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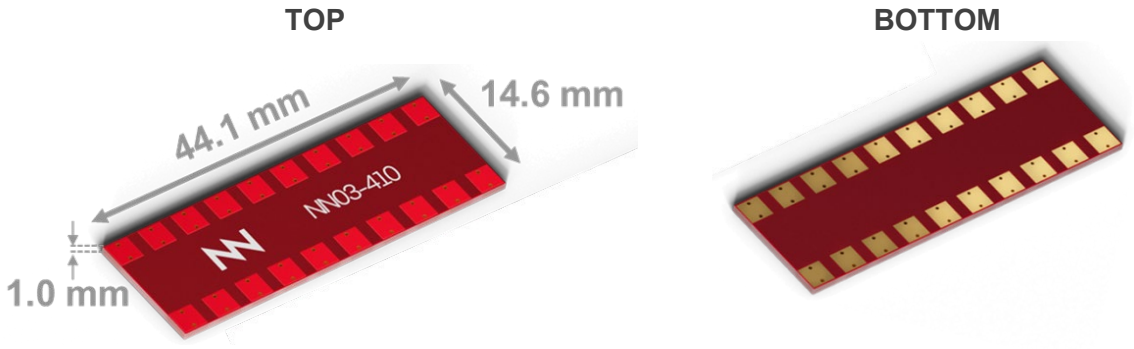
OMNIA mXTEND™

NN03-410

USER MANUAL

OMNIA mXTEND™: A STANDARD ANTENNA SOLUTION FOR MOBILE FREQUENCY BANDS.

The OMNIA mXTEND™ chip antenna component is engineered to provide high-performance multiband coverage in wireless devices, supporting a wide array of communication standards across Cellular, GNSS, and Wi-Fi/BLE technologies. This versatile antenna solution allows for seamless integration into devices that require robust, multi-frequency operation while minimizing design complexity.



Material: The OMNIA mXTEND™ chip antenna component is built on glass epoxy substrate.

Most used industries.

- **Smart Metering**
- **Industrial IoT**
- **Automotive Telematics**
- **Asset Tracking & Logistics**

OMNIA mXTEND™ benefits.

- **High Performance:** Provides reliable and consistent signal strength across Cellular, GNSS, and BLE/Wi-Fi, ensuring robust connectivity even in challenging environments.
- **Multiband:** Supports a broad range of frequencies, ensuring global compatibility for mobile, location-based, and data transmission services.
- **Simplified Integration:** A single antenna part with a triple-port configuration reduces the need for multiple components, simplifying your design and lowering costs.
- **Reliability:** An off-the-shelf standard product that requires no customization, allowing for quicker deployment and reduced time-to-market.

Operation bands summary.

The OMNIA mXTEND™ SMD antenna component covers a broad spectrum of frequencies, ensuring comprehensive support for Cellular Networks (4G, 5G, NB-IoT, LTE-M), GNSS Systems (GPS, GLONASS, Galileo, BeiDou), and Wi-Fi/BLE and many more within the range of 400 MHz to 8000 MHz.

CHAPTER INDEX

1 CONFIGURATION OVERVIEW

The OMNIA mXTEND™ chip antenna component is a versatile antenna component that can be easily tuned to operate at any wireless frequency. Table 1 shows an overview of an example of configuration of the OMNIA mXTEND™ chip antenna component for common wireless frequencies.

Configuration	Frequency range	Frequency regions
CELLULAR IoT + GNSS + Wi-Fi/BLE	790 – 960 MHz, 1561 – 1606 MHz & 2400 – 2500 MHz	3

Table 1 - List of communication standards included in this user manual.

The following table presents the technical specifications of the OMNIA mXTEND™ chip antenna component, including its dimensions, radiation pattern, polarization, weight, temperature range and impedance. These features make the OMNIA mXTEND™ a highly versatile and durable component that can be easily integrated into a wide range of wireless applications.

Technical Features	OMNIA mXTEND™ (NN03-410)
Dimensions	44.1 x 14.6 x 1.0 (mm)
Radiation Pattern	Omnidirectional
Polarization	Linear
Weight (approx.)	1.23 g
Temperature	-40 to +125 ºC
Impedance	50 Ω

Table 2 - Technical features of the OMNIA mXTEND™.

PURCHASE EVALUATION BOARD THROUGH DISTRIBUTOR

Any of the evaluation boards shown in this document can be purchased through our main distributors, find them here: https://ignion.io/distributors/.

1.1. OMNIA mXTEND™ FOR CELLULAR IoT

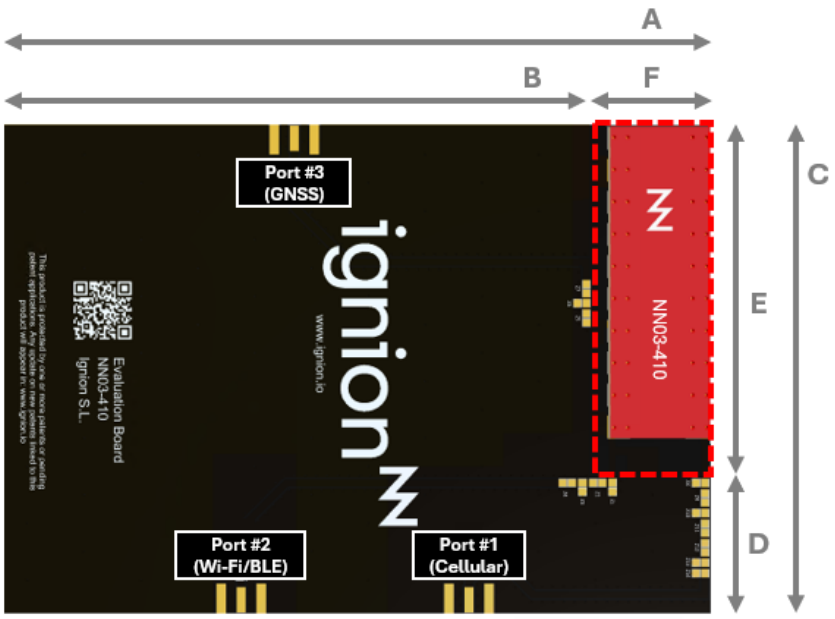
OMNIA mXTEND™ is designed to support a wide range of wireless communication standards, including LTE CAT 1, LTE CAT-M, NB-IoT, GNSS and Wi-Fi/BLE. It provides reliable operation across multiple frequency bands, ensuring a secure path to certification.

Technical Features	790 – 960 MHz	1561 – 1606 MHz	2400 – 2500 MHz
Average Efficiency	> 55 %	> 75 %	> 65 %
Peak Gain	0.9 dBi	4.0 dBi	3.5 dBi
VSWR	< 2.6:1	< 1.5:1	< 2:1

Table 3 - Performance of the OMNIA mXTEND™ configured for NB-IoT, GNSS and Wi-Fi/BLE on an evaluation board (100 mm x 69 mm x 1 mm).

EVALUATION BOARD FOR CELLULAR IoT

This Evaluation Board (part number: EB_NN03-410) integrates one OMNIA mXTEND™ chip antenna component to provide operation in three frequency regions, from 790 MHz to 960 MHz, from 1561 MHz to 1606 MHz and from 2400 MHz to 2500 MHz. A UFL cable connects each input/output port to the SMA connector.



Measure	mm
A	100
B	83
C	69
D	19
E	50
F	17

Tolerance: ±0.2 mm

Material: The Evaluation Board is built on FR4 substrate. The thickness is 1 mm.

Clearance Area: 50 x 17 mm (ExF)

Figure 1 – EB_NN03-410. Three ports Evaluation Board, providing operation in 3 frequency ranges, 790 – 960 MHz (Port 1), 2400 – 2500 MHz (Port 2) and 1561 – 1606 MHz (Port 3).

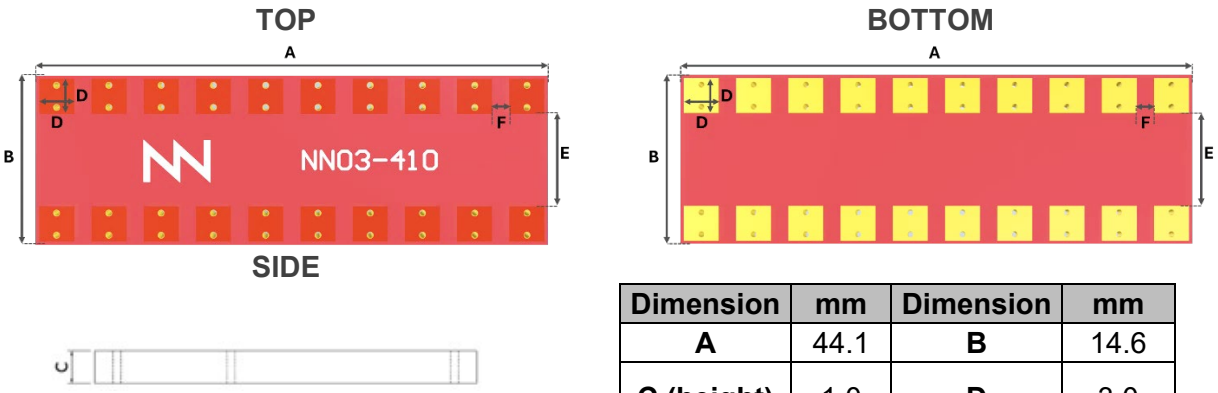
1.2. ASSESS YOUR OWN DEVICE REQUIREMENTS

If you are designing a device with a different size or operating frequency than shown above, you can assess the performance of this configuration using our free-of-charge Oxion™ platform. This platform provides a complete design report, including expected performance and tailored design guide, within 24 hours. For additional information about Ignion's range of R&D services, please visit: https://ignion.io/resources-support/technical-center/engineering-support/. If you require further assistance, please contact support@ignion.io.

Purchase this or other evaluation boards through our main distributors by visiting the following link: https://ignion.io/distributors/.

2 MECHANICAL SPECIFICATIONS

2.1 DIMENSIONS, TOLERANCES, AND RoHS



Dimension	mm	Dimension	mm
A	44.1	**B**	14.6
C (height)	1.0	**D**	3.0
E	8.0	**F**	1.5

Figure 2 – OMNIA mXTEND™ SMD antenna component dimensions.

The OMNIA mXTEND™ (NN03-410) chip antenna component is compliant with the restriction of the use of hazardous substances (**RoHS**). For more information, please contact support@ignion.io.

The RoHS certificate can be downloaded from https://ignion.io/files/RoHS_NN03-410.pdf.

2.2 SPECIFICATIONS FOR THE INK

The next figure shows the range of the colors in the OMNIA mXTEND™ SMD chip antenna component:

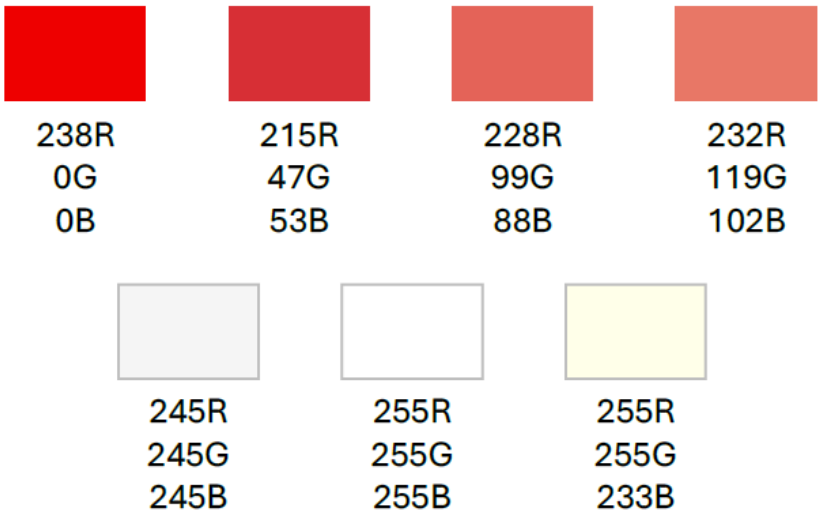
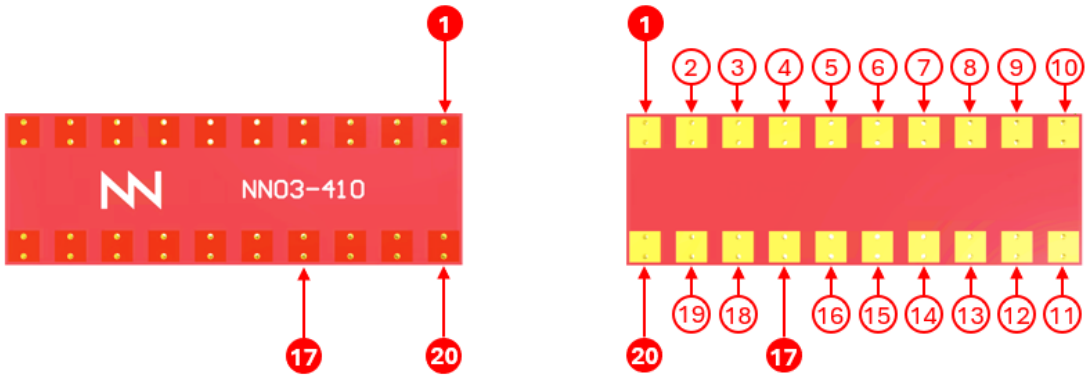


Figure 3 – Acceptable color range.

3 ASSEMBLY AND MANUFACTURING

Figure 4 shows the back and front views of the OMNIA mXTEND™ SMD antenna component NN03-410. Due to the product configuration, the feeding pads are pad 1 (for NB-IoT), pad 17 (for GNSS) and pad 20 (for Wi-Fi/BLE).

Mounting pads (from 2 to 16 and from 18 to 19): solder the Omnia mXTEND™ chip antenna component mounting pads to the soldering pads on the PCB. These pads must NOT be grounded.



Feed pads (1, 17 and 20): align each pad with the corresponding feeding line on the PCB. See section **1.1**

Figure 4 – Pads of the OMNIA mXTEND™ chip antenna component (NN03-410).

As a surface mount device (SMD), the OMNIA mXTEND™ chip antenna component is compatible with industry standard soldering processes. The basic assembly procedure for the OMNIA mXTEND™ chip antenna component is as follows:

1. Apply a solder paste on the pads of the PCB. Place the OMNIA mXTEND™ chip antenna component on the board.
2. Perform a reflow process according to the temperature profile detailed in Table 4, Figure 5 and Figure 6.
3. After soldering the OMNIA mXTEND™ chip antenna component to the circuit board, perform a cleaning process to remove any residual flux. Ignion recommends conducting a visual inspection after the cleaning process to verify that the OMNIA reflux has been removed.

The drawing below shows the soldering details obtained after a correct assembly process:

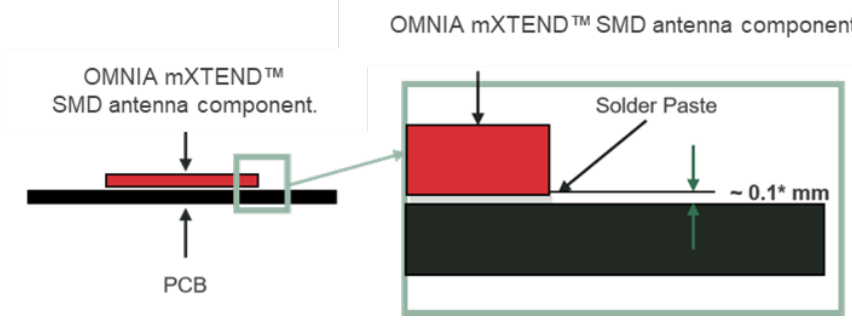


Figure 5 – Soldering Details.

NOTE(*): Solder paste thickness after the assembly process will depend on the thickness of the soldering stencil mask. A stencil thickness equal or larger than 127 microns (5 mils) is required.

The OMNIA mXTEND™ chip antenna component NN03-410 can be assembled following the Pb-free assembly process. According to the Standard **IPC/JEDEC J-STD-020C**, the temperature profile suggested is as follows:

Phase	Profile features	Pb-Free Assembly (SnAgCu)
RAMP-UP	Avg. Ramp-up Rate (Tsmax to Tp)	3 ºC / second (max.)
PREHEAT	- Temperature Min (Tsmin) - Temperature Max (Tsmax) - Time (tsmin to tsmax)	150 ºC 200 ºC 60-180 seconds
REFLOW	- Temperature (TL) - Total Time above TL (tL)	217 ºC 60-150 seconds
PEAK	- Temperature (Tp) - Time (tp)	260 ºC 20-40 seconds
RAMP-DOWN	Rate	6 ºC/second max
Time from 25 ºC to Peak Temperature		8 minutes max

Table 4 - Recommended soldering temperatures.

Next graphic shows temperature profile (grey zone) for the OMNIA mXTEND™ chip antenna component assembly process reflows ovens.

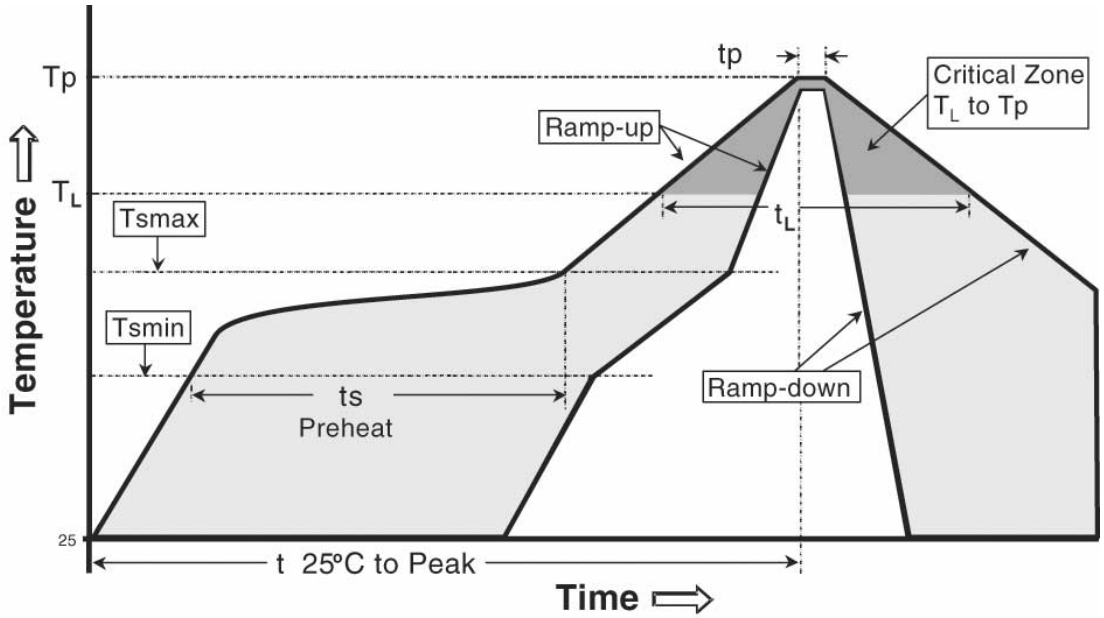
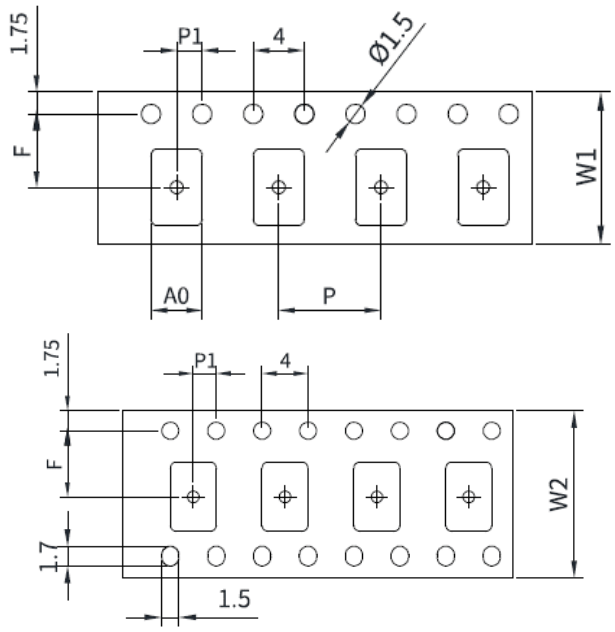


Figure 6 – Temperature profile.

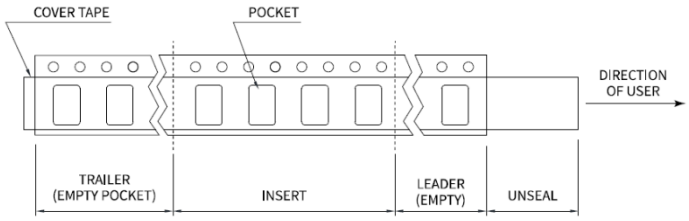
4 PACKAGING

The OMNIA mXTEND™ chip antenna component NN03-410 is delivered in tape and reel packaging. Ambient room conditions according to Moisture Sensitivity Level (MSL3): Floor life limited to 168 hours at ≤ 30°C / 60% RH. If this limit is exceeded, components must be baked following the **JEDEC J-STD-033** standard before solder reflow to remove absorbed moisture.



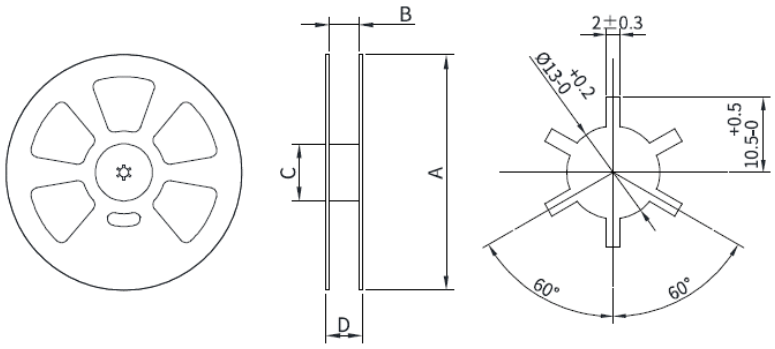
Measure	mm
A0	14.9 ± 0.15
B0	44.4 ± 0.15
K0	8.3 ± 0.1
W_1	-
W_2	56.0 ± 0.3
P	20.0 ± 0.1
T	0.4 ± 0.05

Figure 7 - Tape dimensions and tolerances.



Trailer (cm)	Leader (cm)	Unseal (cm)
30 ~ 40	30 ~ 40	10 ~ 30

Figure 8 - Taping schedule.



Measure	mm
A	Φ 330
B	57
C	Φ 80
D	61

Reel Capacity: 1300 pcs

Figure 9 – Reel dimensions and capacity.

5 EASY DESIGN JOURNEY WITH VIRTUAL ANTENNA® TECHNOLOGY

This is the simple step by step design journey when designing with Virtual Antenna® technology. You can either do it yourself or you can leverage Ignion's comprehensive support. Our team of experts is available throughout every step, from feasibility to certification and can help ensure you get the antenna right.

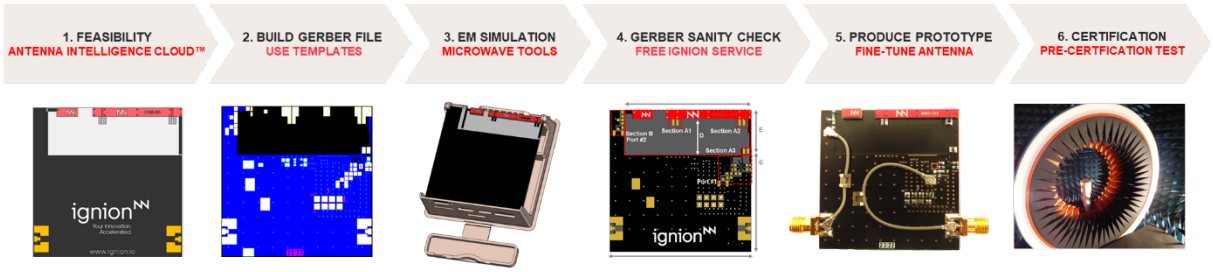
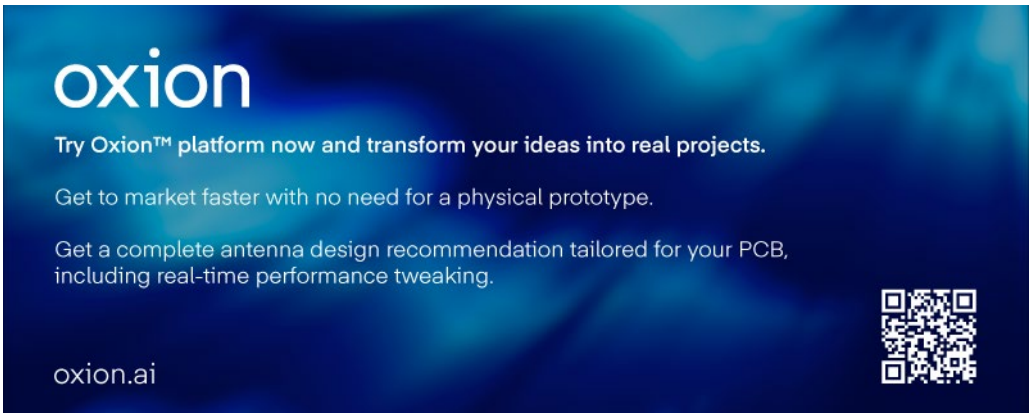


Figure 10 – Virtual Antenna® design journey for a successful IoT solution.

Step 1 - Feasibility: The Oxion™ platform provides feasibility results on a bare PCB in terms of reflection coefficient, total efficiency, and design recommendations such as antenna placement and clearance area.



Step 2 - Build design file: Build the design files (Gerber files) with optimal antenna integration based on Ignion templates and design recommendations received from the Oxion™ platform.

Step 3 - EM simulation: Validation of the design files with an Electro-Magnetic (EM) simulation of the full device considering every component, ensuring project requirements are met. Further allowing evaluation of design changes and their impact to the antenna performance.

Step 4 - Final Gerber design file sanity check: Check done by Ignion free of charge, ensuring that the antenna, matching network layout and other design recommendations on the final Gerber file follows the design guidelines before manufacturing.

Step 5 - Produce prototype and test: Verify performance results are aligned with expectations, easily fine-tune matching network if needed.

Step 6 - Certification pre-test: Perform OTA tests to ensure the device is meeting certification requirements.

Ignion is an ISO 9001:2015 certified company. Our entire portfolio is lead-free and RoHS compliant.

ISO 9001: 2015 Certified

6 ANNEX: List of bands

6.1 Cellular IoT bands covered

Bands	Uplink (MHz)	Downlink (MHz)	Region
5	824 – 849	869 – 894	NA
6	830 – 840	875 – 885	APAC
8	880 – 915	925 – 960	GLOBAL
18	815 – 830	860 – 875	JAPAN
19	830 – 845	875 – 890	JAPAN
20	832 – 862	791 – 821	EMEA
26	814 – 849	859 – 894	NA
27	807 – 824	852 – 869	NA

2. GNSS bands covered

Bands	Frequency (MHz)	System
B1	1561.098 – 1591.7875	BeiDou
L1	1575.42	GPS
L1	1598.0625 – 1605.375	GLONASS
E1	1575.42 – 1602	Galileo

3. Bluetooth/Wi-Fi bands covered

Bands	Frequency (MHz)	# band
Bluetooth/Wi-Fi	2400 – 2500	single band

CHANGE LOG

Publication date	Change description
November 2024	Release date
December 2025	Section 2.2 - SPECIFICATIONS FOR THE INK Added 238R 0G 0B under the acceptable color range Added a changelog section for traceability and version control.

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