

Inverted F Bluetooth Antenna Specifications

Version Number: V1.0

Release Date: 2025-01-01

1. Product Overview

Antenna Type: PCB Antenna

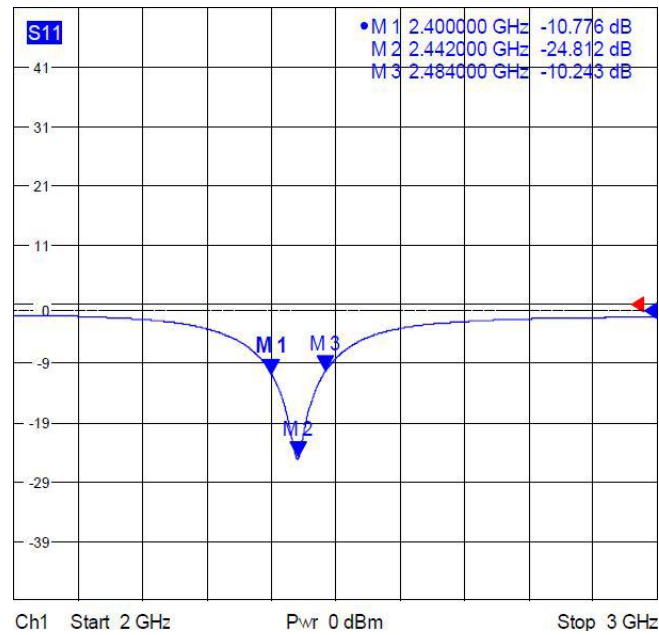
Application Scenario: Bluetooth (2.4GHz ISM band, such as BLE 5.0/5.1/5.2)

Features: Miniaturized, low cost, PCB integrated design, omnidirectional radiation, etc.

1. Electrical characteristics

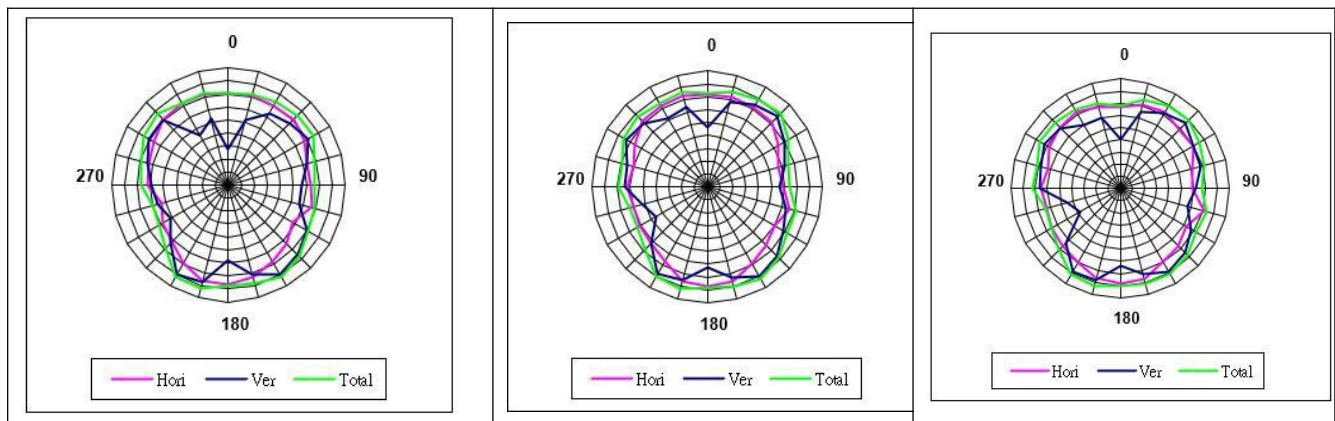
Parameter	Specification Value	Test Conditions
Operating Frequency	2400~2480 MHz	Bluetooth frequency band
Impedance	50Ω (±10%)	Reference plane: PCB ground plane
(VSWR)	≤2.0	Center frequency 2450MHz
Return Loss (S11)	≤-10 dB	2400~2480MHz range
Gain	1.3 dBi (typical)	Free space
Efficiency	≥70%	With PCB ground plane
Polarization	Linear polarization	

Return Loss



Frequency(MHz)	S11 (dB)
2400	-10.77
2450	-24.81
2484	-10.243

Radiation



Horizontal: 2400 MHz 2450 MHz 2500 MHz

Power (dBm) Max: 0 Min: -40 Scale: 5/div

Vertical: 2400 MHz 2450 MHz 2500 MHz

Power (dBm) Max: 0 Min: -40 Scale: 5/div

	2400MHz	2450MHz	2500MHz
Efficiency	70.56%	75.25%	71.01%

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rovince

2. Mechanical Characteristics

Dimensions:

Total length (L): 21 mm ($\lambda/4$ wavelength design)

Short-circuit pin height (H): 6.3 mm

Feed point location:

3.3 mm from the short-circuit pin

Materials:

Radiator: PCB copper layer (thickness 1 oz)

Substrate: FR4 (dielectric constant $\epsilon=4.4$, thickness 1.2 mm)

3. Design Parameters

Structural schematic diagram



PCB layout requirements:

The antenna area must be clear (no traces or metal).

The ground plane should extend at least 15-30 mm beneath the antenna.

The distance between the shorting pin and the feed point: 2-5 mm.

4 Environmental Adaptability

Operating Temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$

Humidity: $\leq 95\%$ RH (non-condensing)

5. Testing and Certification

Standard Compliance:

FCC CFR 47 Part 15 (if applicable)

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ETSI EN 300 328 (if applicable)

Measured Data:

S11 tested using a Vector Network Analyzer (VNA).

Radiation efficiency and gain tested in an anechoic chamber.

6. Precautions

Antenna performance is affected by surrounding metal objects; strict adherence to clearance requirements is necessary. Impedance matching fine-tuning (e.g., using a π -type matching network) is required during mass production.

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