Datasheet

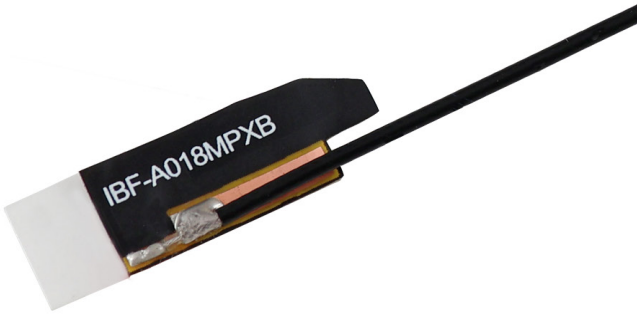
JOYMAX
EnJOY MAX Wireless®

IBF-A018ccXB

2.4 GHz ISM Adhesive FPC Antenna

The Joymax IBF-A018ccXB antenna is an embedded/internal, adhesive-mount, flexible print circuit (FPC) board monopole antenna designed for use in 2.4 GHz frequency bands supporting Bluetooth®, ZigBee®, Thread®, IEEE 802.15.4, IEEE 802.11b/g and other unlicensed applications in the 2400 MHz to 2500 MHz frequency range.

The FPC antenna provides a ground plane independent internal/embedded antenna solution to easily mount in RF transparent (e.g. plastic) enclosures, enabling environmental sealing and for protection from antenna damage. Connection is made to the radio via a coaxial cable terminated in a MHF plug connector.



Features

- Bandwidth 2400 MHz to 2500 MHz
- Performance at 2400 MHz to 2500 MHz
  - VSWR: ≤ 1.9
  - Peak Gain: 1.7 dBi
  - Efficiency: 43%
- Ground plane independence design
- Omni-directional radiation
- Compact package, low profile
- Adhesive backing permanently adheres to non-metallic enclosure/chassis using 3M 467MP™

Applications

- 2.4 GHz ISM applications:
  - Bluetooth®
  - ZigBee®
  - Thread®
  - IEEE 802.15.4
  - IEEE 802.11b/g
- Portable / Hand-held devices
- Wearables
- Internet of Things (IoT) devices

Ordering Information

Part Number	Cable Diameter	Cable Length	Connector
IBF-A018MPXB-W010M	ø1.13 mm	100 mm	U.FL-Type / MHF1 Plug
IBF-A018MPXB-W020M	ø1.13 mm	200 mm	U.FL-Type / MHF1 Plug
IBF-A018MFXB-W010M	ø1.13 mm	100 mm	MHF4L Plug
IBF-A018MFXB-W020M	ø1.13 mm	200 mm	MHF4L Plug

Available from Joymax Inc. and select distributors and representatives.

Table 1: Electrical Specifications

IBF-A018ccXB	2.4 GHz ISM Band (MHz)
Frequency Range	2400 to 2500
VSWR (Max.)	1.9
Peak Gain (dBi)	1.7
Average Gain (dBi)	-3.7
Efficiency (%)	43
Polarization	Linear
Radiation	Omni-directional
Max. Power	1 Watt
Wavelength	¼-λ
Electrical Type	Monopole
Impedance	50 Ω

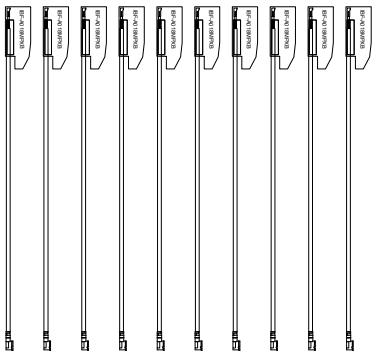
Electrical specifications and plots measured with antenna adhere to a 150 mm x 150 mm (5.91 in. x 5.91 in.) non-conductive plate.

Table 2: Mechanical Specifications

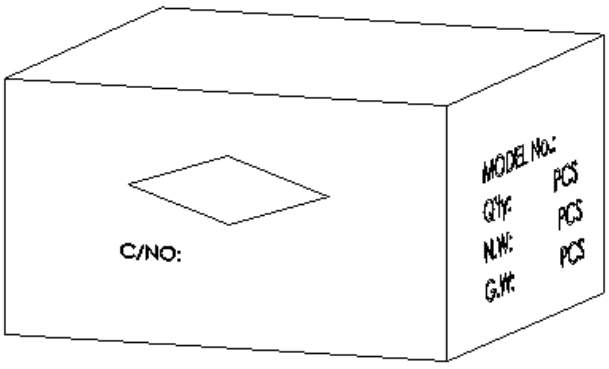
Parameter	Value
Connection	U.FL-type / MHF Plug (female socket)
Dimension	18.4 mm x 7.4 mm x 0.25 mm
Weight	0.44 g (0.02 Oz)
Operating Temp.	-40˚C to +85˚C
Adhesive Backing	3M 467MP™
Cable Type	ø1.13 mm
Cable Length	60 mm, 120 mm, 180 mm or custom

Packaging Information

The IBF-A018ccXB are bulk packaged into a clear plastic bag of 100 pcs as shown in **Figure 1**. 2000 pcs per shipping carton size 330 mm x 180 mm x 180 mm (13.0 in x 7.1 in x 7.1 in) with total weight 1.5 kgs (3.3 lb). Distribution channels may offer alternative packaging options.



100 pcs / PE bag



2,000 pcs / carton

Figure 3. Antenna Packaging

Product Dimensions

Figure 2 provides dimensions of the IBF-A018ccXB in mm measurement unit. The adhesive backing is 3M 467MP™, which provides outstanding adhesion to high surface energy plastics.

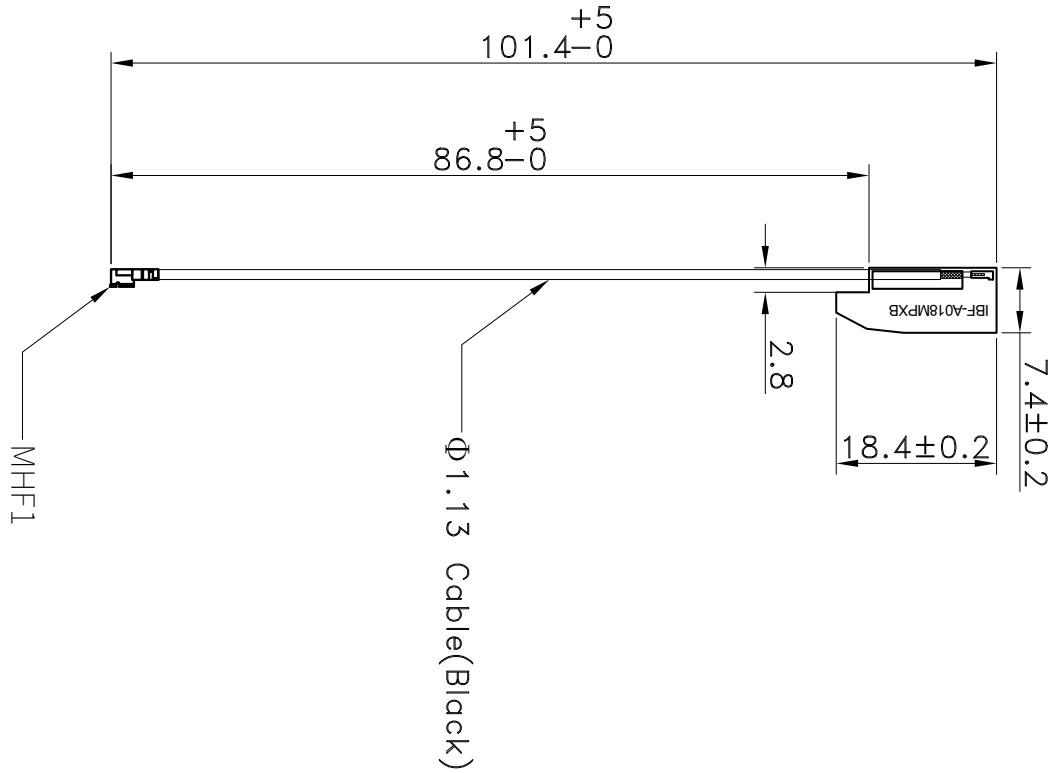


Figure 2. Antenna Dimensions

Antenna Installation

The IBF-A018ccXB antenna is designed for chassis-mount installation as shown in **Figure 3**. The integration of inner mount allows the antenna to be less affected from external pressure and intensive wavering, guaranteeing the state-of-art performance through inner side enclosure installation. The antenna should never be bent to the point of creating a crease or allowing the angle of the bend to fall below 90 degree (i.e. become acute) as this will impair function and may cause permanent damage.

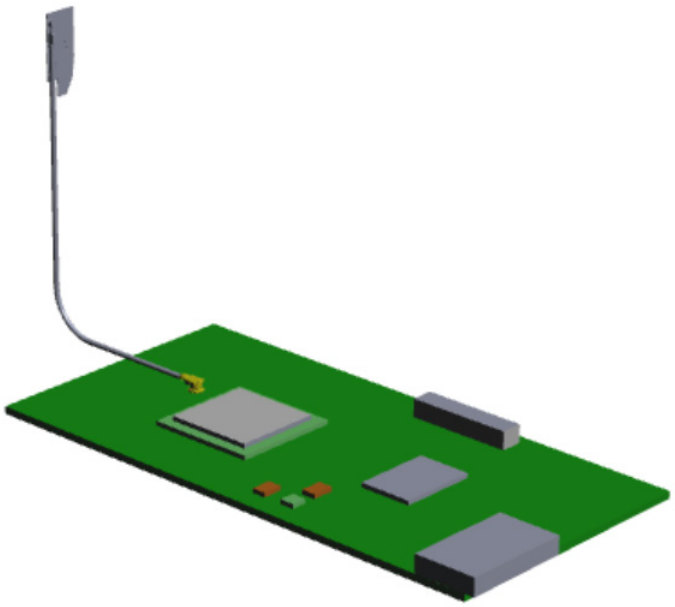


Figure 3. Antenna Installation

Antenna Test Setup: CHASSIS MOUNT, GROUND PLANE INDEPENDENT

The charts on the following pages represent data taken with the antenna adhere to a 150 mm x 150 mm (5.91 in. x 5.91 in.) non-conductive plate as shown in **Figure 4**. Connection is made via a 120 mm long 1.13 mm diameter coaxial cable terminated in a MHF plug (female socket) connector.

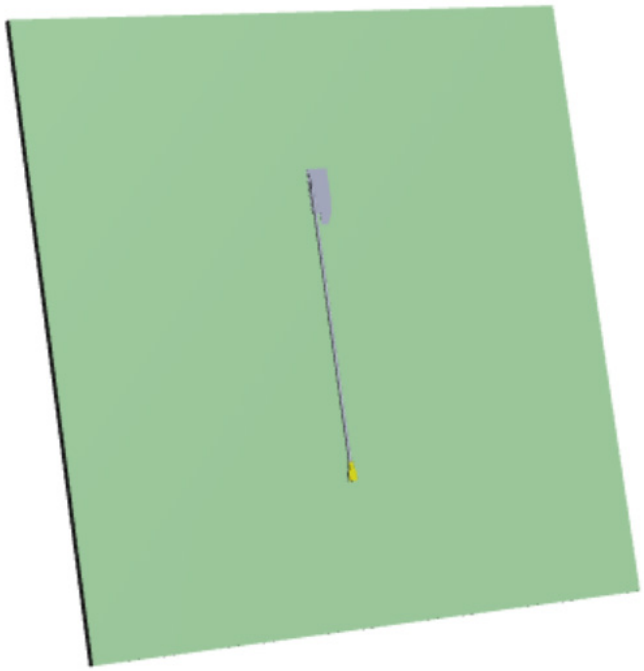


Figure 4. Antenna Test Setup

VSWR

Figure 5 provides the voltage standing wave ratio (VSWR) across the antenna bandwidth. VSWR is a function of the reflection coefficient, which describes the power reflected from the antenna back to the radio. A lower VSWR value indicates better antenna performance at a given frequency. Reflected power is also shown on the right-side vertical axis as a gauge of the percentage of transmitter power reflected back from the antenna.

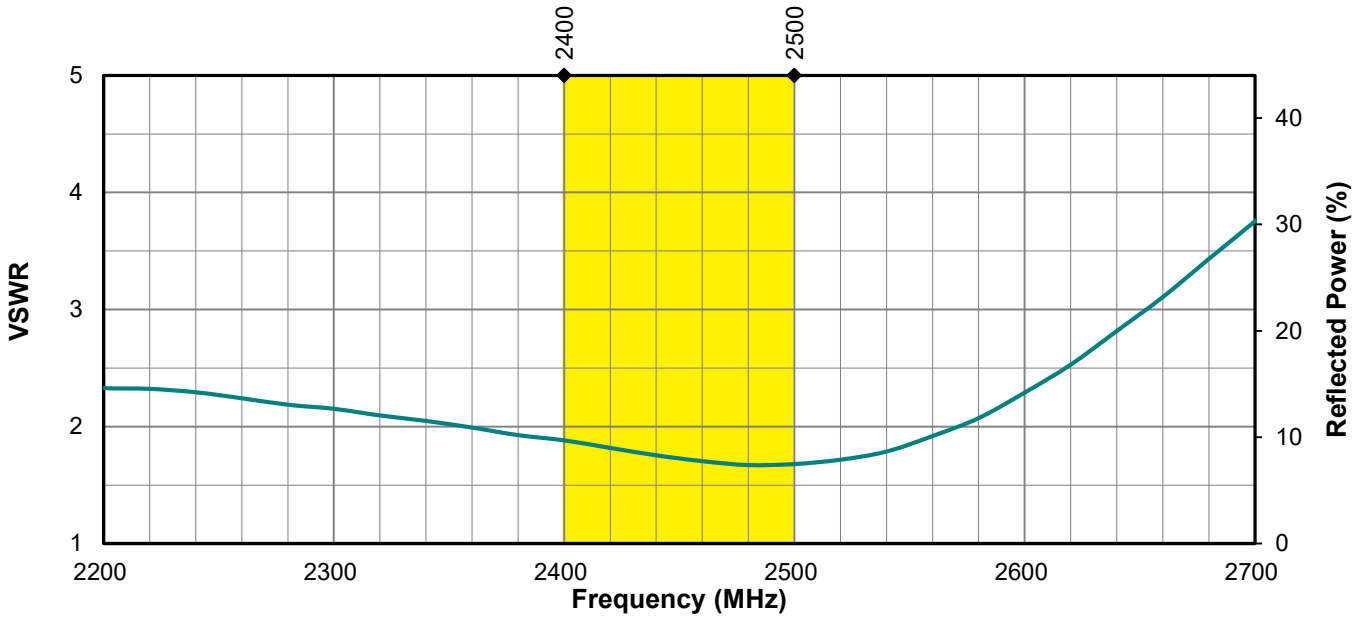


Figure 5. Antenna VSWR

JOYMAX
EnJOY MAX Wireless®

Return Loss

Return loss (**Figure 6**), represents the loss in power at the antenna due to reflected signals. Like VSWR, a lower return loss value indicates better antenna performance at a given frequency.

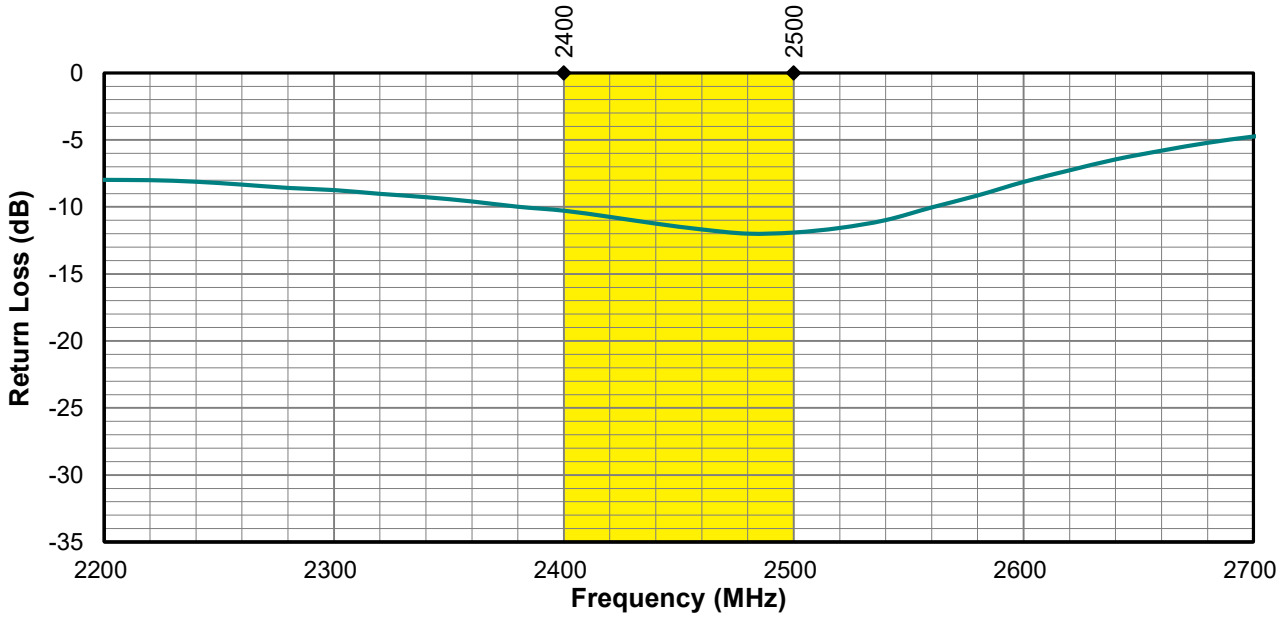


Figure 6. Antenna Return Loss

Peak Gain

The peak gain across the antenna bandwidth is shown in **Figure 7**. Peak gain represents the maximum antenna input power concentration across 3-dimensional space, and therefore peak performance at a given frequency, but does not consider any directionality in the gain pattern.

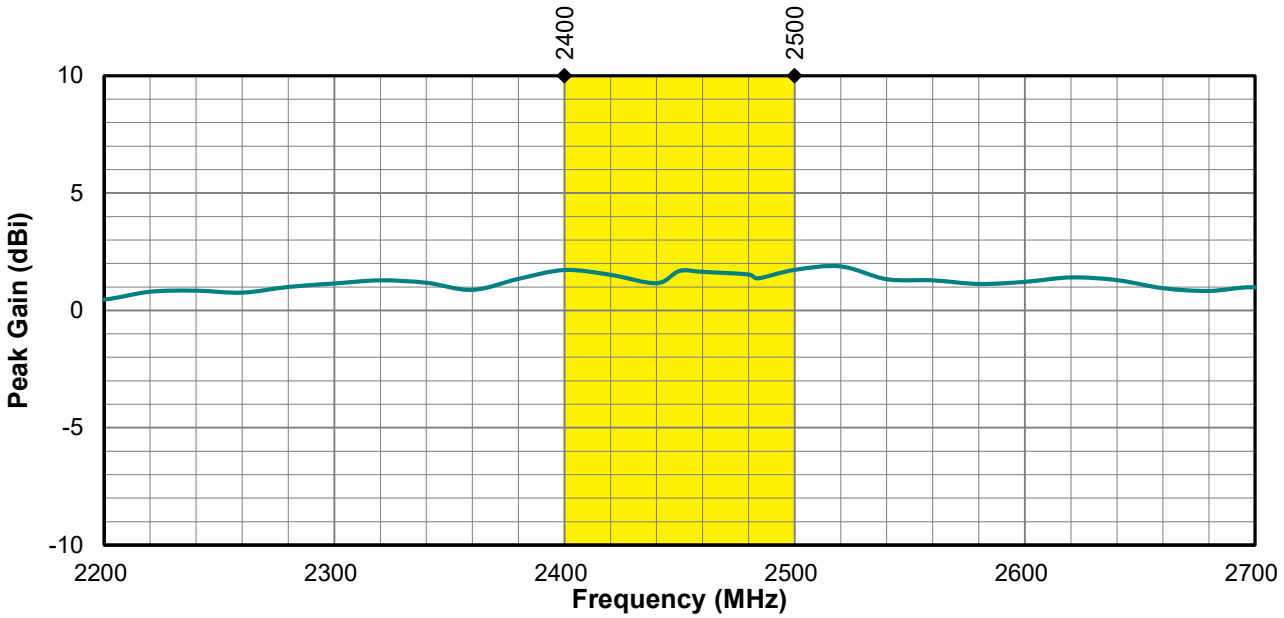


Figure 7. Antenna Peak Gain

JOYMAX
EnJOY MAX Wireless®

Average Gain

Average gain (**Figure 8**), is the average of all antenna gain in 3-dimensional space at each frequency, providing an indication of overall performance without expressing antenna directionality.

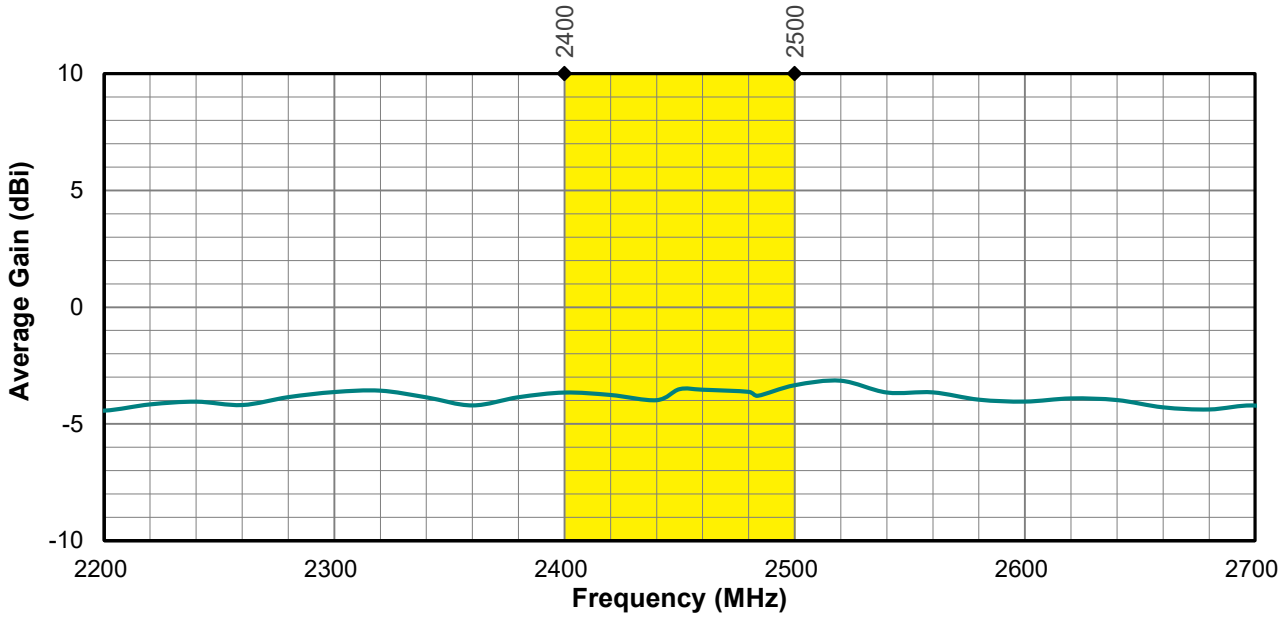


Figure 8. Antenna Average Gain

Radiation Efficiency

Radiation efficiency (**Figure 9**), shows the ratio of power radiated by the antenna relative to the power supplied to the antenna, expressed as a percentage, where a higher percentage indicates better performance at a given frequency. An ideal antenna has 100% efficiency. But in really world, usually an external antenna radiates only 50~60% of power supplied to it.

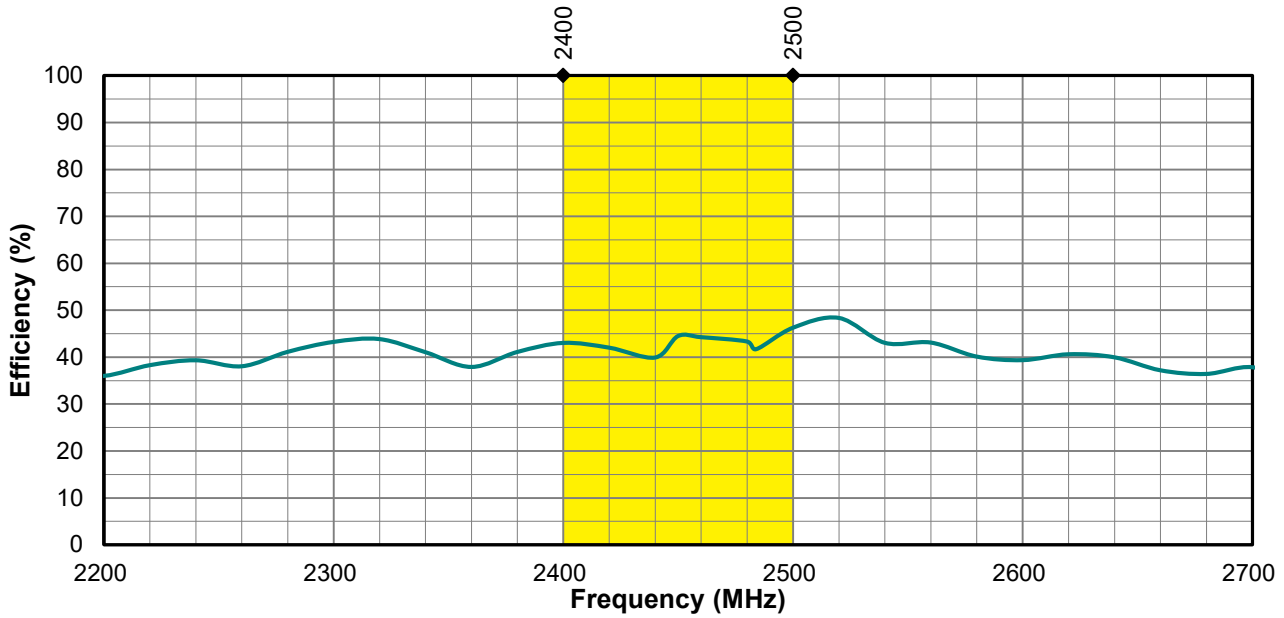


Figure 9. Antenna Efficiency

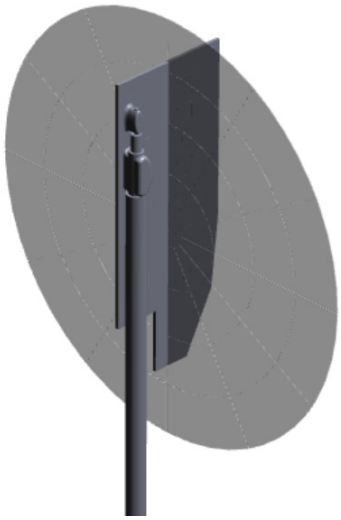
JOYMAX
EnJOY MAX Wireless®

Radiation Patterns

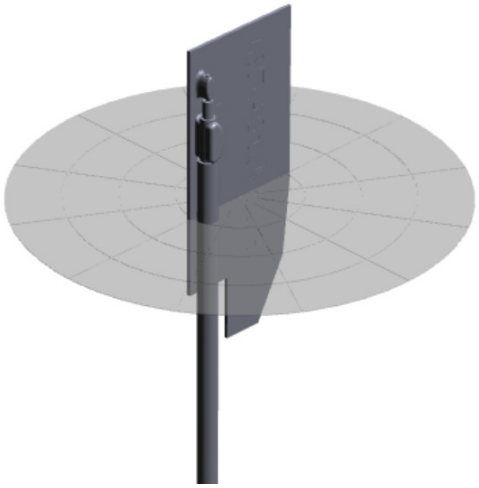
Radiation patterns provide information about the directionality and 3-dimensional gain performance of the antenna by plotting gain at specific frequencies in three orthogonal planes. Antenna radiation patterns are shown in **Figure 10** using polar plots covering 360 degrees. The antenna graphic at the top of the page provides reference to the plane of the column of plots below it.



XZ-Plane Gain

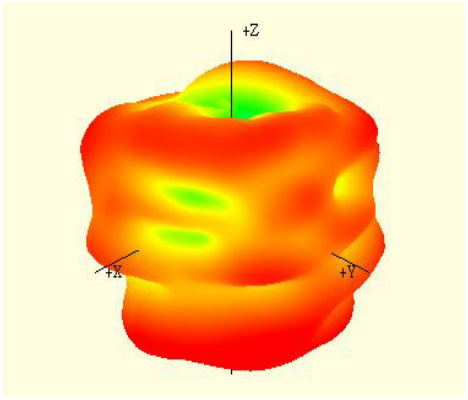


YZ-Plane Gain

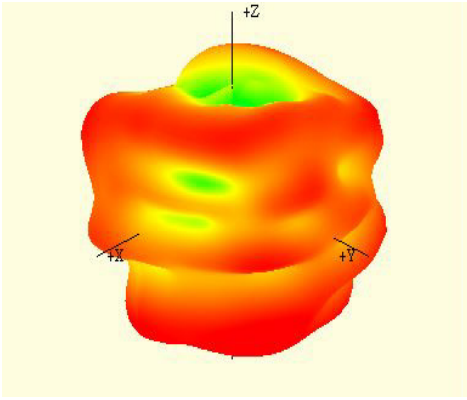


XY-Plane Gain

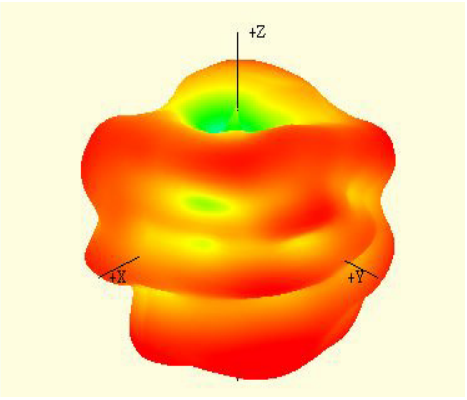
2400 MHz to 2500 MHz (2450 MHz)



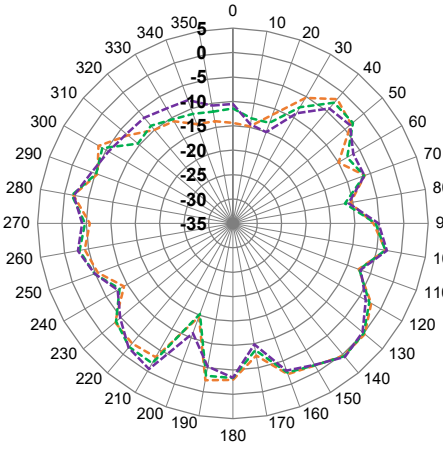
2400 MHz



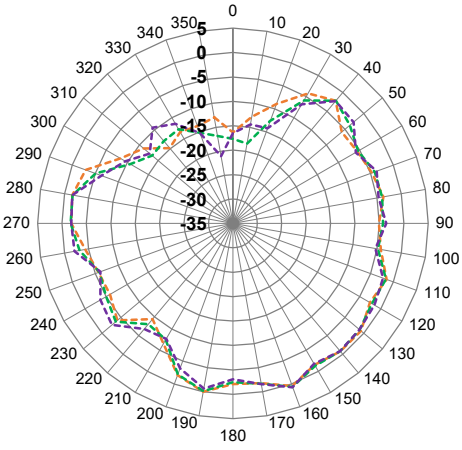
2450 MHz



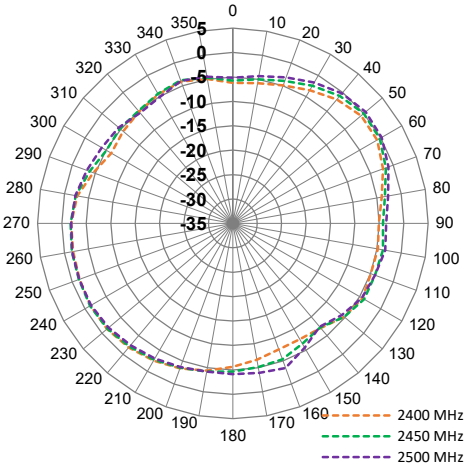
2500 MHz



XZ-Plane



YZ-Plane



XY-Plane

Figure 10. Antenna Radiation Pattern

JOYMAX
EnJOY MAX Wireless®

Antenna FAQs

Q: What is an antenna?

An antenna is used for transmission or reception of radio signals in wireless communication.

Q: How do antennas work?

Electricity flowing into the transmitter antenna makes electrons vibrate up and down it, producing radio waves. The radio waves travel through the air at the speed of light. When the waves arrive at the receiver antenna, they make electrons vibrate inside it.

Q: Does antenna size matter?

A bigger antenna, properly designed, will always have more gain than a smaller one. And it will be the best kind of gain, much better than using a small antenna and simply over-amplifying it, because a small antenna just won't pull in truly weak signals like this gigantic one will.

Q: What is the advantage of external antennas?

External antennas usually offer better bandwidth and high performance due to the nature of their larger size. This often results in a higher rated gain (dBi) than their internal counterparts. Due to its smaller size, an internal antenna would not function well to support lower frequencies.

Ease of integration – an external antenna requires fewer design resources and shorter time to integrate to allow for a more rapid time-to-market. An internal antenna's performance is influenced by device environment – PCB ground plane, nearby metal part, and enclosure. That would require much more effort such as impedance matching network to complete antenna design.

Q: Why is most antenna impedance 50 Ohm?

50 Ohm is an industry standard of coax cables and power amplifiers. It was chosen as a tradeoff between maximum power handling for the transmit coax and the copper losses. The optimum would have been anyway in the range of 30 to 100 ohm with average at 50 Ohm.

Q: Why does GNSS require RHCP (Right-hand-circularly-polarized) antennas?

Satellite's signal has a low power density, especially after propagating through the atmosphere (ionosphere affect radio wave). Polarized waves oscillate in more than one direction, which deliver satellite's signal to receiver on Earth surface more effectively.

MATING COMPONENTS: RF COAXIAL CONNECTOR AND CABLE ASSEMBLY

Part Number	Image	Connector 1 (Receptacle)	Connector 2 (Plug)	Cable Length mm	Cable Length Inch	Cable Diameter (mm)
CT-MFB01X		MHF4L Jack Male Pin Straight	N/A			
CT-MPB01X		MHF1 Jack Male Pin Straight	N/A			
ZX-012CP-00M						0.81
ZX-012CP-01M						1.37
ZX-003CP-00M						1.13

Website:	https://www.joymax.com.tw
Offices:	5, Dong-Yuan 2nd Road, Zhong-Li Dist., Tao-Yuan City 320023 Taiwan (R.O.C.)
Phone:	+886 (0)3 433 5698
E-MAIL	info@joymax.com.tw

Joymax Inc. reserves the right to make changes to the product(s) or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such product(s) or information.
EnJOY MAX Wireless is a registered trademark of Joymax Inc. Other product and brand names may be trademarks or registered trademarks of their respective owners.
Copyright © 2026 Joymax Inc.
All Rights Reserved.

10/26 RevA

JOYMAX
EnJOY MAX Wireless®