

NANO mXTEND[™] (NN02-101)

Ignion's smallest Virtual Antenna[®] component: 3.0 × 2.0 × 0.8 mm non-resonant antenna booster that covers Bluetooth, Wi-Fi and UWB from as small as 5 × 5 mm clearance.



Quick-spec block

Product	NANO mXTEND [™] non-resonant Virtual Antenna [®] component				
Part number	NN02-101				
Dimensions	3.0 × 2.0 × 0.8 mm				
Radiation pattern	Omnidirectional				
Recommended placement	PCB corner or center edge				
Supported protocols	Bluetooth / Wi-Fi		UWB LFR		UWB HFR
Min. clearance	5 × 5 mm		10 × 7.6 mm		6 × 6 mm
Frequency bands	2.4 – 2.5 GHz		3.1 – 4.8 GHz		6.0 – 8.5 GHz
Average efficiency	65 %		77.0 %		70.4 %
Reference board	80 × 40 × 1 mm		40 × 20 × 0.8 mm		25 × 20 × 0.8

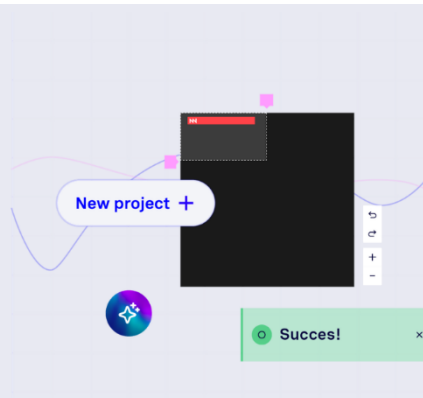
Applications

- **Wearables:** Smartwatches, fitness bands, headsets, earphones
- **Asset tracking & logistics:** Tags, trackers, UWB locators
- **Smart home:** Sensors, controllers, connected devices
- **Consumer electronics / gaming:** Controllers, peripherals
- **Industrial IoT:** Compact IoT modules, access control, smart locks

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1. Overview

1.1. Product description

The NANO mXTEND™ is the smallest Virtual Antenna® component in Ignion's portfolio, measuring 3.0 × 2.0 × 0.8 mm. It is a non-resonant antenna booster: a single off-the-shelf part can cover Bluetooth, Wi-Fi or UWB across 2.4 – 10.6 GHz, with the operating band set by the matching network rather than by a new antenna part. This lets one component serve multiple bands and regional variants and lets the same design be retuned, instead of redesigned, when the host PCB, enclosure or frequency changes. It mounts by standard pick-and-place at a PCB corner or center edge and needs only 5 × 5 mm of clearance.

1.2. Key benefits

- **Space efficiency:** 3.0 × 2.0 × 0.8 mm chip antenna, 5 × 5 mm minimum clearance (Bluetooth/Wi-Fi).
- **Design flexibility:** corner or center-edge mounting. The operating band is set by the matching network, not by a change of antenna part.
- **Scalability:** the same non-resonant part carries from prototype to production across different PCB sizes. You retune the matching network instead of selecting a new antenna.
- **Performance:** up to 77.0 % average efficiency on validated boards (see [Sec. 2](#)).
- **Integration:**
 - off-the-shelf
 - no antenna customization
 - 50 Ohm feed
 - matching reference values provided
- **Reliability:**
 - –40 to +125 °C operating temperature
 - REACH & RoHS compliant
 - MSL3
 - tape-and-reel
 - ISO 9001:2015

2. Available configurations summary

One component, three validated configurations. Same part, the matching network sets the band.

	Bluetooth/Wi-Fi corner	Bluetooth/Wi-Fi center edge	UWB LFR	UWB HFR
Frequency range	2.4 – 2.5 GHz	2.4 – 2.5 GHz	3.1 – 4.8 GHz	6.0 – 8.5 GHz
Protocols	Bluetooth, Wi-Fi	Bluetooth, Wi-Fi	UWB (bands 1–3)	UWB (bands 5–9)
Reference board	80 × 40 × 1 mm	80 × 40 × 1 mm	40 × 20 × 0.8 mm	25 × 20 × 0.8 mm
PCB thickness	1.0 mm	1.0 mm	0.8 mm	0.8 mm
Substrate	FR4	FR4	Low-loss laminate	Low-loss laminate
Connector	SMA	SMA	SMA	SMA
Clearance area	5 × 5 mm	5 × 5 mm	10 × 7.6 mm	6 × 6 mm
Avg. efficiency	55.0 %	65.0 %	77.0 %	70.4 %
Peak gain	2.4 dBi	2.4 dBi	3.6 dBi	3.1 dBi
VSWR	< 2.5:1	< 3.0:1	< 2.6:1	< 3.0:1
Group delay	—	—	< 220 ps (2 boards, d = 130 mm)	< 160 ps (2 boards, d = 75 mm)
Application	Smart home, IoT modules	Wearables, compact devices	Asset tracking, smart locks	Precision location, access control

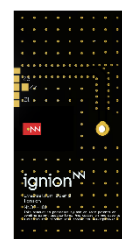
Bluetooth/Wi-Fi corner



Bluetooth/Wi-Fi center edge



UWB LFR



UWB HFR

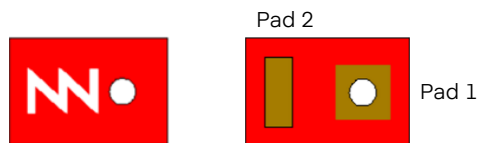


3. Technical patterns per configuration

Measured RF performance per validated configuration: PCB dimensions, matching network topology, S_{11} , efficiency, and radiation patterns after the shared placement rules below.

Integration & placement rules (all configurations)

- **Location:** PCB corner or center of the longitudinal edge.
- **Ground plane:** required (booster in clearance area; matching network in ground-plane area, as close as possible to feed point).
- **Feed:** 50 Ohms transmission line.
- **Pads:** two pads: one for the RF feed and one for mounting, depending on the configuration.



- **Clearance area:** from 5 × 5 mm (Bluetooth/Wi-Fi) up to 10 × 7.6 mm (UWB LFR), depending on configuration (see [Sec. 2](#))

Test conditions & equipment

Ignion operates a fully equipped RF laboratory with Vector Network Analyzers (VNAs), a CMW500 radio communication tester, and a STARLAB 18 anechoic chamber (see figure below). This equipment supports key RF measurements including S_{11} , total efficiency, OTA testing such as TRP and TIS, as well as noise debugging and the identification of spurious emissions.



STARLAB 18 anechoic chamber

3.1. Bluetooth/Wi-Fi corner configuration

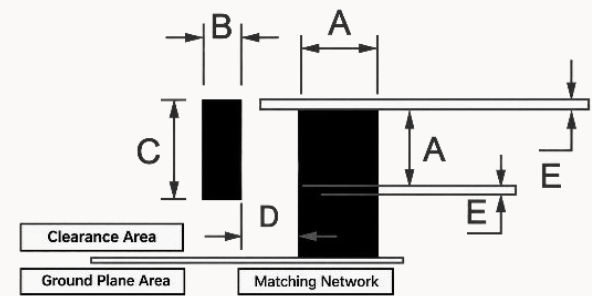
Bluetooth/Wi-Fi at 2.4 – 2.5 GHz with the booster in the board corner (compact, general-purpose layout):
55 % average efficiency on an 80 × 40 mm board.

Board Characteristics

PCB dimensions and Virtual Antenna[®] Technology RF design



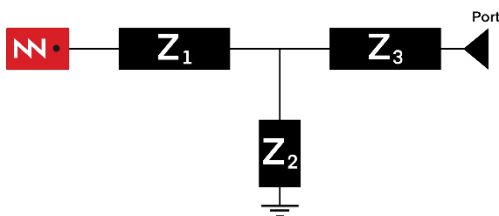
Footprint dimensions



Measure	A	B	C	D	E
mm	1.00	0.50	1.30	0.80	0.15
inches	0.040	0.020	0.051	0.031	0.006

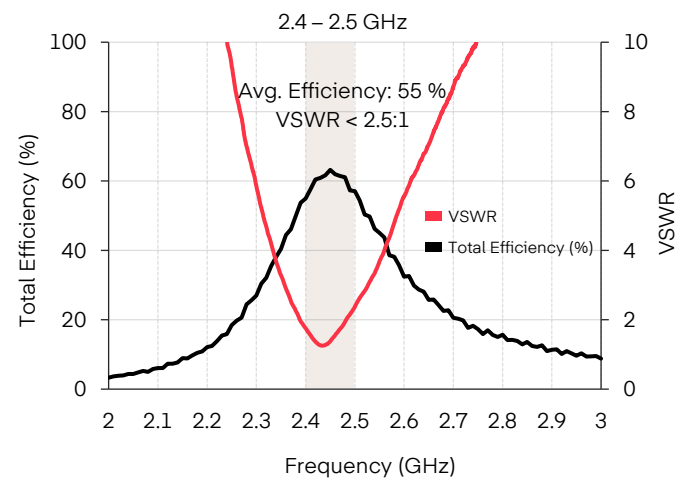
Tolerance: ±0.05 mm | ±0.00197 in

Matching Network



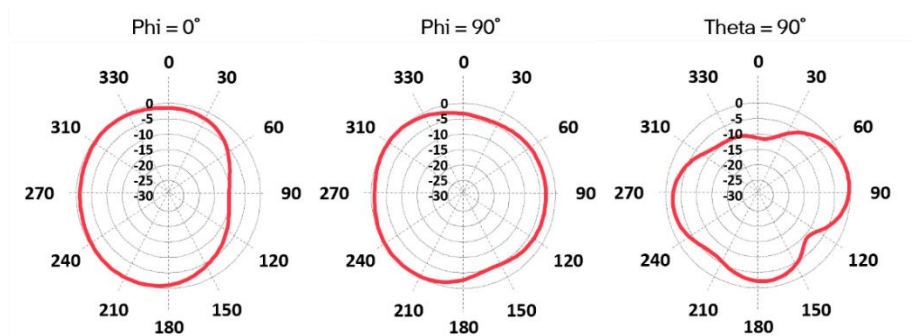
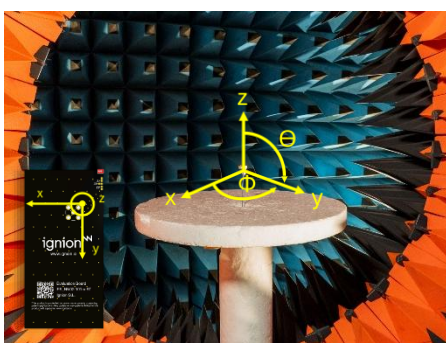
	Value	Part number
Z ₁	9.1 nH	LQW18AN9N1G80
Z ₂	6.8 nH	LQW18AN6N8G80
Z ₃	6 nH	LQW18AN6N0G80

Total efficiency (%) and VSWR



Radiation Patterns

Radiation patterns at a frequency of 2.45 GHz:



3.2. Bluetooth/Wi-Fi edge configuration

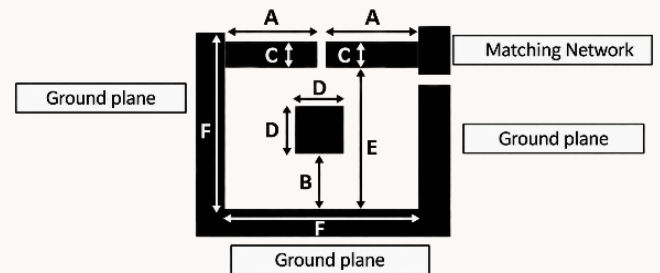
The same 2.4 – 2.5 GHz band with the booster on the center of the longitudinal edge: 65 % average efficiency for wearables and compact devices.

Board Characteristics

PCB dimensions and Virtual Antenna[®] Technology RF design



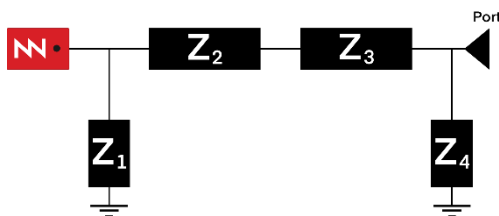
Footprint dimensions



Measure	A	B	C	D	E	F
mm	2.375	2.35	0.50	1.00	4.15	5.00
inches	0.094	0.093	0.02	0.04	0.163	0.197

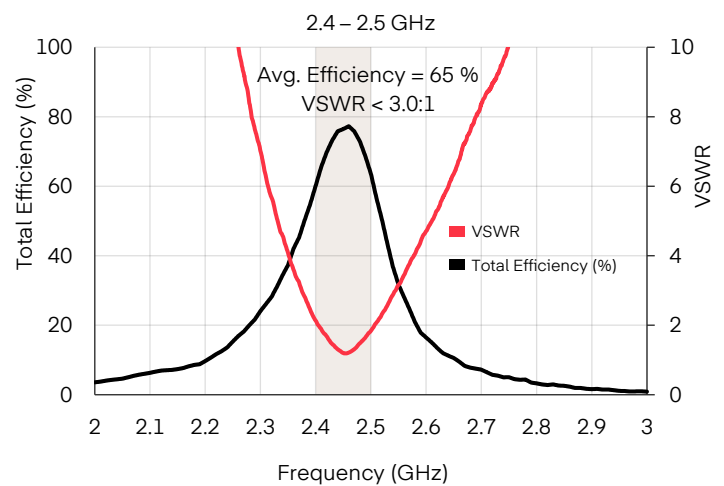
Tolerance: ± 0.05 mm | ± 0.00197 in

Matching Network



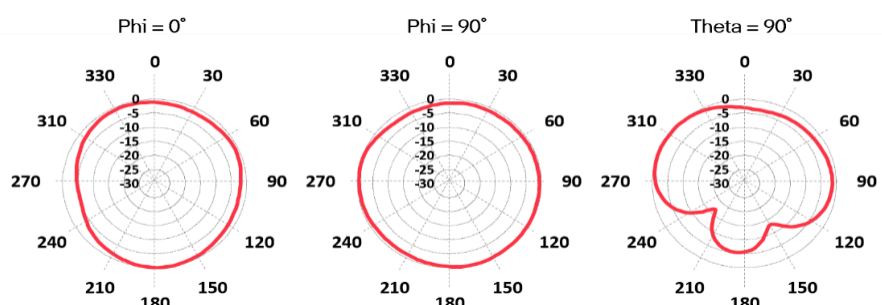
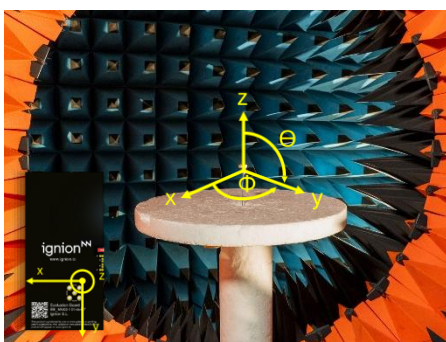
	Value	Part number
Z ₁	-	-
Z ₂	0.4 pF	GJM1555C1HR40WB01
Z ₃	0.3 pF	GJM1555C1HR30WB01
Z ₄	0.3 pF	GJM1555C1HR30WB01

Total efficiency (%) and VSWR



Radiation Patterns

Radiation patterns at a frequency of 2.45 GHz:

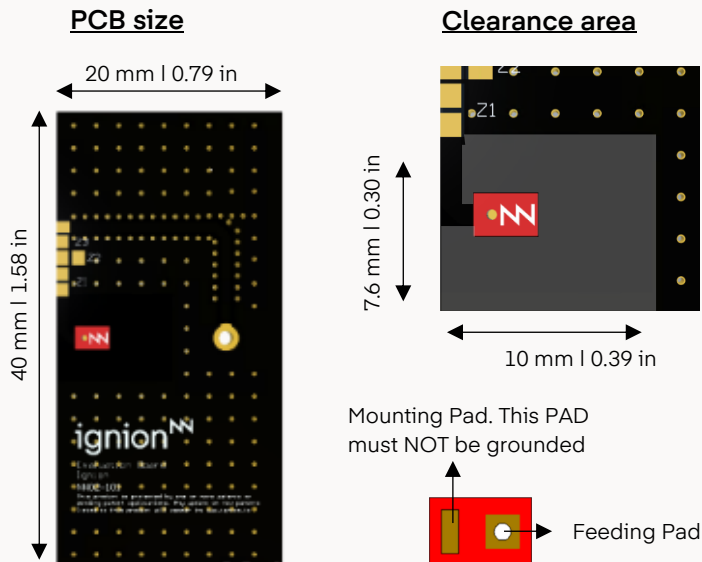


3.3. UWB LFR (3.1 – 4.8 GHz)

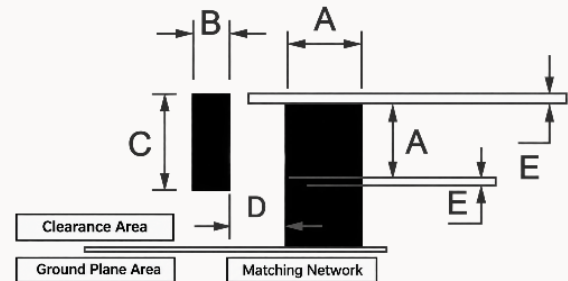
Low-frequency UWB (3.1 – 4.8 GHz, bands 1 – 3) for asset tracking and smart locks: 77 % average efficiency and 3.6 dBi peak gain on a 40 × 20 mm board.

Board Characteristics

PCB dimensions and Virtual Antenna[®] Technology RF design



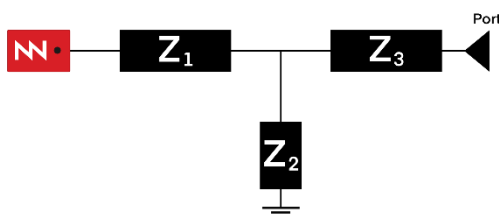
Footprint dimensions



Measure	A	B	C	D	E
mm	1.00	0.50	1.30	0.80	0.15
inches	0.040	0.020	0.051	0.031	0.006

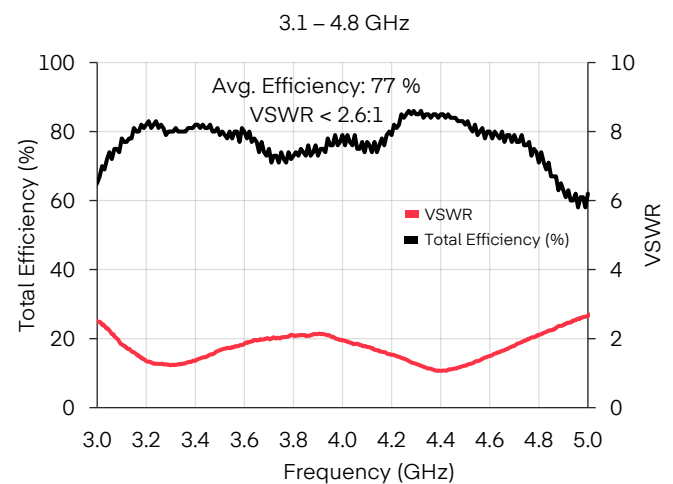
Tolerance: ± 0.05 mm / ± 0.00197 in

Matching Network



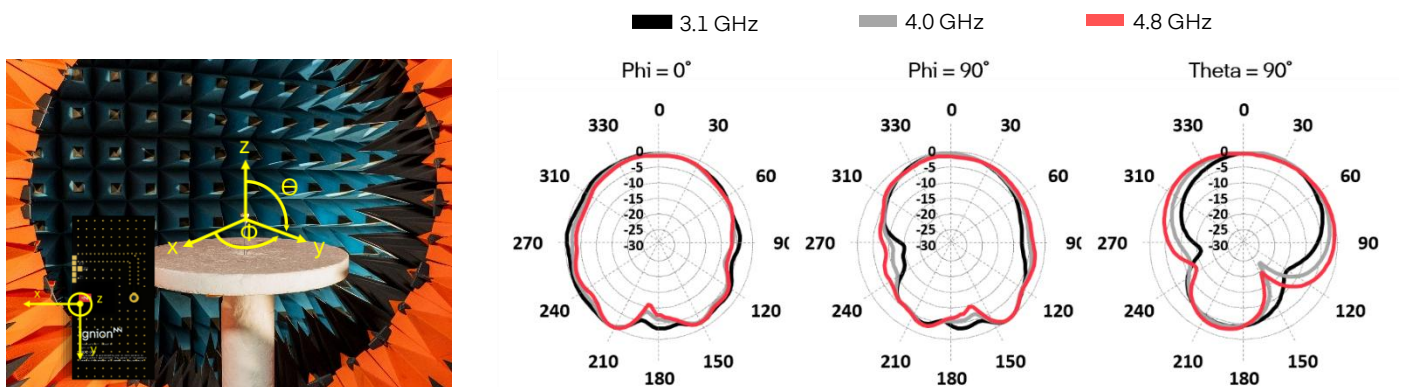
	Value	Part number
Z ₁	1.5 nH	LQW15AN1N5C80
Z ₂	2.2 nH	LQW15AN2N2G80
Z ₃	0.6 pF	GJM1555C1HR60WB01

Total efficiency (%) and VSWR



Radiation Patterns

Radiation patterns at 3.1, 4.0, and 4.8 GHz:



3.4. UWB HFR (6.0 – 8.5 GHz)

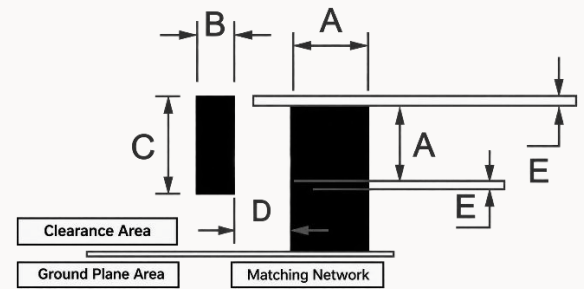
High-frequency UWB (6.0 – 8.5 GHz, bands 5 – 9) for precision location and access control: 70.4% average efficiency and 3.1 dBi peak gain on a 25 × 20 mm board.

Board Characteristics

PCB dimensions and Virtual Antenna[®] Technology RF design



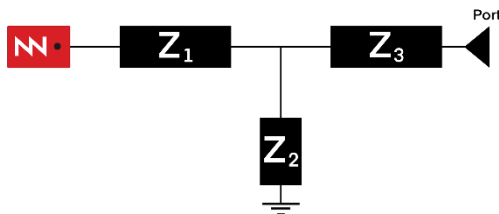
Footprint dimensions



Measure	A	B	C	D	E
mm	1.00	0.50	1.30	0.80	0.15
inches	0.040	0.020	0.051	0.031	0.006

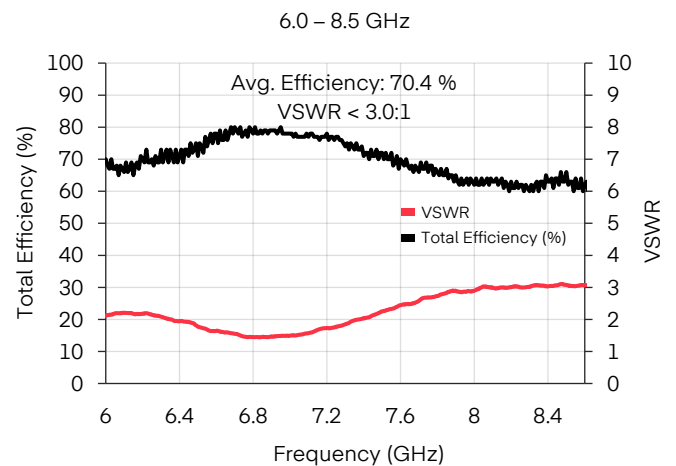
Tolerance: ± 0.05 mm | ± 0.00197 in

Matching Network



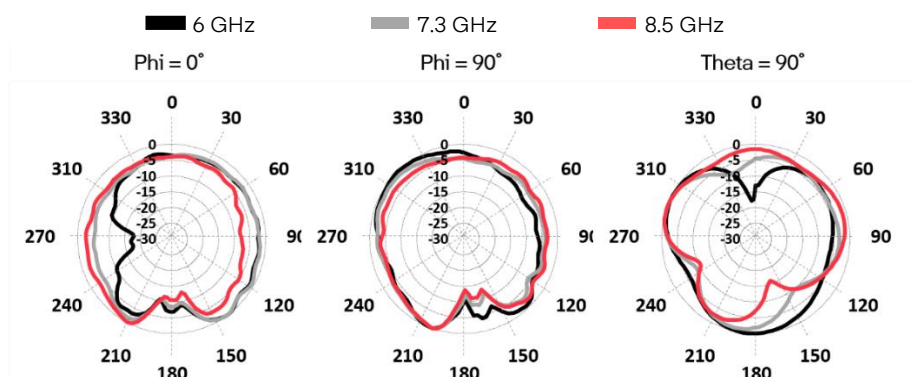
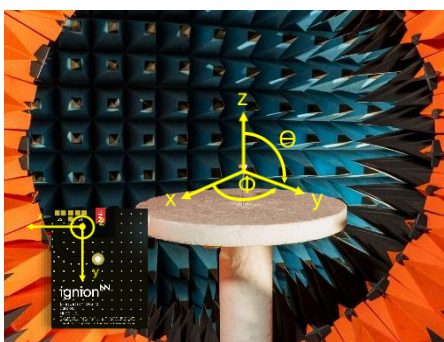
	Value	Part number
Z ₁	0.7 pF	GJM1555C1HR70WB01
Z ₂	-	-
Z ₃	0 Ohms	0 Ohms

Total efficiency (%) and VSWR



Radiation Patterns

Radiation patterns for the frequencies: 6 GHz, 7.3 GHz and 8.5 GHz.



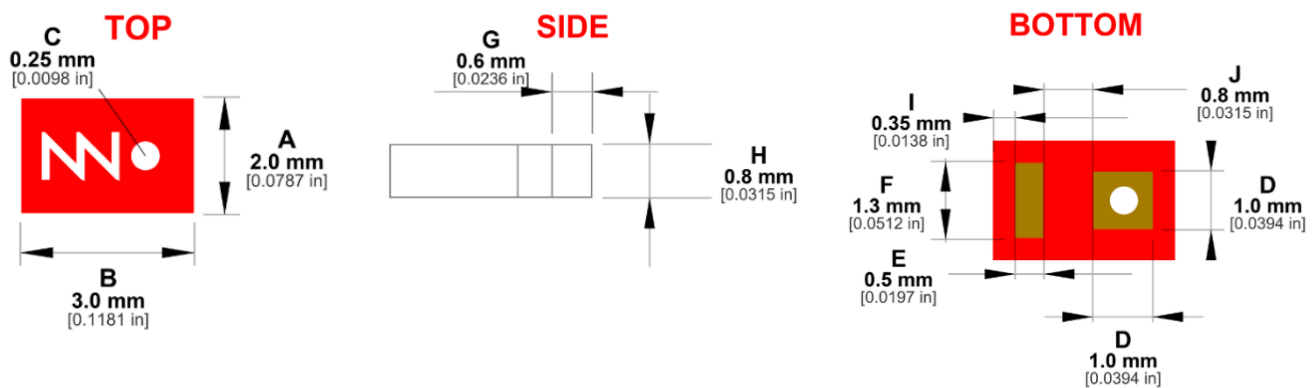
4. Electrical & mechanical specifications

Electrical ratings and physical dimensions: impedance, polarization, power, weight, substrate and packaging.

4.1. Electrical specifications

Parameter	Value	Unit	Condition
Frequency range	2.4 – 2.5 3.1 – 4.8 6.0 – 8.5	GHz	Per configuration
VSWR	< 2.5:1 < 2.6:1 < 3.0:1	ratio	Bluetooth corner UWB LFR UWB HFR
Average efficiency	up to 77	%	Board-dependent (see Sec. 2)
Peak gain	up to 3.6	dBi	UWB LFR
Impedance	50	Ohm	—
Polarization	Linear	—	—
Radiation pattern	Omnidirectional	—	—

4.2. Mechanical specifications



Parameter	Value	Unit	Tolerance
Length	3.0	mm	± 0.2
Width	2.0	mm	± 0.2
Height	0.8	mm	± 0.1
Weight	0.01	g	—
Mounting	SMD (pick & place)	—	—
Packaging	Tape & reel, 2500 pcs, 10 m length	—	—

5. Compliance, manufacturing & ordering

Environmental limits, soldering and moisture-sensitivity data, regulatory compliance, and ordering codes.

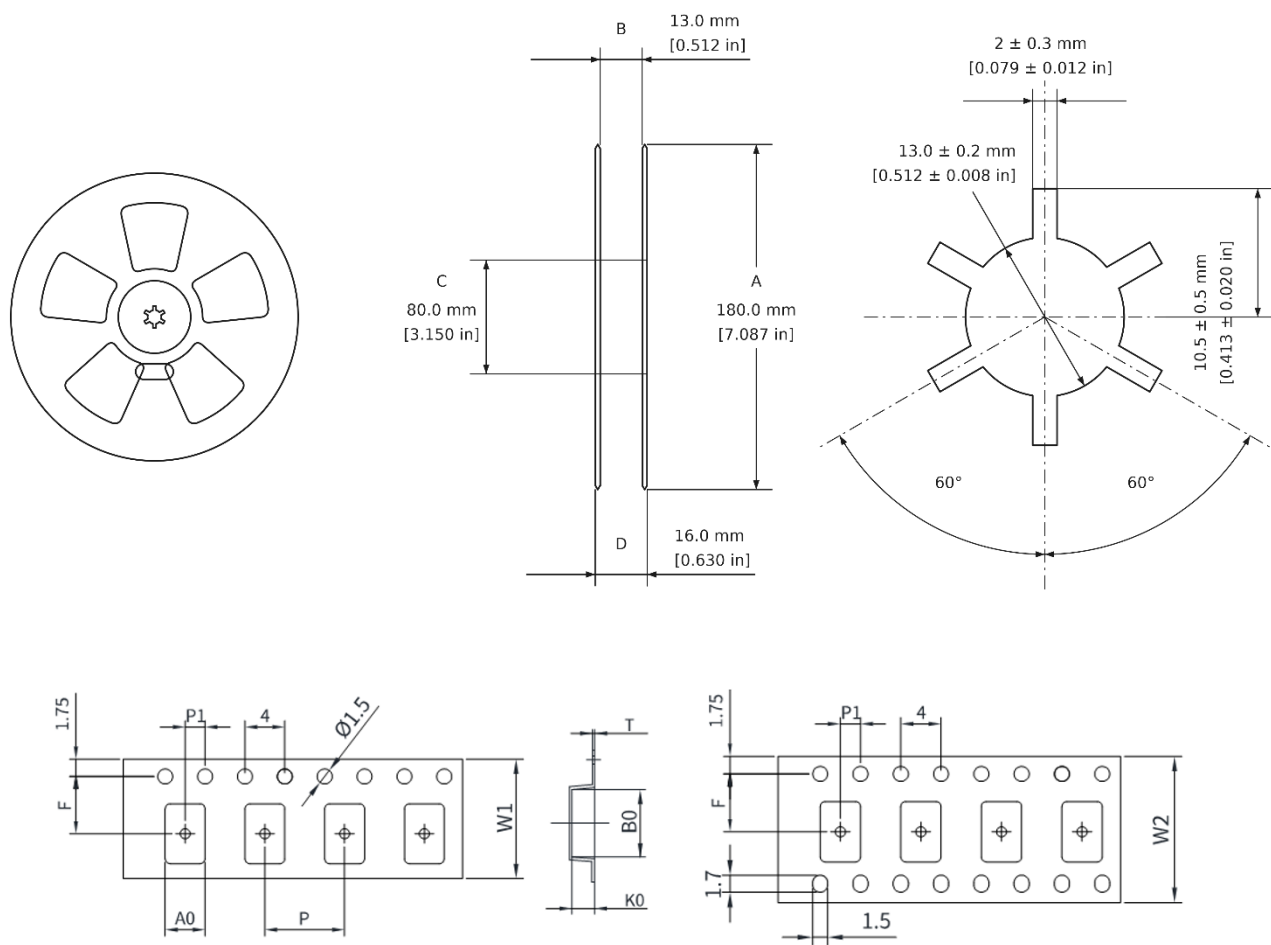
Environmental, manufacturing & compliance

Parameter	Value
Operating temperature	–40 to +125 °C
Storage temperature	20 to 25 °C
Humidity	Below 50%
MSL	MSL3 (floor life limited to 168 hours at ≤ 30 °C / 60% RH)
Reflow (Pb-free SnAgCu)	Preheat 150 – 200 °C (60 – 180 s); Reflow: 217 °C (60 – 150 s); Peak 260 °C (20 – 40 s); Ramp: 6 °C/s; Total < 8 min
Packaging	Tape & reel, 2500 pcs, 10 m length
RoHS	Compliant (2011/65/EU + 2015/863)
REACH	Compliant
Process quality certification	ISO 9001:2015

Ordering information

Part number	Description	Packaging	Quantity
NN02-101	NANO mXTEND™ antenna booster chip component	Tape & reel	2500 pcs

Reel & dimensions



Part Number: NN02-101

W	W1	W2	A0
—	$12.0 \pm 0.3 \text{ mm}$ $0.472 \pm 0.012 \text{ in}$	—	$2.3 \pm 0.15 \text{ mm}$ $0.091 \pm 0.006 \text{ in}$
B0	K0	P	T
$3.3 \pm 0.15 \text{ mm}$ $0.130 \pm 0.006 \text{ in}$	$1.0 \pm 0.15 \text{ mm}$ $0.039 \pm 0.006 \text{ in}$	$4.0 \pm 0.1 \text{ mm}$ $0.157 \pm 0.004 \text{ in}$	$0.3 \pm 0.05 \text{ mm}$ $0.012 \pm 0.002 \text{ in}$

6. Resources, revision history & patents

Design files, application notes, support links, and the datasheet revision record.

Related resources

- Oxion[™] free 24 h design report: <https://oxion.ai>
- Engineering support: <https://ignion.io/resources-support/technical-center/engineering-support/>
- Distributors: <https://ignion.io/distributors/>
- More resources: <https://ignion.io/product/nano-mxtend/>
- Contact: support@ignion.io / +34 935 660 710
- **Application Notes**
 - [Bluetooth/WI-FI](#): NANO mXTEND[™] tested across 7 PCB shapes/sizes and wearable placements
 - [UWB](#): DUO/NANO mXTEND[™] covering the full UWB band (3.1 – 8.5 GHz)

Revision history

Revision	Date	Change summary
1.0	Sep 2023	Original datasheet
2.0	Sep 2026	Restructured to AI-readable format; added RF performance summary, radiation patterns, matching values, reference-board conditions, compliance & ordering blocks.

Patents

This product is protected by one or more intellectual property rights held by Ignion, including but not limited to the following patents (<https://ignion.io/patents>) in the U.S. and elsewhere. This is intended to serve as notice under 35 U.S.C. § 287(a).

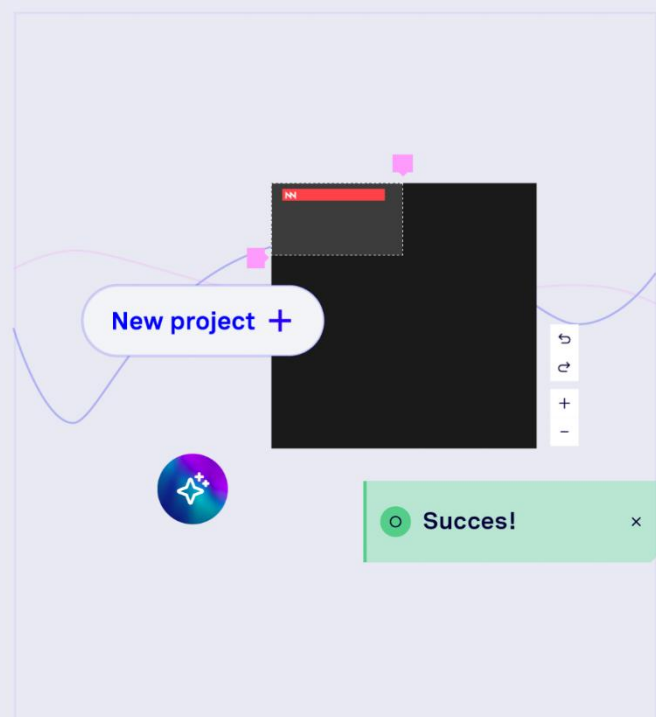
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- expected performance
- matching values
- a tailored design guide

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