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Embedded Virtual Antenna[®] Technology

(NN00-101)

DATASHEET

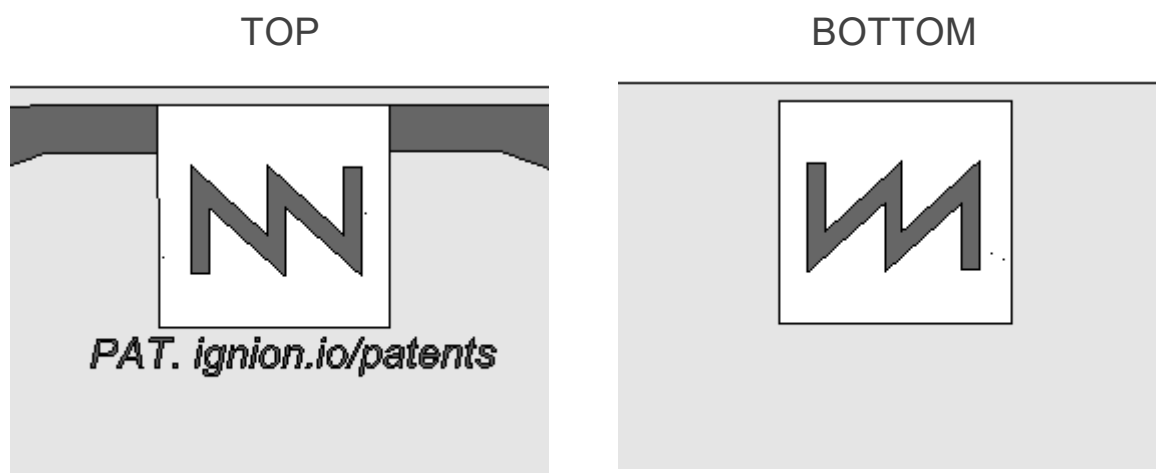
EMBEDDED VIRTUAL ANTENNA[®] TECHNOLOGY (NN00-101)

The Embedded Virtual Antenna[®] technology is a compact and cost-effective antenna solution specifically engineered to deliver reliable wireless connectivity in space-constrained environments. With an ultra-small footprint of only $2.4 \times 2.5 \times 0.6$ mm, matching the thickness of the printed circuit board (PCB), this embedded antenna integrates seamlessly into nearly any high-end IoT device.

This technology leverages the existing PCB substrate and copper layers as part of the radiating structure, achieving high spatial efficiency and enhanced mechanical robustness. This unique design approach gives the antenna its hallmark characteristics: ease of integration, versatility, and broad tunability.

The Embedded Virtual Antenna[®] is ideally suited for IoT devices, wearables, Bluetooth and Wi-Fi modules, compact sensors, and other wireless systems operating from 2.4 GHz to 10.6 GHz. For optimal performance, careful attention to substrate selection, ground-plane design, impedance matching, and isolation from noise sources is essential to ensure excellent radiation efficiency and stable frequency response.

Powered by Ignion's proprietary Virtual Antenna[®] technology, this embedded solution is non-resonant and therefore broadly tunable, supporting multiple frequency bands — including those that can be enabled in future product releases — using a single antenna component.



Embedded Virtual Antenna[®] technology (NN00-101)

Most used industries

- Consumer Electronic
- Healthcare
- Wearables & Hearings
- Wireless Modules
- Asset Tracking & Logistics
- Smart home & Smart City

- Gaming Devices

Product Benefits

- **Smallest clearance:** 6 mm x 5 mm.
- **Miniature:** Smallest Virtual Antenna[®] form factor of 2.5 mm x 2.4 mm x 0.6 mm.
- **Reliability:** Off-the-Shelf standard product, no antenna part customization is required.

Operation Bands Summary

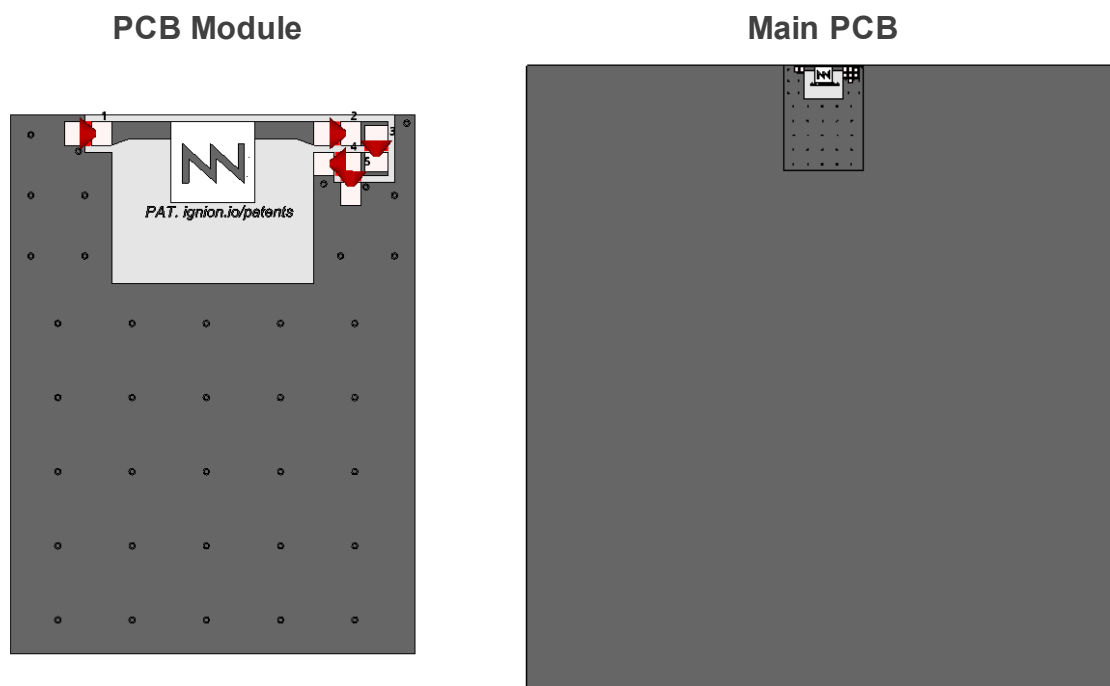
- Bluetooth and Wi-Fi (2400 GHz – 2500 MHz).

1. AVAILABLE SOLUTIONS

1.1. Bluetooth (2400 – 2500 MHz)

The following table presents the technical specifications of the embedded NN00-101 Virtual Antenna[®] product, including its radiation pattern, polarization, weight, temperature range, impedance, and dimensions. It is a highly versatile and durable component that can be easily integrated into a wide range of wireless applications.

The proposed solution covers the Bluetooth band (2400 – 2500 MHz).



PCB Module (16 mm x 12 mm x 0.6 mm) integrated into a main PCB (95 mm x 90 mm x 1 mm)

Technical features	2400 MHz – 2500 MHz
Average Efficiency	> 60 %
Peak Gain	3.2
VSWR	< 3:1
Radiation Pattern	Omnidirectional
Polarization	Linear
Weight (approx.)	0 g.
Temperature	-40 to +125 °C
Impedance	50 Ω
Dimensions (L x W x H)	2.5 mm x 2.4 mm x 0.6 mm

Technical features. Measures from the main board (95 mm x 90 mm x 1.0 mm), integrating the PCB module (16 mm x 12 mm x 0.6 mm)

RADIATION PATTERNS (2400 – 2500 MHz), GAIN, AND EFFICIENCY

This section describes the different radiation patterns, gain and efficiency of the embedded NN00-101 Virtual Antenna[®] product for Bluetooth considering the main board.

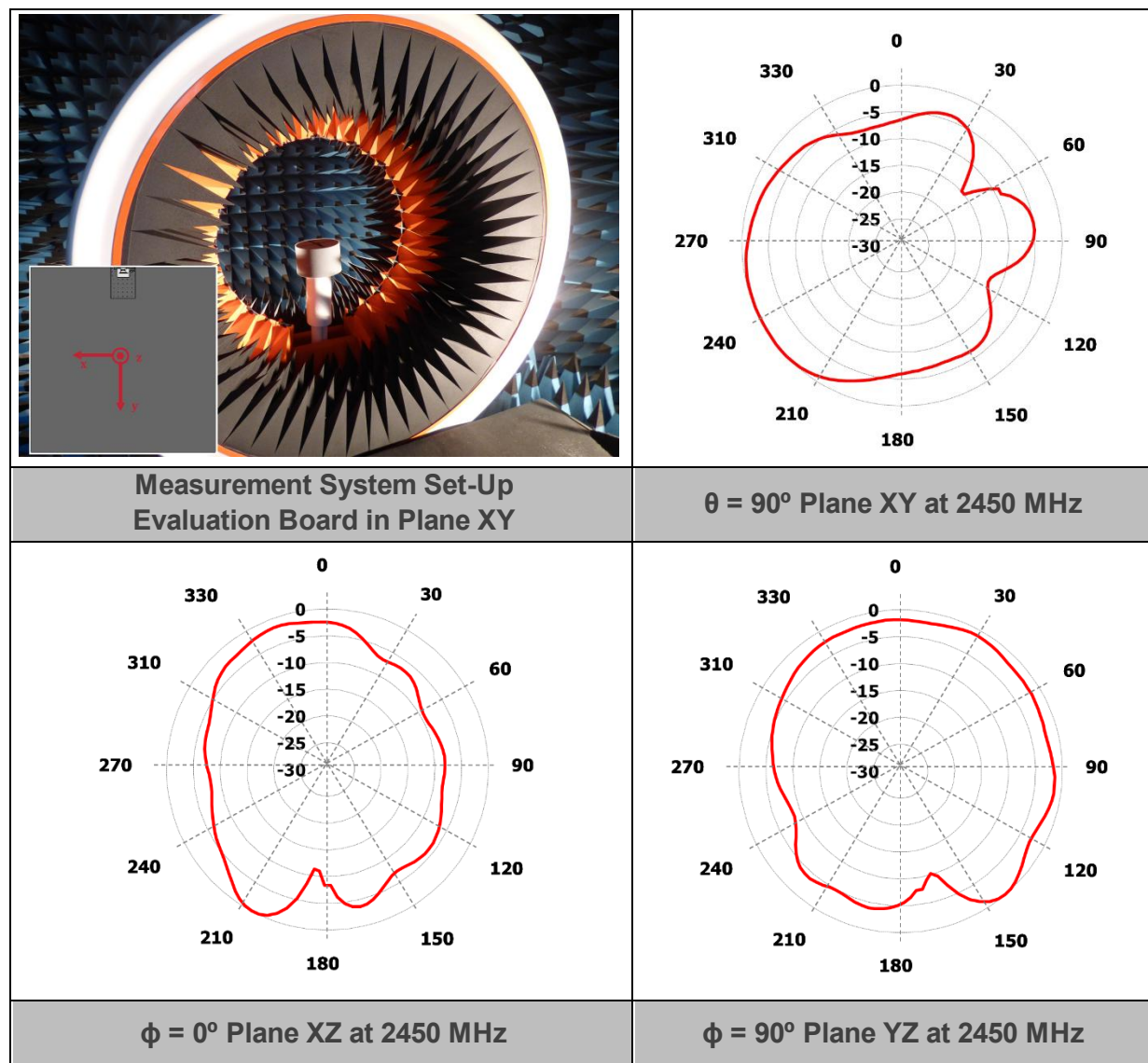
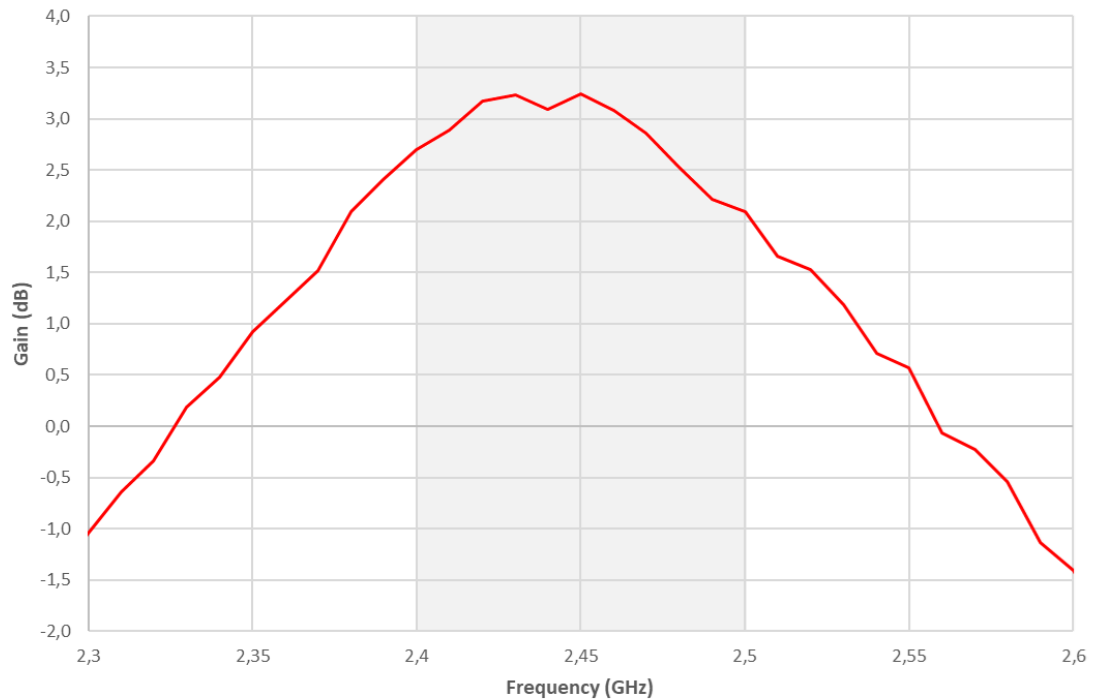


Table 1 – Radiation patterns from the main PCB including the module PCB with the NN00-101 for 2400 MHz – 2500 MHz with the proposed matching network.



Bluetooth	Gain	Peak Gain	3.2 dBi
		Average Gain across the band	2.8 dBi
		Gain Range across the band (min, max)	2.1 <=> 3.2 dBi
	Efficiency	Peak Efficiency	69 %
		Average Efficiency across the band	63.2 %
		Efficiency Range across the band (min, max)	69 – 54 %

Table 2 - Antenna gain and total efficiency from the main PCB including the module PCB with the NN00-101 for 2400 MHz – 2500 MHz with the proposed matching network.

If you need assistance to design your matching network, please contact support@ignion.io



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