Datasheet

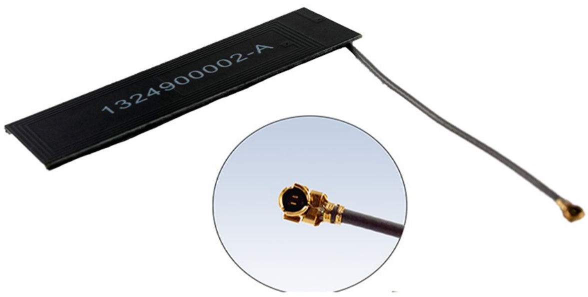
JOYMAX
EnJOY MAX Wireless®

LBF-A045ccXB-*

13.56 MHz PCB antenna

The Joymax LBF-A045ccXB-* series antennas are adhesive mount, rigid print circuit board (PCB) antennas designed for use in 13.56 MHz ISM band supporting NFC (Near Field Communication) application.

The antennas integrated with ferrite backing provides 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 an U.FL-type / MHF plug (female socket) connector.



Features

- Bandwidth 13.56 MHz
- Performance at 13.56 MHz
  - VSWR: ≤ 2.0
  - Reading Distance: 70 mm
- Integrated with Ferrite for better sensing performance
- Compact size, low profile
- Adhesive permanently adheres to non-metallic enclosure/chassis using 3M 467MP

Applications

- 13.56 MHz ISM applications
  - NFC (Near Field Communication)
  - RFID (Radio Frequency Identification)
- Internet of Things (IoT) devices
- Point of Sale Terminal
- Retail Machine
- Access Control
- Attendance System

Ordering Information

Part Number	Cable Diameter	Cable Length	Connector
LBF-A045MPXB-W006	1.13 mm	60 mm	U.FL-Type / MHF1 Plug
LBF-A045MPXB-W012	1.13 mm	120 mm	U.FL-Type / MHF1 Plug
LBF-A045MPXB-W018	1.13 mm	180 mm	U.FL-Type / MHF1 Plug
LBF-A045MFXB-W006	1.13 mm	60 mm	MHF4 Plug
LBF-A045MFXB-W012	1.13 mm	120 mm	MHF4 Plug
LBF-A045MFXB-W018	1.13 mm	180 mm	MHF4 Plug

Available from Joymax Electronics and select distributors and representatives.

Table 1: Electrical Specifications

LBF-A045ccXB-*	ISM Band MHz
Frequency Range	13.56
VSWR (Max)	2.0
Return Loss (dB)	-10
Inductance	1.5621 uH
DC Resistance	3.1692 Ω
Reading Distance	70 mm
Radiation	Directional
Max Power	1 W
Electrical Type	Loop
Impedance	50 Ω
Evaluation Module	Texas Instrument - TRF7970A EVM

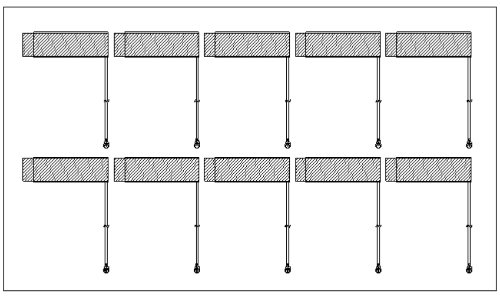
Electrical specifications measured with the antenna hanging free connecting to VNA directly. Reading test setup please refer to Figure 6

Table 2: Mechanical Specifications

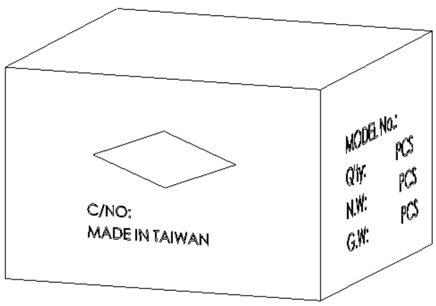
Parameter	Value
Connection	U.FL-Type / MHF Plug (female socket)
Operating Temp.	-40˚C to +85˚C
Weight	3 g
Dimension	45 mm x 14 mm x 2 mm
Antenna Color	Black
Ingress Protection	N/A

Packaging Information

The LBF-A045ccXB-* antennas are 50 pcs bulk packaged into a clear plastic bag. **Figure 1**. 500 pcs per carton, 320 mm x 250 mm x 290 mm (12.5 in x 9.8 in x 11.4 in), total weight 2.5 kgs (5.5 lb) Distribution channels may offer alternative packaging options.



50 pcs antenna/ 1 Bigger PE bag



500 pcs antenna/ 1 Carton

Figure 1. Antenna Packaging

Product Dimensions

Figure 2 provides dimensions of the LBF-A045ccXB-*. The antenna has an integrated ferrite backing for better sensing performance. The adhesive is 3M 467MP™, which provides outstanding adhesion to high surface energy plastics.

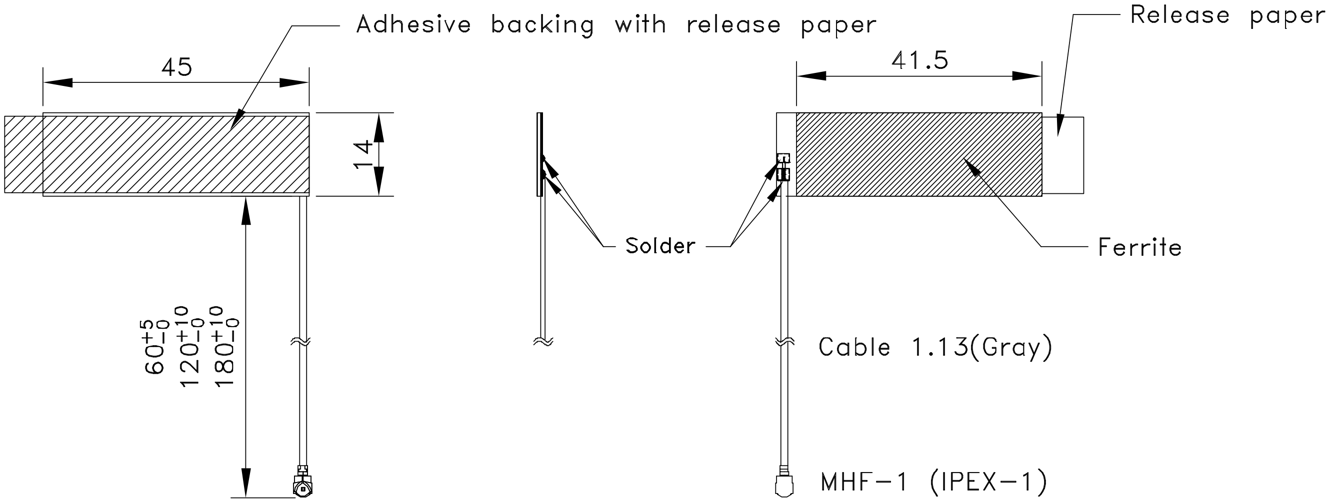


Figure 2. Antenna Dimensions

Antenna Installation

The LBF-A045ccXB-* antenna is designed for chassis-mount installation as shown in **Figure 3**. The integration of inner mount allows for less affected from external pressure and intensive wavering, guaranteeing the state-of-art performance through inner side enclosure installation. Connection is made to the radio via a coaxial cable terminated in an U.FL-type / MHF plug (female socket) connector.

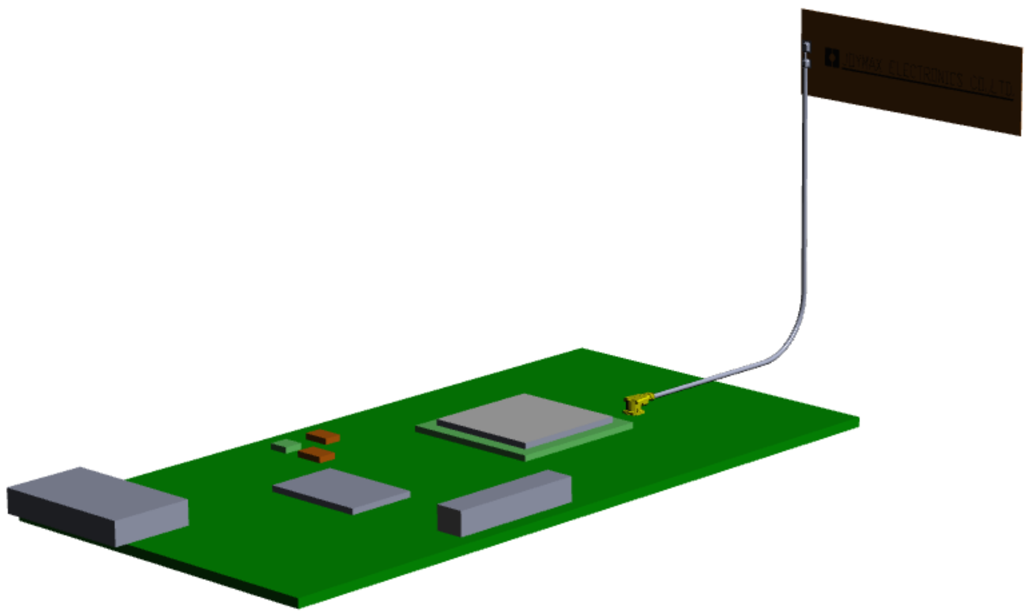


Figure 3. Antenna Installation

VSWR

Figure 4 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.

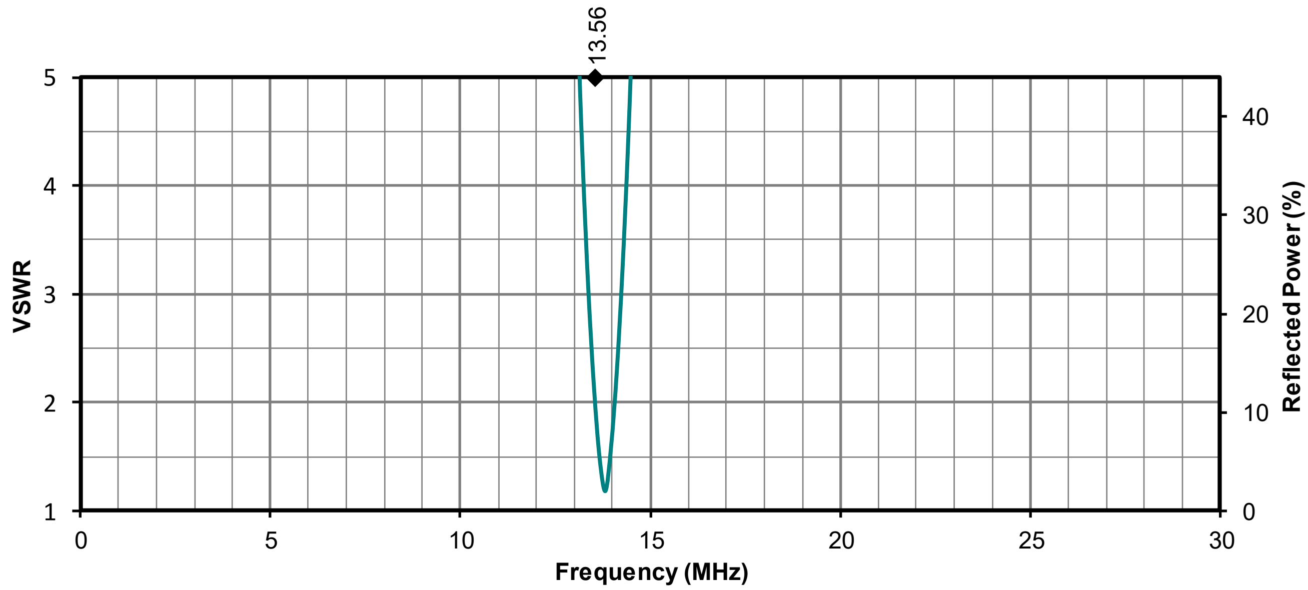


Figure 4. Antenna VSWR, free space

Return Loss

Return loss (**Figure 5**), 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.

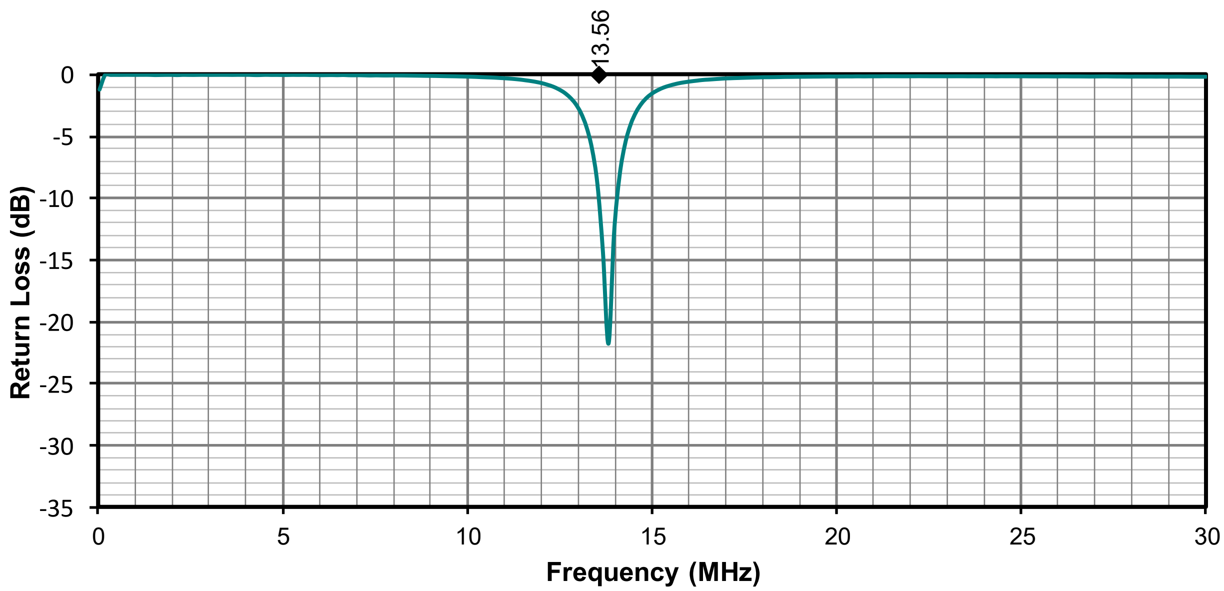


Figure 5. Antenna Return Loss, free space

Antenna Test Setup

Figure 6 provides the antenna test setup for evaluation. The NFC antenna radio signal is connecting to customer main board where a “π” (Pi) matching circuit is recommended to tune the antenna in order to secure right frequency operation. Value of inductors and capacitors may vary owing to different customer device environmental configuration. Please contact Joymax Electronics for complimentary design review service as needed.

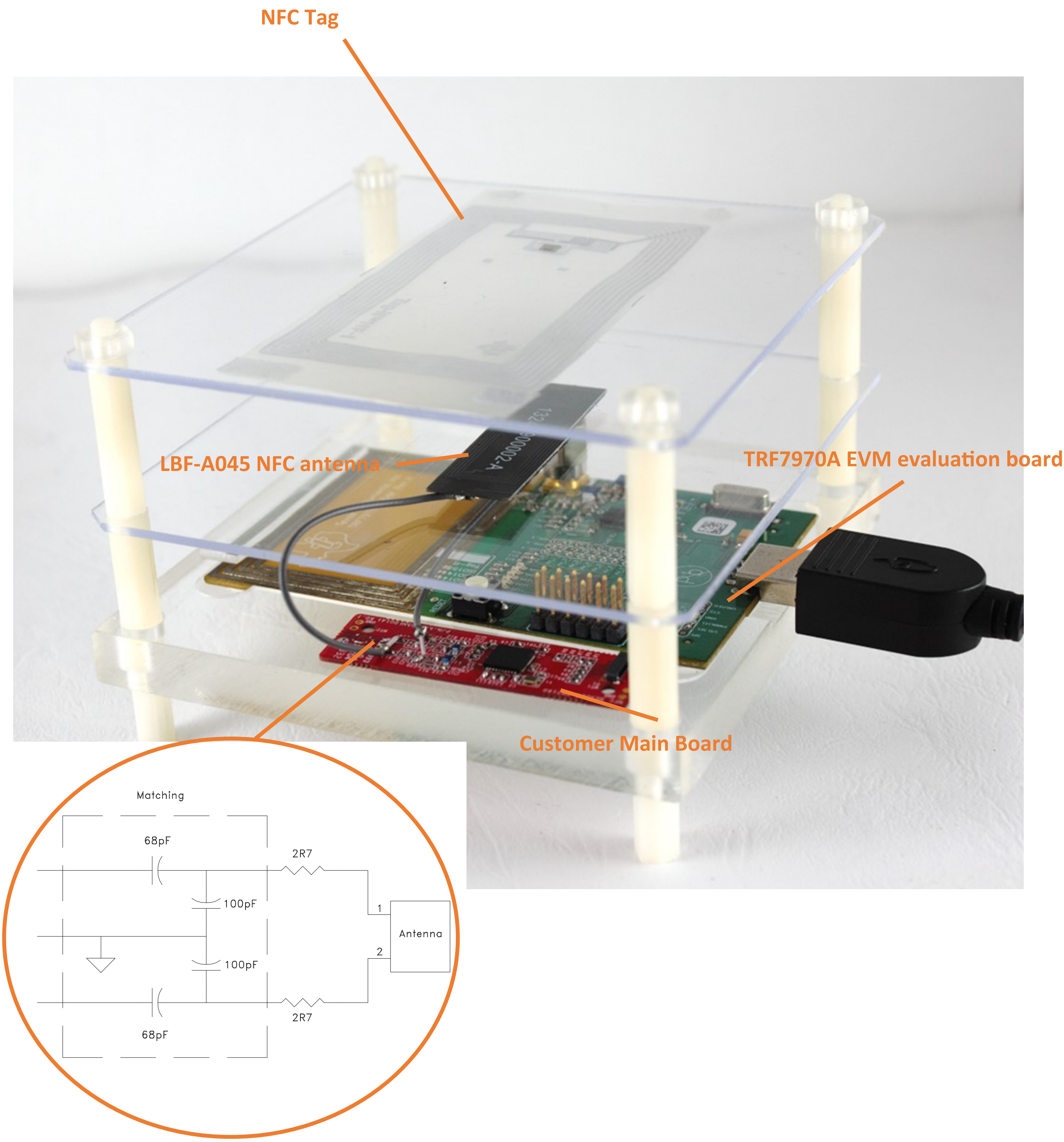


Figure 6. Antenna Test Setup and Matching Circuit

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.

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