u>	<u>30</u>
<u>Prediction frequency (MHz):</u>	<u>5785</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>12</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>15.85</u>
<u>Power density of prediction frequency at 30.0 cm (mW/cm<sup>2</sup>):</u>	<u>0.2609</u>
<u>FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u>	<u>1</u>

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 30 cm is 0.2609 mW/cm<sup>2</sup>. Limit is 1.0 mW/cm<sup>2</sup>.

**5 GHz Wi-Fi Regular**

Maximum peak output power at antenna input terminal (dBm): 24  
Maximum peak output power at antenna input terminal (mW): 251.19  
Prediction distance (cm): 30  
Prediction frequency (MHz): 5745  
Maximum Antenna Gain, typical (dBi): 11  
Maximum Antenna Gain (numeric): 12.59  
Power density of prediction frequency at 30.0 cm (mW/cm<sup>2</sup>): 0.2796  
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>): 1

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 30 cm is 0.2796 mW/cm<sup>2</sup>. Limit is 1.0 mW/cm<sup>2</sup>.

RF Exposure evaluation has been evaluated for all radio co-location to represent the worst case.

Frequency Band	Max Conducted Power(dBm)	Evaluated Distance (cm)	Worst-Case MPE (mW/cm <sup>2</sup> )	MPE Limit (mW/cm <sup>2</sup> )	Worst-Case MPE Ratios	Sum of MPE Ratios	Limit
<b>Worst Case</b>							
5 GHz Wi-Fi Regular	24	30	0.2796	1.0	27.96 %	84.41 %	100%
5 GHz Wi-Fi Aux	13.9	30	0.0086	1.0	0.86 %		
5 GHz Wi-Fi XOR	22.7	30	0.2609	1.0	26.09 %		
2.4 GHz Wi-Fi	23.1	30	0.286	1.0	28.60 %		
2.4 GHz Aux	13.4	30	0.008	1.0	0.8 %		
2.4 GHz BLE	2.88	30	0.001	1.0	0.1 %		

## **1.4 RF exposure evaluation exemption for ISED**

### **2.4 GHz Wi-Fi**

$$23.1 + 12 \text{ dBi} = 35.1 \text{ dBm} < 1.31 \times 10^{-2} f^{0.6834} = 4.903 \text{ W} = 36.904 \text{ dBm}$$

### **2.4 GHz Wi-Fi Aux**

$$13.4 + 6 \text{ dBi} = 19.4 \text{ dBm} < 1.31 \times 10^{-2} f^{0.6834} = 4.903 \text{ W} = 36.904 \text{ dBm}$$

### **BLE**

$$2.88 + 6 \text{ dBi} = 8.88 \text{ dBm} < 1.31 \times 10^{-2} f^{0.6834} = 4.903 \text{ W} = 36.904 \text{ dBm}$$

### **5 GHz Wi-Fi Aux**

$$13.9 + 6 \text{ dBi} = 19.9 \text{ dBm} < 1.31 \times 10^{-2} f^{0.6834} = 4.903 \text{ W} = 36.904 \text{ dBm}$$

### **5 GHz Wi-Fi XOR**

$$22.7 + 12 \text{ dBi} = 34.7 \text{ dBm} < 1.31 \times 10^{-2} f^{0.6834} = 4.880 \text{ W} = 36.884 \text{ dBm}$$

### **5 GHz Wi-Fi Regular**

$$24 + 11 \text{ dBi} = 35 \text{ dBm} < 1.31 \times 10^{-2} f^{0.6834} = 4.880 \text{ W} = 36.884 \text{ dBm}$$

Therefore the RF exposure is not required.