



# RF Exposure Evaluation Declaration

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**FCC ID:** P27ME4221  
**Applicant:** Sercomm Corporation  
**Application Type:** Certification  
**Product:** Dual Band WiFi Mesh  
**Model No.:** AME-4221SR  
**Brand Name:** Airtel  
**FCC Classification:** Digital Transmission System (DTS)  
Unlicensed National Information Infrastructure (NII)  
**FCC Rule Part(s):** 47 CFR Part 2.1091  
**Test Procedure(s):** KDB 447498 D04v01

**Reviewed By:** \_\_\_\_\_

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



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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**Revision History**

Report No.	Version	Description	Issue Date	Note
2112RSU004-U5	Rev. 01	Initial Report	2022-06-20	Valid

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#### 1.4. Product Information

Product Name	Dual Band WiFi Mesh
Model No.	AME-4221SR
Brand Name	Airtel
Wi-Fi Specification	802.11a/b/g/n/ac
Antenna Information	Refer to section 1.5
Accessories	
Adapter 1#	Model No.: MSA-C2000IS12.0-24W-IN Input Power: 90 - 270V ~ 50/60Hz, 0.7A max Output Power: 12V dc 2.0A
Adapter 2#	Model No.: NSA18E1-12015001 Input Power: 100 - 240V ~ 50/60Hz, 1.0A max Output Power: 12V dc 1.5A
Remark:	
1. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

#### 1.5. Antenna Details

Antenna Type	Frequency Band (MHz)	Tx Paths	Max Antenna Gain (dBi)	Beamforming Directional Gain (dBi)	CDD Directional Gain (dBi)	
					For Power	For PSD
PIFA Antenna	2412 ~ 2462	2	3.10	--	3.10	6.11
	5180 ~ 5240	2	2.90	5.91	2.90	5.91
	5260 ~ 5320	2	3.50	6.51	3.50	6.51
	5500 ~ 5720	2	3.50	6.51	3.50	6.51
	5745 ~ 5825	2	3.40	6.41	3.40	6.41

#### Remark:

- The EUT supports Cyclic Delay Diversity (CDD) mode and CDD signals are correlated.  
 If all antennas have the same gain,  $G_{ANT}$ , Directional gain =  $G_{ANT} + \text{Array Gain}$ , where Array Gain is as follows.
  - For power spectral density (PSD) measurements on all devices,  
 Array Gain =  $10 \log(N_{ANT}/N_{SS})$  dB;
  - For power measurements on IEEE 802.11 devices,  
 Array Gain = 0 dB for  $N_{ANT} \leq 4$ ;
- The EUT also supports Beam Forming mode, and the Beam Forming support 802.11n/ac for 5G Wi-Fi, not include 802.11a for 5G Wi-Fi and 2.4G Wi-Fi. BF Directional gain =  $G_{ANT} + 10 \log(N_{ANT})$ .

## 2. RF Exposure Evaluation

### 2.1. Test Limits

According to §1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in §1.1307(b)

#### 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> )	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	<6
30-300	61.4	0.163	1.0	<6
300-1,500	--	--	f/300	<6
1,500-100,000	--	--	5	<6
(B) Limits for General Population/ Uncontrolled Exposures				
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
300-1,500	--	--	f/1500	<30
1,500-100,000	--	--	1.0	<30

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

## 2.2. Test Exemptions

**For single RF sources** (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph §1.1307(b)(2) of this section): 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) of this section.

Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(ii)(A);

(Option B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P (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 is given by:

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

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) Or 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  $\lambda$  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 to §1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1920R <sup>2</sup>
1.34-30	3450R <sup>2</sup> /f <sup>2</sup>
30-300	3.83R <sup>2</sup>
300-1,500	0.0128R <sup>2</sup> /f
1,500-100,000	19.2R <sup>2</sup>

**For multiple RF sources:** Multiple RF sources are exempt if:

(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 paragraph §1.1307(b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(i)(A).

(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 using paragraph §1.1307(b)(3)(i)(B) of this section for  $P_{th}$ , including existing exempt transmitters and those being added.

**b** = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(C) of this section 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 paragraph §1.1307(b)(3)(i)(B) of this section 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 paragraph §1.1307(b)(3)(i)(C) of this section.

**$Evaluated_k$**  = 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 of this chapter.

### 2.3. Test Result

Product	Dual Band WiFi Mesh
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Max Conducted Power (dBm)	Tune-up Power (dBm)	Antenna Gain (dBi)	Max ERP (dBm)
802.11b/g/n	2412 ~ 2462	29.85	30.00	3.10	33.10
802.11a/n/ac (CDD Mode)	5180 ~ 5240	29.29	30.00	2.90	32.90
	5260 ~ 5320	23.96	24.00	3.50	27.50
	5500 ~ 5720	23.92	24.00	3.50	27.50
	5745 ~ 5825	26.47	27.00	3.40	30.40
802.11n/ac (BF Mode)	5180 ~ 5240	29.29	30.00	5.91	35.91
	5260 ~ 5320	23.96	24.00	6.51	30.51
	5500 ~ 5720	23.92	24.00	6.51	30.51
	5745 ~ 5825	26.47	27.00	6.41	33.41

Note:

1. The level of max peak power was from RF report 2112RSU004-U2 and 2112RSU004-U3.
2. Tune-up power declared by manufacturer.

#### **For multiple RF sources**

Frequency (MHz)	Max ERP (Watts)	$\lambda / 2 \pi$ (cm)	R (cm)	Option C (Watts)
2412	2.042	1.98	56	6.021
5180	3.899	0.92	56	6.021
5260	1.125	0.91	56	6.021
5500	1.125	0.87	56	6.021
5745	2.193	0.83	56	6.021

Simultaneous analysis

$$\text{Exposure ratio} = 2.042 / 6.021 + 3.899 / 6.021 = 0.987 < 1$$

#### **CONCLUSION:**

WLAN 2.4GHz and WLAN 5GHz can transmit simultaneously.

Therefore, the min compliance distance is 56cm.