

# Fortinet FAP-U24JEV

## *Deployment Guide*



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# 1 About FAP-U24JEV

The FAP-U24JEV is a single-radio 802.11a/b/g/n/ac/wave-2 WLAN access point with 1x1 + 1x1 stream design and an in-room wall plate form factor. It operates in the 2.4 GHz band for 802.11n support in 1 chain and the 5 GHz band wave-2 in one chain to deliver an aggregate data rate of 583Mbps data for demanding business applications such as video and voice.

Designed to be placed in any location flush to a wall surface, the FAP-U24JEV can be installed by normal service personnel using existing CAT5/6 cabling connected from a standard wall junction box. For wired connectivity, it features two 10/100 BASE-T switch ports to support a range of in-room IP device and user connectivity options. Additionally, one of the wired ports can operate as an IEEE 802.3af-compliant PoE Out port, offering up to 13 watts of power and capable of powering devices such as IP telephones. This reduces costs in additional cabling, switch ports, and power sourcing equipment. An additional pass-through port allows connectivity for digital phones that require native access to an in-house PBX system, and a USB port offers options for future uses. The FAP-U24JEV is built to provide years of trouble-free operation and is backed by a limited lifetime warranty.

It is designed for in-room deployments, such as:

- Dorm Rooms
- Hotel Rooms
- Hospital Rooms

# System Configuration Details

Optimal System Configuration			Full Loaded System Configuration		
System Configuration	Power Consumption	802.3af Compliant	System Configuration	Power Consumption	802.3af Compliant
<ul style="list-style-type: none"> <li>• 2.4 GHz &amp; 5.0 GHz</li> <li>• dual band dual radio concurrent; IEEE</li> <li>• 802.11ac; 2.4GHz 1x1 40MHz &amp; 5.0GHz 1x1 80MHz</li> <li>• 80 MHz channel bonding</li> <li>• USB port is disabled</li> </ul>	10.00 Watts	Yes	<ul style="list-style-type: none"> <li>• 2.4 GHz &amp; 5.0 GHz</li> <li>• dual band dual radio concurrent; IEEE</li> <li>• 802.11ac; 2.4GHz 1x1 40MHz &amp; 5.0GHz 1x1 80MHz</li> <li>• 80 MHz channel bonding</li> <li>• 12.9W PSE OUT and USB disabled or 10W PSE OUT and USB enabled</li> </ul>	25.50 Watts	802.3at PoE required for such configuration

## Safety Precautions—IMPORTANT

Read and follow the regulatory instructions in Appendix B before installing and operating this product.



To avoid loss of warranty, use only Fortinet supplied power adapter

The FAP-U24JEV is intended only for installation in Environment A as defined in IEEE Std 802.3 All interconnected equipment must be contained within the same building, including the interconnected equipment's associated LAN connection.

## Power Options

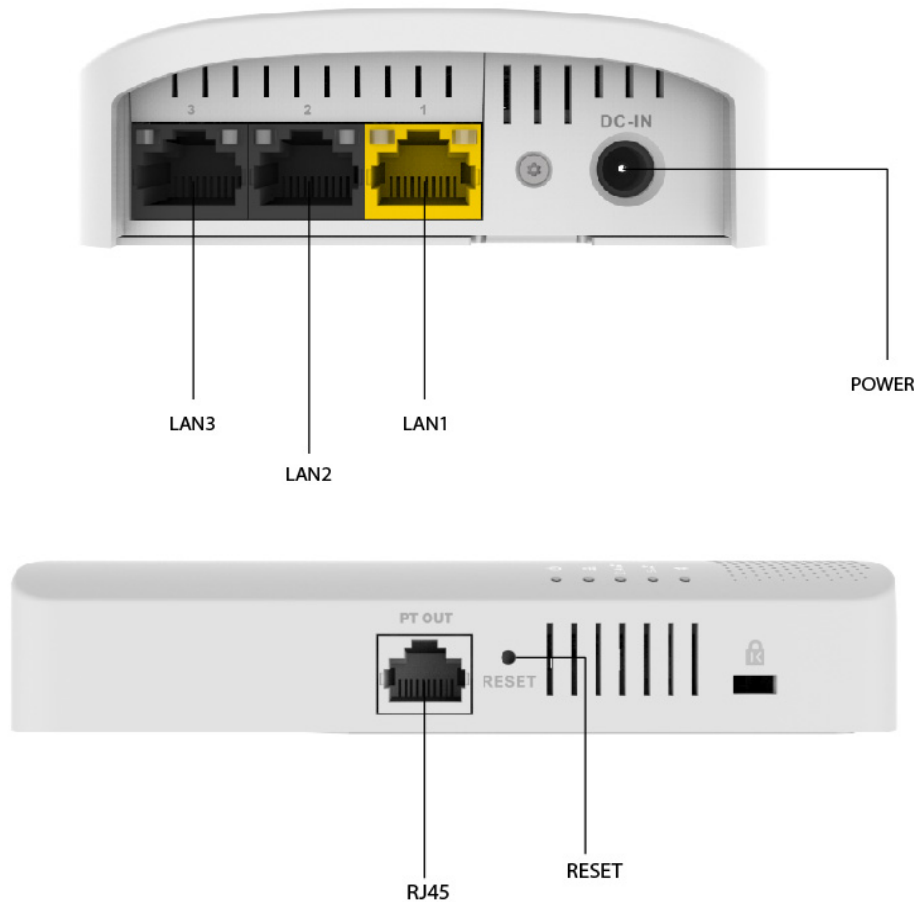
The AP is powered using a IEEE802.3at-2012 compliant PoE PD IN or 48V DC input.



## Power Output

The IEEE802.3af-2012 compliant PoE PSE provides power output up to 12.95W.

## Enclosures and Connectors



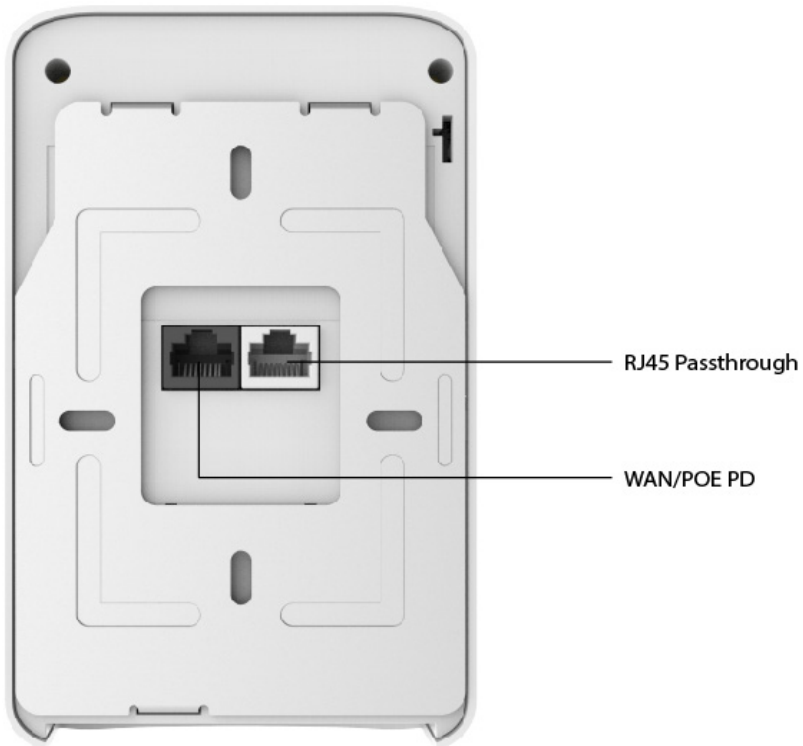
**TABLE 1:** *FAP-U24JEV Connectors - Top and Side View*

<b>Parts</b>	<b>Descriptions</b>
Power	48V DC/0.5A input.
LAN1 PSE	10/100/1000Mbps Ethernet port.  PSE delivers 802.3af only when: <ul style="list-style-type: none"><li>• Power adapter is used.</li></ul> OR <ul style="list-style-type: none"><li>• 802.3at power is supplied to the FAP unit.</li></ul>
LAN2	10/100/1000Mbps Ethernet port.
LAN3	10/100/1000Mbps Ethernet port.
Reset	Reset pin. Using a sharp pin and press in for 3 seconds to return the AP to factory default settings
RJ45	Pass through out



**TABLE 2: FAP-U24JEV LED Status**

Parts	Description
Power	<ul style="list-style-type: none"> <li>● Green: FAP powered ON.</li> <li>● Yellow: FAP is rebooting or upgrading firmware</li> <li>● Off: FAP is powered off.</li> </ul>
WAN	<ul style="list-style-type: none"> <li>● Steady Green: Link is up</li> <li>● Yellow: WAN</li> </ul>
WiFi 1	<ul style="list-style-type: none"> <li>● Steady Green: 2.4G link Is up</li> <li>● Off: Link down</li> </ul>
WiFi 2	<ul style="list-style-type: none"> <li>● Steady Green: 5.0G link is up</li> <li>● Off: Link down</li> </ul>
BLE	<ul style="list-style-type: none"> <li>● Steady Green: BLE or BLE activity</li> <li>● Off: No activity</li> </ul>



**TABLE 3:** *FAP-U24JEV Connectors - Bottom View*

Parts	Description
RJ-45 Passthrough IN	Wired connection with Pass through out
WAN/PoE PD	10/100/1000Mbs Ethernet port.

## Getting Started

Before you begin mounting the FAP-U24JEV, you will need the following:

- Phillips screwdriver
- Torx screwdriver

# Mounting

The FAP-U24JEV is designed for mounting to a single standard US or EU- style utility wall box. This section provides step-by-step instructions on how to mount an FAP-U24JEV Wall Plate in the following mounting scenarios:

- Wall Plate Mounting
- Wall Mounting (No Wall Plate)

## Wall Plate Mounting

This section provides illustrated instructions to wall mount FAP-U24JEV

1. The FAP-U24JEV is shipped with the wall mount bracket installed on the bottom of the AP. The metal bracket clips into slots in the plastic housing. The captive screw used to lock the AP into place, is not engaged during shipment.



2. The wall mount bracket is designed to be installed over a wall plate (single gang box). There are a series of slots in the mounting bracket to allow optional installations.



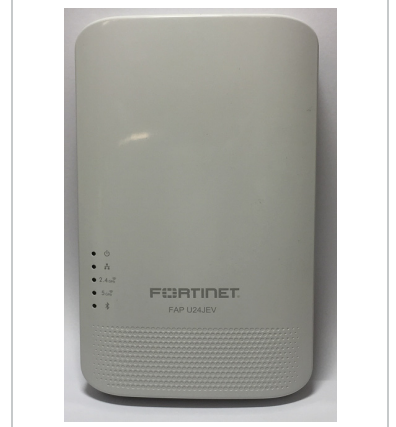
3. Position the bracket over the wall plate and install two screws (not included) as shown. Adjust the bracket over the wall plate box before tightening the screws. Slide the bracket up or down along the screws in the slots to the desired location. Be sure to cover any gaps in the wall. Tighten screws to secure bracket to wall plate. Do not over-tighten. Over-tightening may cause the bracket to bend.



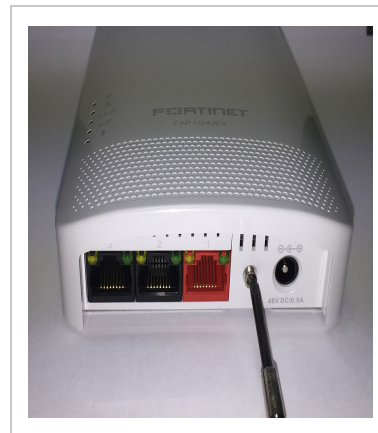
4. Install the AP onto the mounting bracket by visually aligning the top "hook" clips to the small raised bumps on the top edge of the AP. For additional visual alignment reference, use the edges of the bracket which line up with the outside vent holes on the AP.



5. Move the AP up slightly until you feel the top hooks slide into the receiving holes on the back of the AP. Once the top hooks are engaged, push gently on the bottom, front of the AP to engage the bottom hooks. You should feel the clips lock into place.



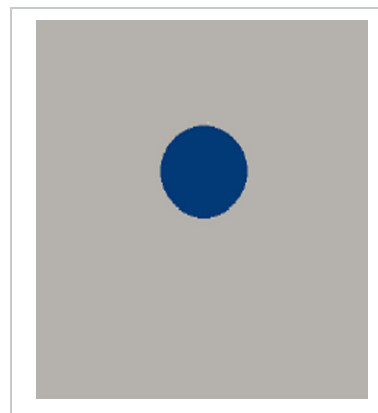
6. Tighten the captive screw to secure the AP to the bracket.



## Wall Mounting (No Wall Plate)

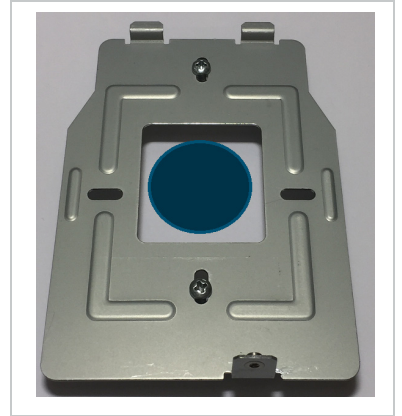
This section provides illustrated instructions to wall mount an FAP-U24JEV without the wall plate

1. Make 1.5" diameter hole on the wall for the cable entry at the location selected for AP placement.



2. Position the bracket over the wall and match the 1.5" diameter hole and the bracket middle hole.

3. Mark and drill **2** holes for the screw and Install using the two screws (not included) as shown in the figure. Adjust the bracket over the wall plate box before tightening the screws. Slide the bracket up or down along the screws in the slots to the desired location. Be sure to cover any gaps in the wall.



Next, follow procedures from [Step 4 on page 8](#).



## 2 Installation Planning

It is a good practice to conduct a site survey to assess coverage area and look for problem areas such as poor RF coverage or high retries. Fortinet enables customers to easily complete a site survey right from within the FAP-U24JEV.

### Site Survey tools

This section describes the tools used to conduct site surveys for FAP-U24JEV.

#### Fortiplanner

Fortiplanner can be used for accurate site survey and WiFi network planning.

Starting with a floor plan of the area that you want to cover with your wireless network, the planning tool will provide a color-shaded image predicting the expected signal strength throughout the coverage area. Using the tool, you can try out different placements of wireless access points prior to installation on the premises. The overall process for using the planning tool is as follows:

- Draw a floor plan of the coverage area.
- Place APs on your floor plan.
- Run a propagation prediction.
- The last two steps are iterative. If the prediction shows some areas with poor coverage, you can change the placement of your APs and run another propagation prediction. After you have implemented your wireless network, you can
- Monitor the AP transmit power levels and client load.
- Perform a site survey in which you measure the actual received signal strength throughout the coverage area.

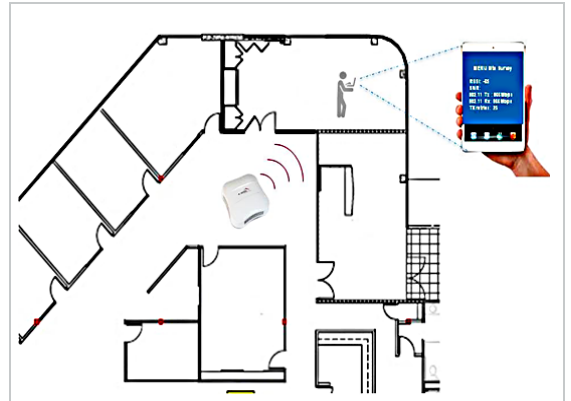
See the *Fortiplanner User Guide* for complete site survey and planning information.

## Built in Site Survey tool

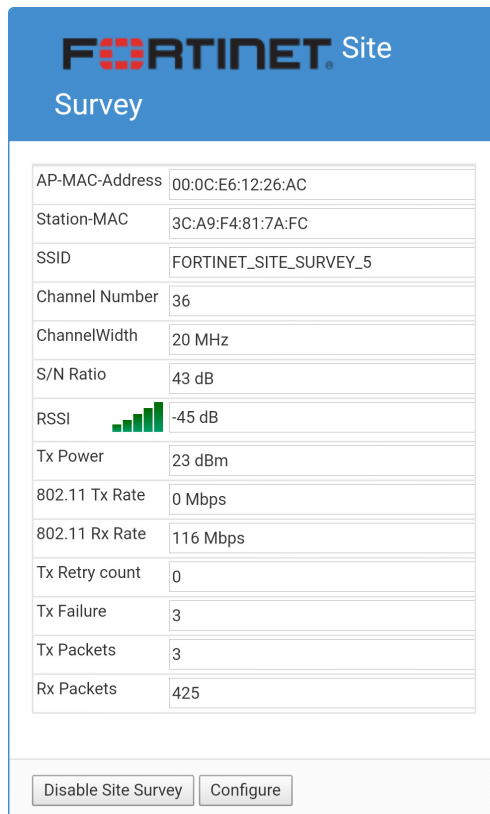
Customers now have a fast and easy way to perform a site survey of the 11ac network -- getting a true validation of their design for AP placement and RF coverage.


This feature is supported in all Fortinet 802.11ac APs such as FAP-U24JEV, AP832 and AP822.

Performing a site survey with FAP-U24-JEV is really simple. AP needs to be powered on near the intended mounting locations and the user can use any mobile device with a web browser to view the AP site survey information by logging into the WebUI. Real-time RSSI, S/N ratio, 802.11 Tx and Rx rates is shown on the WebUI.



This is the web user interface of the site survey tool.



FORTINET Site Survey	
AP-MAC-Address	00:0C:E6:12:26:AC
Station-MAC	3C:A9:F4:81:7A:FC
SSID	FORTINET_SITE_SURVEY_5
Channel Number	36
ChannelWidth	20 MHz
S/N Ratio	43 dB
RSSI 	-45 dB
Tx Power	23 dBm
802.11 Tx Rate	0 Mbps
802.11 Rx Rate	116 Mbps
Tx Retry count	0
Tx Failure	3
Tx Packets	3
Rx Packets	425

Fortinet SiteSurvey make it easy for users to survey a location/ room without needing additional hardware.

Users can use the existing infrastructure (Fortinet APs) to run a simple survey. Some of the real-time benefits of using the site survey features

- Fast and easy way to validate 11ac design
- No controller required while taking measurements at different floors and locations in the building
- Surveys using laptop or tablet or mobile phone
- Easy-to-use web UI for setting up and measuring survey data
- Real time RSSI, S/N ratio, 802.11 Tx and Rx rates
- Simple 3-step process – connect, configure, and monitor

# Location of Wall Plate

This section describes finding an optimum location for installing the FAP-U24JEV.

## Finding the right location

- The AP should be placed at a clear empty location on the side walls.
- Avoid mounting the AP near heavy metal objects such as refrigerator and microwave, which will block the radio waves, impact the antenna radiation patterns and interfere with the radio receiver.
- Do not place the AP close to the floor. This will alter the antenna radiation pattern. The AP should be placed between 1 and 4 feet above the floor.

Use larger metal wall box (not included) behind the AP to reduce the antenna back lobe and interferences due to the back room AP.

Note: Avoid back to back AP installation to reduce the interference and the throughput.

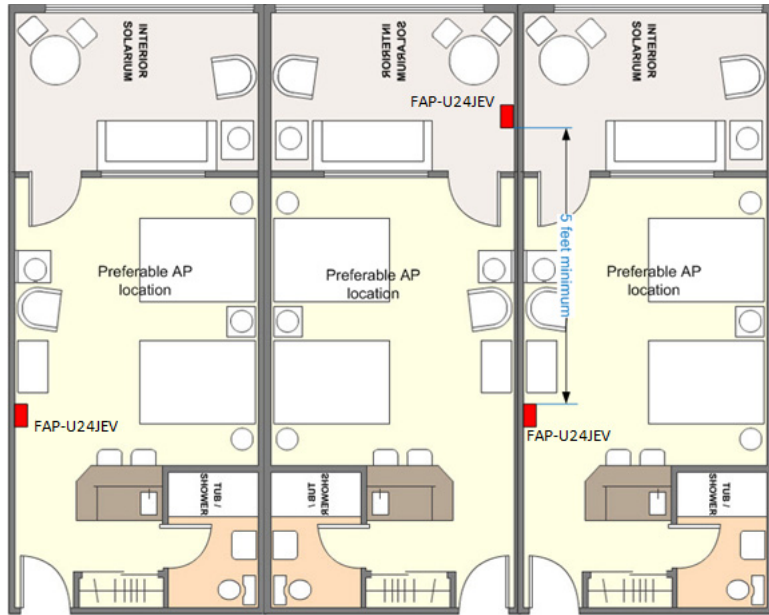
## Wall Plate Density Planning

FAP-U24JEV can be deployed as an in-room wall mountable AP. It can be mounted in variety of locations based on the room size, type of wall, furniture and appliances in the room.

### **Scenario 1: One FAP-U24JEV per room**

The one AP per room scenario is ideal for room size up to ~500 sq feet. The location of the FAP-U24JEV is shown in the image below. The expected signal strength is approximately -30 to -65dBm across the entire room with the default Transmit EIRP settings. High attenuation are expected in areas with appliances.

Do not place the APs in a back to back position as this may cause high interference between the APs and the clients. Keep a minimum distance of 5 feet between the APs to avoid back lobe interferences.



### Scenario 2: FAP-U24JEV in Suite

In the example shown below shows the suite size is approximately 750 sq feet. The expected downlink RSSI values are -30 to -70dBm. High signal attenuation is expected in areas with appliances. Place the AP preferably in the middle of the suite so that signals are distributed equally on all sides of the suite.

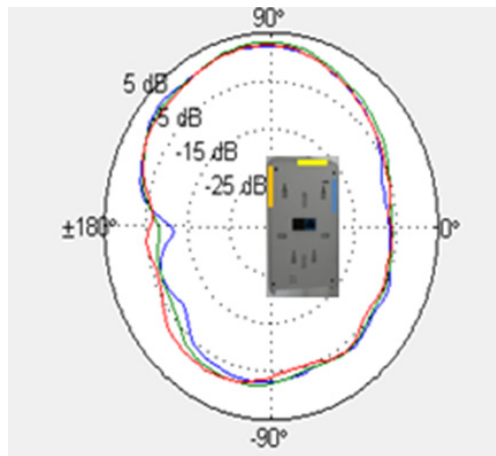


# 3 Antenna Radiation Patterns

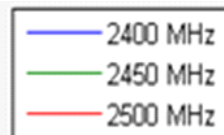
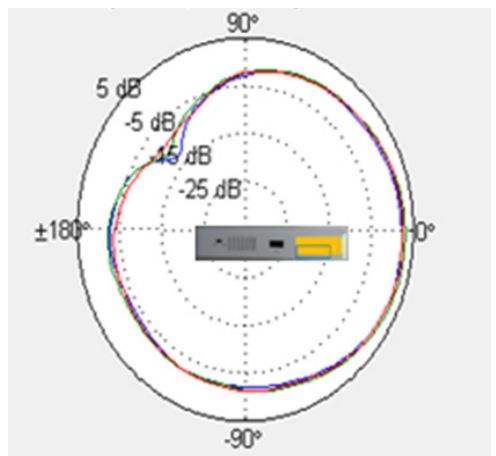
The vertical and horizontal antenna radiation patterns of FAP-U24JEV in the 2.4GHz and 5.0GHz bands are depicted in this chapter.

## 2.4GHz Antenna Radiation Patterns

Antenna Horizontal Radiation Patterns

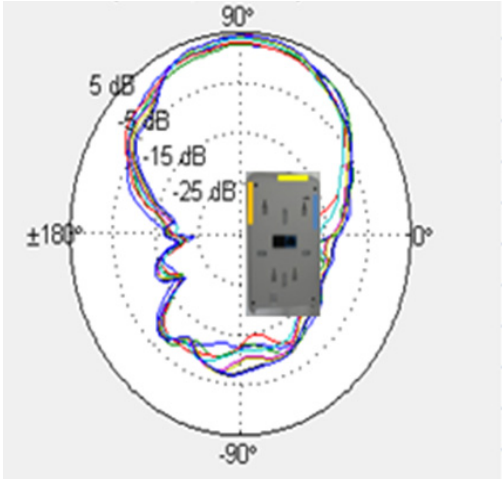


Antenna Vertical Radiation Patterns

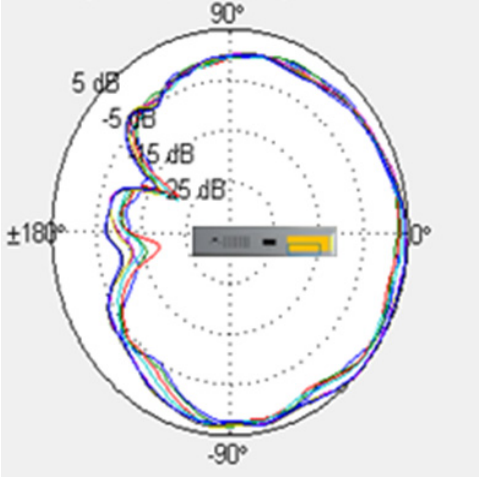


# 5.0GHz Antenna Radiation Patterns

Antenna Horizontal Radiation Patterns



Antenna Vertical Radiation Pattern



- 5150 MHz
- 5350 MHz
- 5475 MHz
- 5600 MHz
- 5725 MHz
- 5750 MHz
- 5825 MHz
- 5875 MHz



# Transmit Power and EIRP

The table below shows the FAP-U24JEV default radiated transmit power settings in the GUI for FCC regulatory domain. The transmit power can be varied depending upon the cell size.

Radio	Frequency Range	Channel	Default Transmit Power per Antenna (EIRP)	Transmit Power Range (with 1 dBm increments)
2.4 GHz	2412 - 2472 MHz	1 - 13	20 dBm	5 - 24 dBm
5 GHz	5180 - 5825 MHz	36 - 165	20 dBm	5 - 23 dBm

## Supported Data Rates (MBPS)

- IEEE Std 802.11ac per stream: 6.5 to 433.3 Mbps (MCS0-HT20 @ 800 nS to MCS9-VHT80 @ 400 nS)
- IEEE Std 802.11n per stream: 6.5 to 150.0 Mbps (MCS0-HT20 @ 800nS to MCS7-HT40 @ 400nS)
- IEEE Std 802.11a/g: 6, 9, 12, 18, 24, 36, 48, and 54 Mbps
- IEEE Std 802.11b: 1, 2, 5.5, and 11 Mbps

