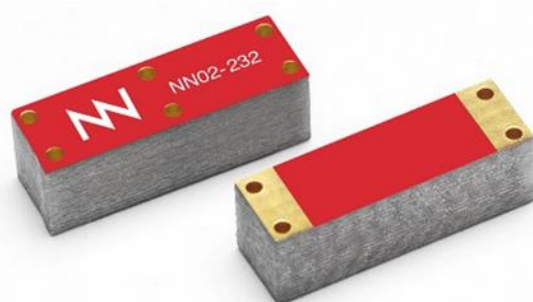


BAR mXTEND™: A STANDARD ANTENNA SOLUTION FOR MOBILE FREQUENCY BANDS

BAR mXTEND[™]: A STANDARD ANTENNA SOLUTION FOR MOBILE FREQUENCY BANDS

Ignion specializes in enabling effective mobile communications. Using Ignion technology, we design and manufacture optimized antennas to make your wireless devices more competitive. Our mission is to help our clients develop innovative products and accelerate their time to market through our expertise in antenna design, testing and manufacturing.



BAR mXTEND[™] antenna booster

NN02-232

Ignion products are protected by [Ignion patents](#).

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Ignion is an ISO 9001:2015 certified company. All our antennas are lead-free and RoHS compliant.

ISO 9001: 2015 Certified



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1. ANTENNA DESCRIPTION

The BAR mXTEND[™] antenna booster has been specifically designed for providing multiband performance in wireless devices (in particular in mobile devices), enabling worldwide coverage by allowing operation in the communication standards GSM850, GSM900, GSM1800/DCS, GSM1900/PCS, UMTS, LTE850, LTE900, LTE1700, LTE1800, LTE1900, LTE2000, and LTE2100.



Material: The BAR mXTEND[™] antenna booster is built on glass epoxy substrate.

APPLICATIONS

- Handsets
- Smartphones
- Tablets
- Phablets
- Laptop PCs
- Netbooks
- Modules
- Routers
- eBook readers

BENEFITS

- High efficiency
- Small size
- Cost-effective
- Easy-to-use (pick and place)
- Multiband behaviour (worldwide standards)
- Off-the-Shelf Standard Product (no customization is required)

The BAR mXTEND[™] antenna booster belongs to a new generation of antenna solutions based on the Virtual Antenna[™] technology developed by Ignion. The technology is mainly focused on replacing conventional antenna solutions by miniature and standard components.

2. QUICK REFERENCE GUIDE

Technical features	824 – 960 MHz	1710 – 2170 MHz
Average Efficiency	> 60 %	> 75 %
Peak Gain	1.3 dBi	2.1 dBi
VSWR	< 3:1	
Radiation Pattern	Omnidirectional	
Polarization	Linear	
Weight (approx.)	0.21 g	
Temperature	-40 to +125 °C	
Impedance	50 Ω	
Dimensions (L x W x H)	10.0 mm x 3.2 mm x 3.2 mm	

Table 1 – Technical Features. Measures from the Evaluation Board. See Figure 1. Note that for obtaining comparable results, a ground plane length larger than 100 mm is recommended.

3. ELECTRICAL PERFORMANCE

3.1. EVALUATION BOARD (824-960 MHz and 1710-2170 MHz)

This Evaluation Board integrates a UFL cable to connect the BAR mXTEND™ antenna booster with the SMA connector. The BAR mXTEND™ provides operation in two frequency regions, from 824 MHz to 960 MHz and from 1710 MHz to 2170 MHz, through a single input/output port.

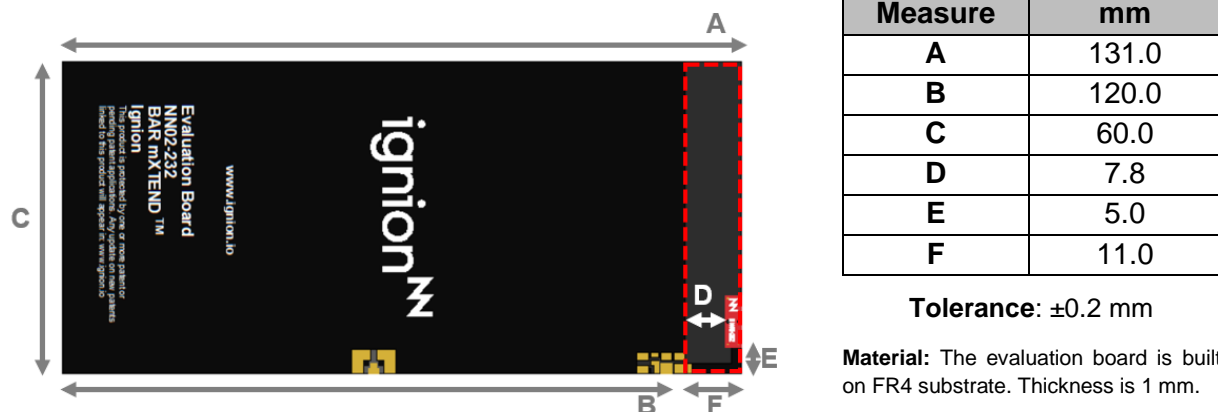


Figure 1 – EB_NN02-232-1B-2R-1P. Evaluation Board providing operation from 824 MHz to 960 MHz and from 1710 MHz to 2170MHz.

Material: The evaluation board is built on FR4 substrate. Thickness is 1 mm.

D: Distance between the BAR mXTEND™ antenna booster and the ground plane.

E: Distance between the BAR mXTEND™ antenna booster and the corner of the evaluation board

Clearance Area: 60 mm x 11 mm (Cx F)

This product is protected by at least the following [patents](#) PAT. US 8,203,492, PAT. US 8,237,615 and other domestic and international patents pending. Any update on new patents linked to this product will appear at www.ignion.io/virtual-antenna/.

3.2. MATCHING NETWORK

The specs of a Ignion standard product are measured in their Evaluation Board, which is an ideal case. In a real design, components nearby the antenna, LCD's, batteries, covers, connectors, etc. affect the antenna performance. This is the reason why it is highly recommended placing pads compatible with 0402 and 0603 SMD components for a matching network as close as possible to the feeding point. Do it in the ground plane area, not in the clearance area. This provides a degree of freedom to tune the BAR mXTEND™ antenna booster once the design is finished and taking into account all elements of the series (batteries, displays, covers, etc.).

Please notice that different devices with different ground planes and different components nearby the BAR mXTEND™ antenna booster may need a different matching network. To ensure optimal results, the use of high Q and tight tolerance components is highly recommended (Murata components). If you need assistance to design your matching network beyond this application note, please contact support@ignion.io, or try our free-of-charge¹ **NN Wireless Fast-Track** design service, you will get your chip antenna design including a custom matching network for your device in 24h¹. Other related to NN's range of R&D services is available at: <https://www.ignion.io/rdservices/>

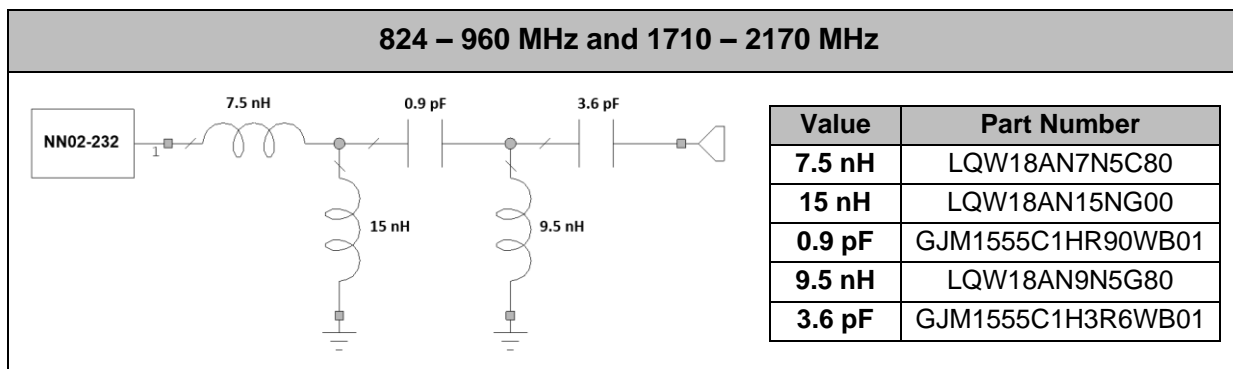


Figure 2 – Matching Network implemented in the evaluation board (Figure 1).

¹ See terms and conditions for a free NN Wireless Fast-Track service in 24h at: <https://www.ignion.io/fast-track-project/>

3.3. VSWR AND TOTAL EFFICIENCY

VSWR (Voltage Standing Wave Ratio) and Total Efficiency versus Frequency (GHz).

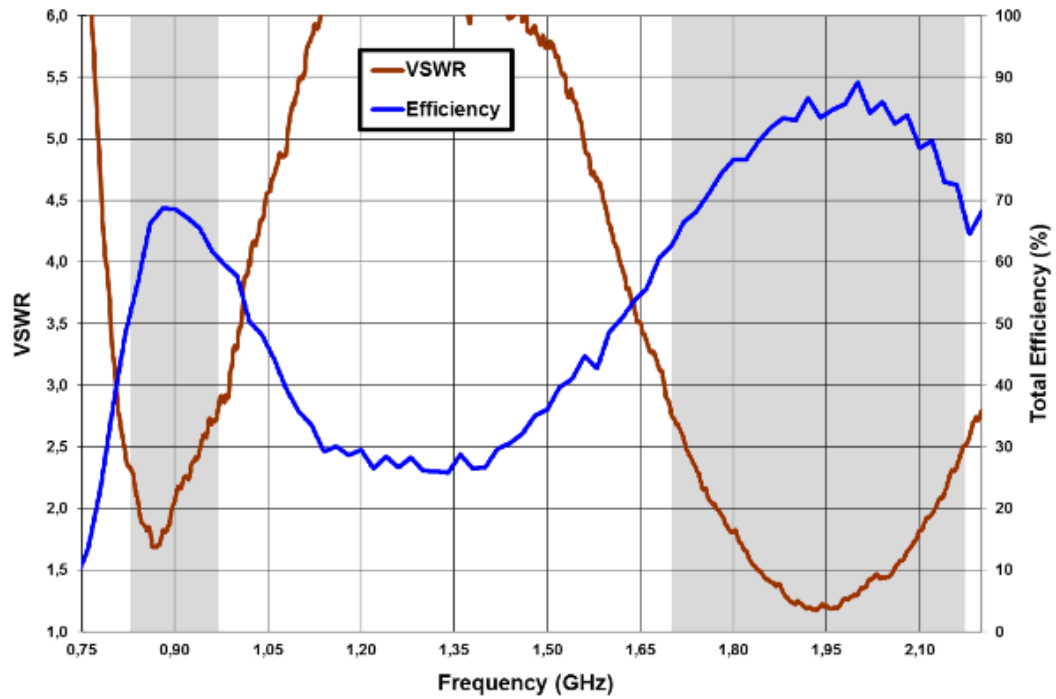
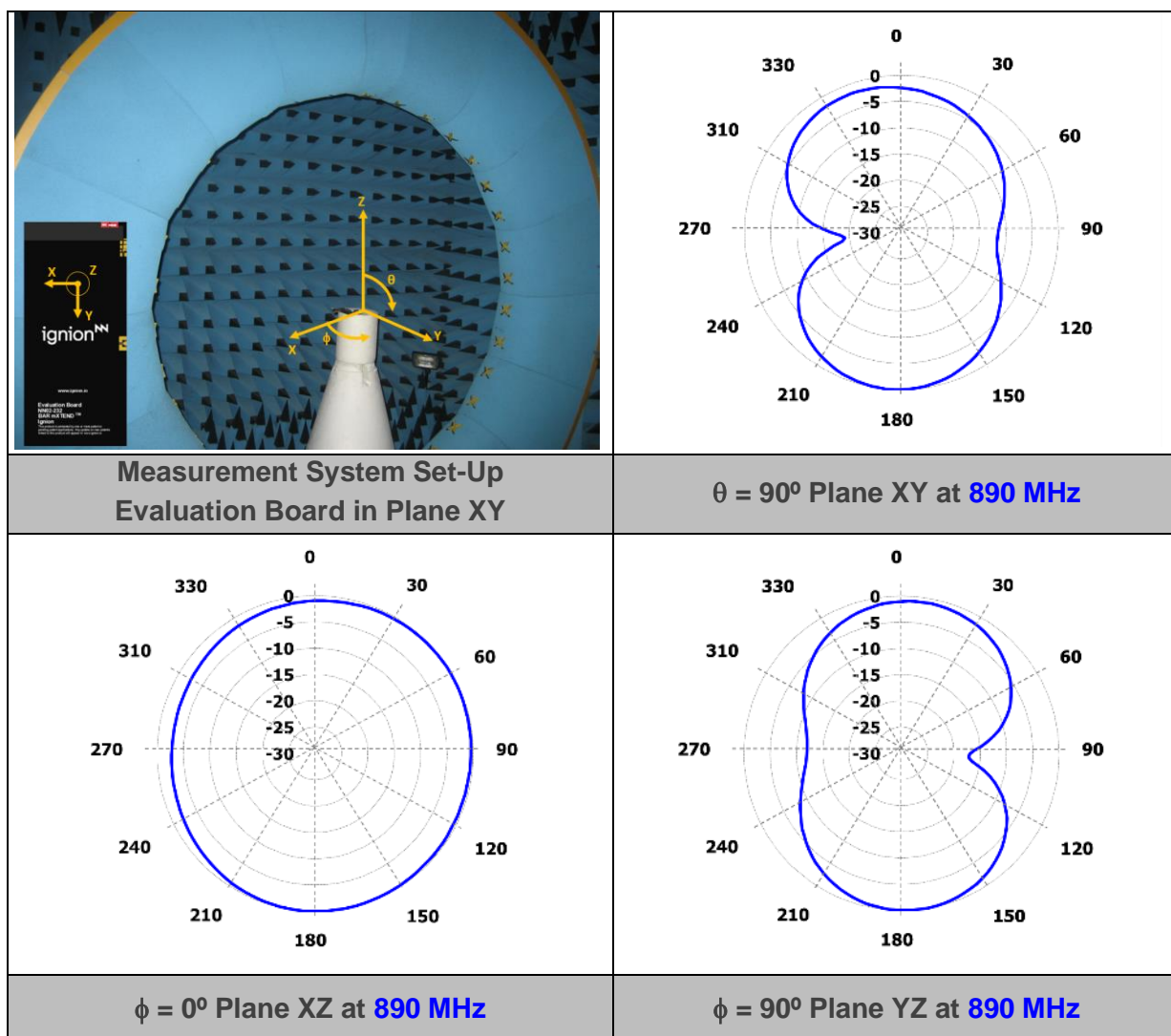


Figure 3 – VSWR and Total Efficiency for the 824 – 960 MHz frequency range and for the 1710 –2170 MHz frequency range (from the evaluation board (Figure 1)).

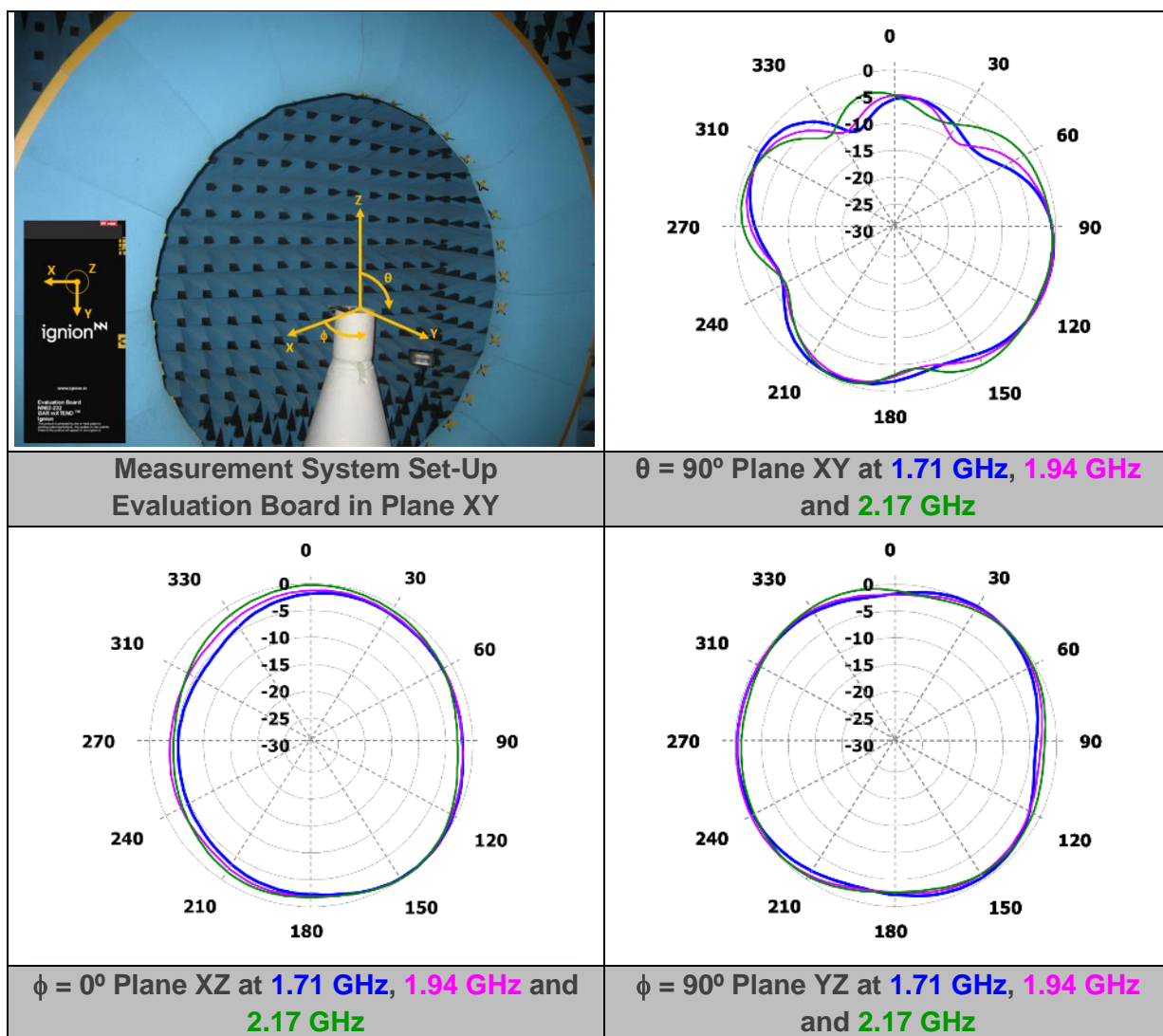
3.4. RADIATION PATTERNS (824-960 MHz), GAIN AND EFFICIENCY



Gain	Peak Gain	1.3 dBi
	Average Gain across the band	0.9 dBi
	Gain Range across the band (min, max)	-0.5 <-> 1.3 dBi
Efficiency	Peak Efficiency	68.7 %
	Average Efficiency across the band	64.4 %
	Efficiency Range across the band (min, max)	50.3 – 68.7 %

Table 2 – Antenna Gain and Total Efficiency from the evaluation board (Figure 1) within the 824 – 960 MHz frequency range. Measures made in the Satimo STARGATE 32 anechoic chamber.

3.5. RADIATION PATTERNS (1710-2170 MHz), GAIN AND EFFICIENCY



Gain	Peak Gain	2.1 dBi
	Average Gain across the band	1.6 dBi
	Gain Range across the band (min, max)	0.9 \leftrightarrow 2.1 dBi
Efficiency	Peak Efficiency	89.1 %
	Average Efficiency across the band	79.5 %
	Efficiency Range across the band (min, max)	64.7 – 89.1 %

Table 3 –Antenna Gain and Total Efficiency from the evaluation board (Figure 1) within the 1710 – 2170 MHz frequency range. Measures made in the Satimo STARGATE 32 anechoic chamber.

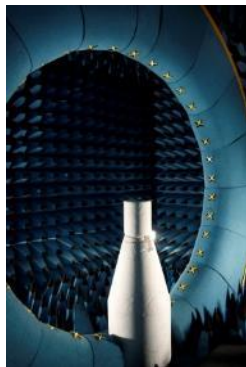
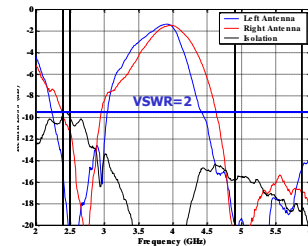
3.6. CAPABILITES AND MEASUREMENT SYSTEMS

Ignion specializes in designing and manufacturing optimized antennas for wireless applications and providing our clients with RF expertise. We offer turn-key antenna products and antenna integration support to minimize your time requirement and maximize your return on investment during your product development efforts. We also provide our clients with the opportunity to leverage our in-house testing and measurement facilities to obtain accurate results quickly and efficiently.



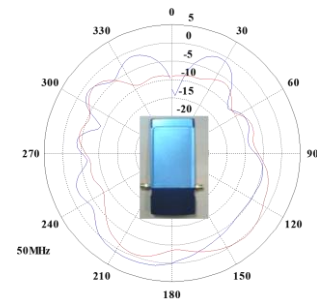
Agilent E5071B

VSWR
&
S Parameters



SATIMO STARGATE 32

Radiation
Pattern
&
Efficiency



Anechoic chambers and full equipped in-house lab

4. MECHANICAL CHARACTERISTICS

4.1. DIMENSIONS AND TOLERANCES

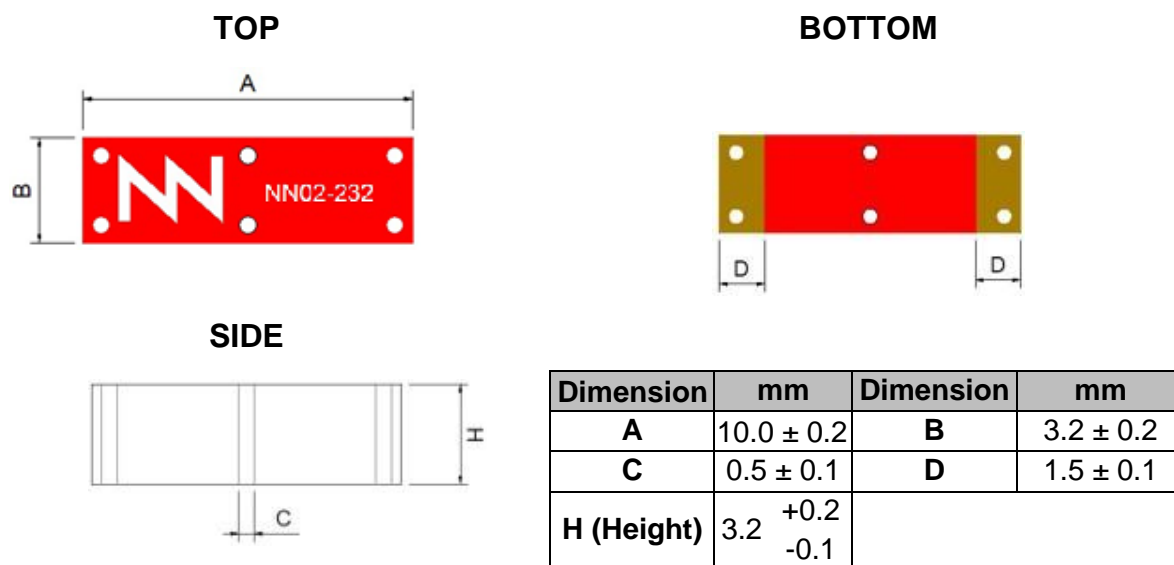


Figure 4 – BAR mXTEND[™] antenna booster dimensions and tolerances.

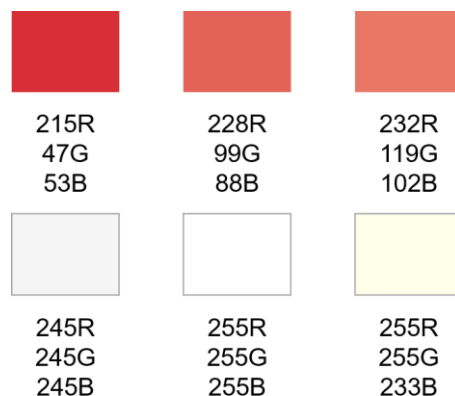
The 2 pads are fully symmetrical to mount it on the PCB. See Figure 6.

The BAR mXTEND[™] antenna booster NN02-232 is compliant with the restriction of the use of hazardous substances (**RoHS**).

The RoHS certificate can be downloaded from www.ignion.io.

4.2. COLOUR RANGE FOR THE INK

Next figure shows the range of the colours in the BAR mXTEND[™] antenna booster:



Acceptable color range

4.3. ANTENNA FOOTPRINT

Assuming that the BAR mXTEND™ antenna booster NN02-232 is placed in the clearance area of the PCB, see below the recommended footprint dimensions.

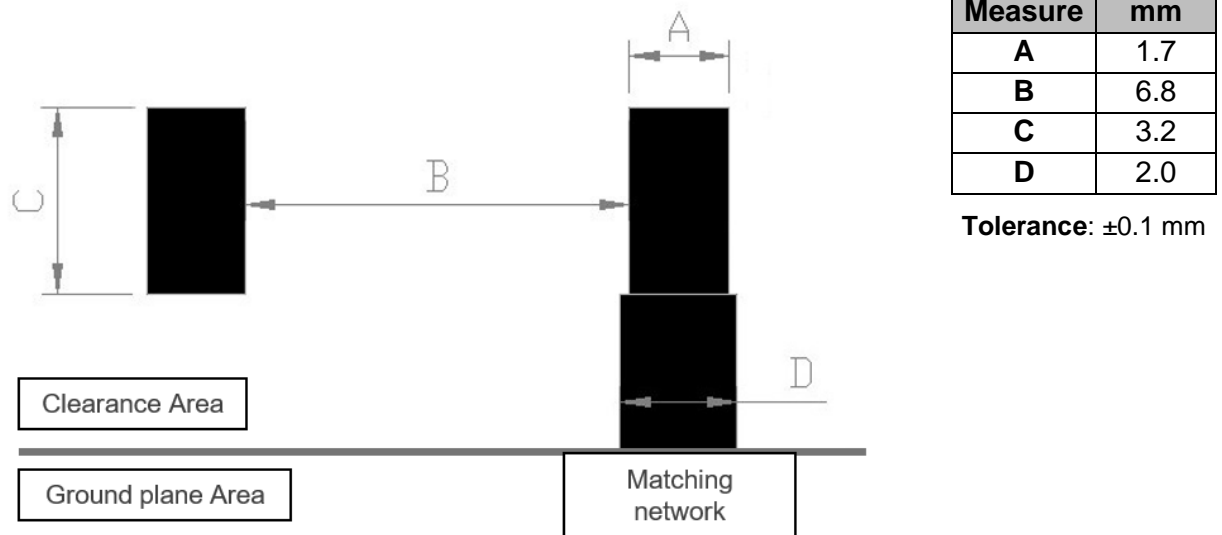


Figure 5 – Footprint dimensions for the single booster.

For additional support in the integration process, please contact support@ignion.io.

5. ASSEMBLY PROCESS

Figure 6 shows the back and front view of the BAR mXTEND[™] antenna booster NN02-232. Due to the symmetry in the product configuration, the feeding pad can be any of the 2 pads.

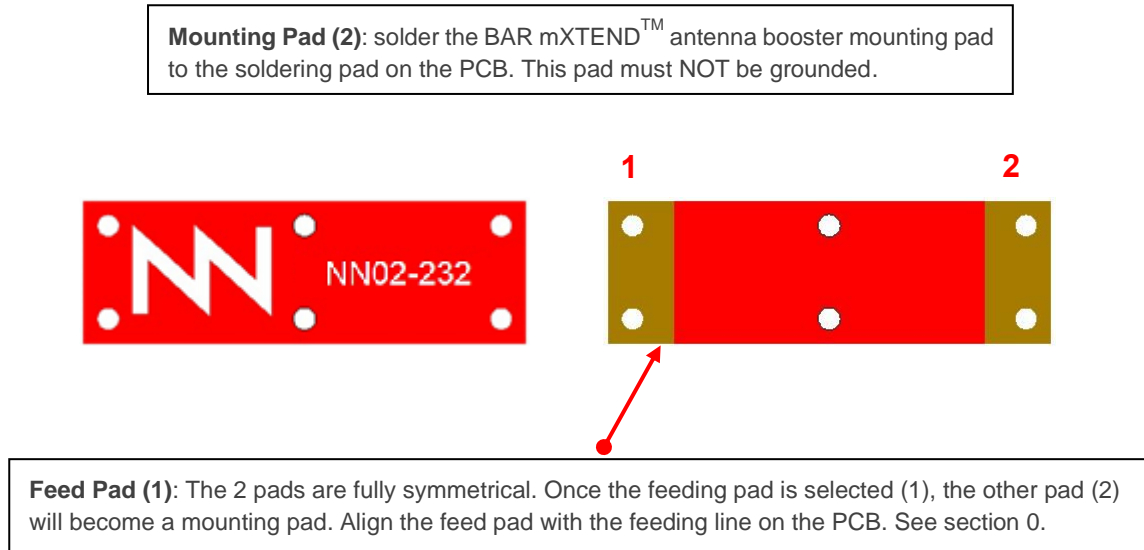


Figure 6 – Pads of the BAR mXTEND[™] antenna booster NN02-232

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

1. Apply a solder paste on the pads of the PCB. Place the BAR mXTEND[™] antenna booster on the board.
2. Perform a reflow process according to the temperature profile detailed in Table 4, Figure 8.
3. After soldering the BAR mXTEND[™] antenna booster 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 all reflux has been removed.

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

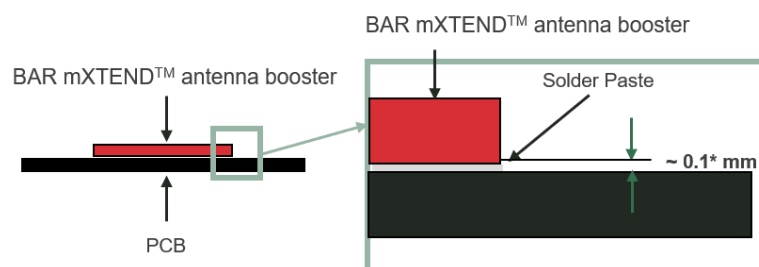


Figure 7 – Soldering Details.

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 BAR mXTEND[™] antenna booster NN02-232 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 (T _{smax} to T _p)	3 °C / second (max.)
PREHEAT	<ul style="list-style-type: none"> - Temperature Min (T_{smin}) - Temperature Max (T_{smax}) - Time (t_{smin} to t_{smax}) 	150 °C 200 °C 60-180 seconds
REFLOW	<ul style="list-style-type: none"> - Temperature (T_L) - Total Time above T_L (t_L) 	217 °C 60-150 seconds
PEAK	<ul style="list-style-type: none"> - Temperature (T_p) - Time (t_p) 	260 °C 20-40 seconds
RAMP-DOWN	Rate	6 °C/second max
Time from 25 °C to Peak Temperature		8 minutes max

Table 4 – Recommended soldering temperatures.

Next graphic shows temperature profile (grey zone) for the BAR mXTEND[™] antenna booster assembly process reflow ovens.

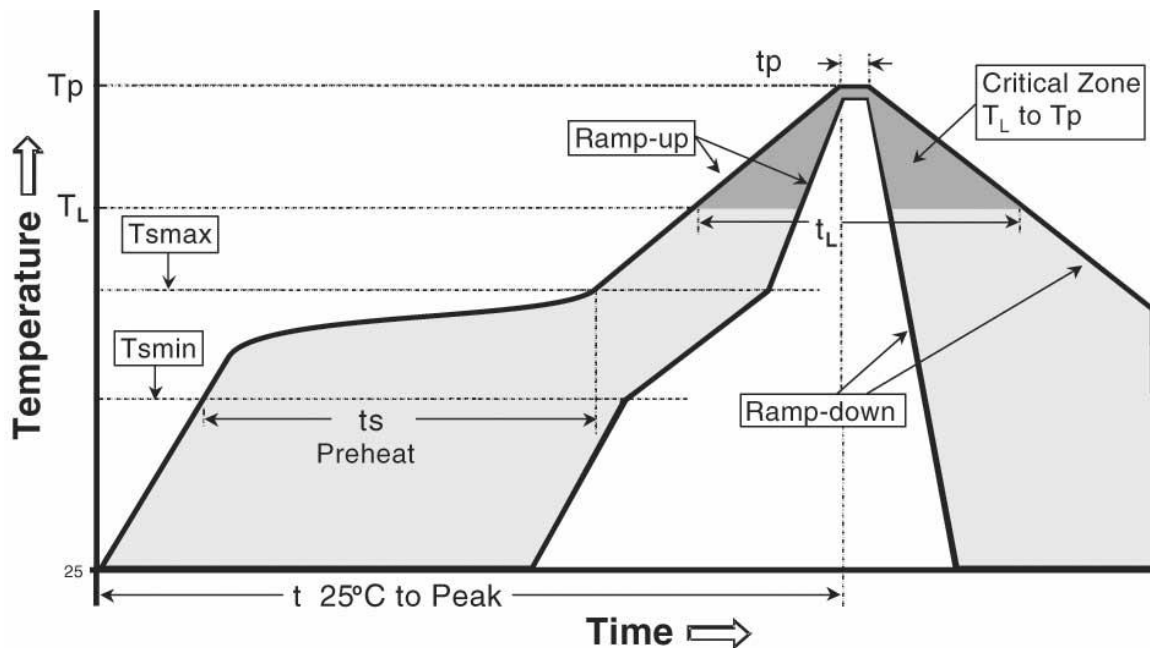


Figure 8 – Temperature profile.

6. PACKAGING

The BAR mXTEND™ antenna booster NN02-232 is delivered in tape and reel packaging.

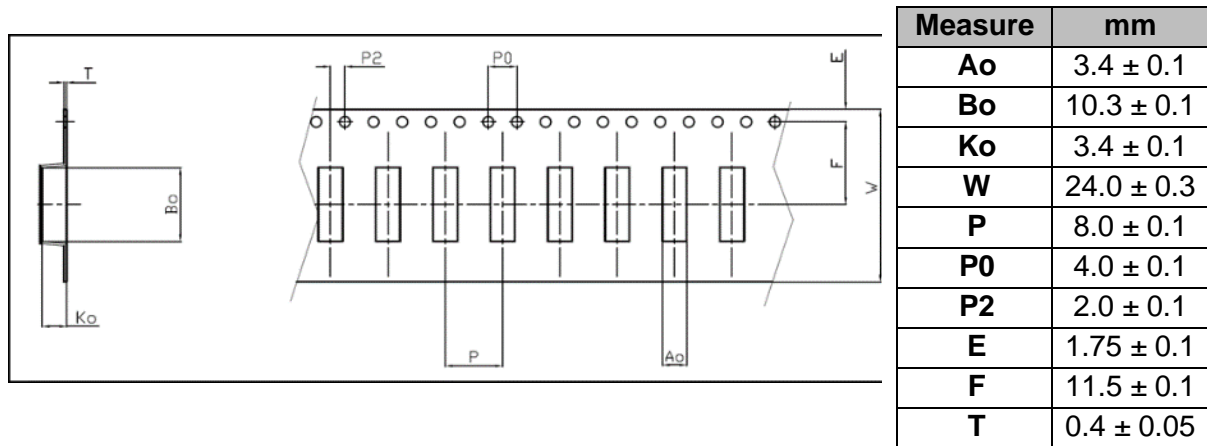


Figure 9 – Tape dimensions and Tolerances.

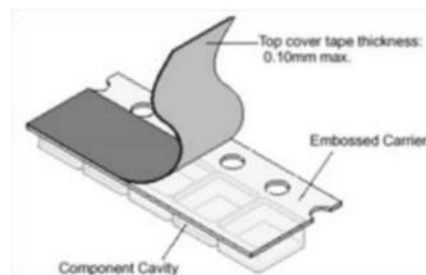
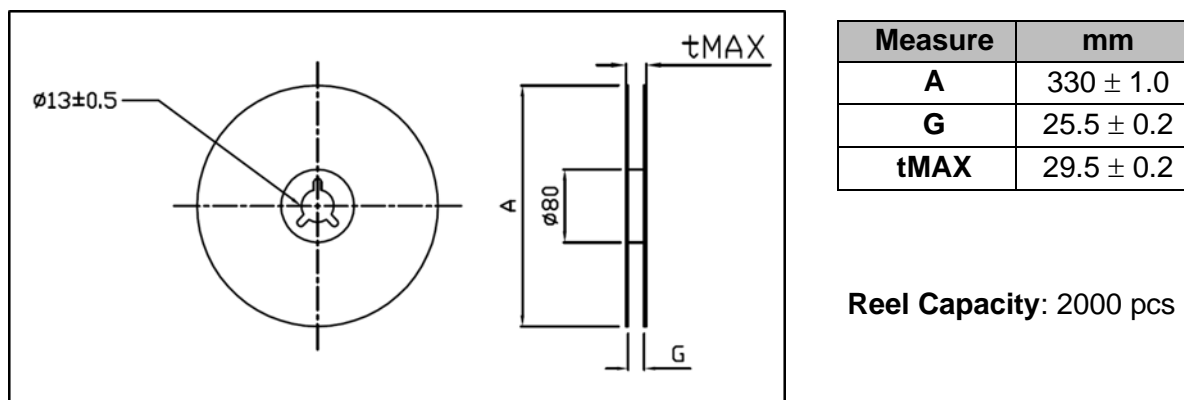


Figure 10 – Image of the tape.



Reel Capacity: 2000 pcs

Figure 11 – Reel Dimensions and Capacity.

7. PRODUCT CHANGE NOTIFICATION

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PCN Number: NN19100010

Notification Date: October 07th, 2019

Part Number identification:

Part Number changes, it will be applied in all the document of the company (User Manual, Data Sheet, ...)

Previous Part Number
FR01-S4-232

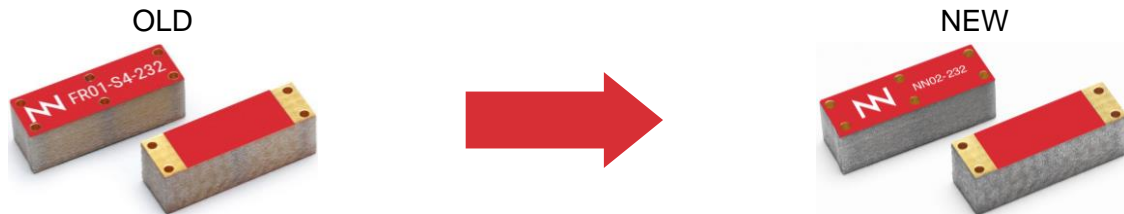
New Part Number
NN02-232

Reason for change:

- | | |
|--|--|
| <input type="checkbox"/> Specs (electrical/mechanical) | <input type="checkbox"/> Manufacturing location |
| <input type="checkbox"/> User Manual/Data Sheet | <input type="checkbox"/> Quality/Reliability |
| <input type="checkbox"/> Material/Composition | <input type="checkbox"/> Logistics |
| <input type="checkbox"/> Processing/Manufacturing | <input checked="" type="checkbox"/> Other: Part Number |

Change description

1.- Part Number: From FR01-S4-232 FRACTUS to NN02-232 Ignion in the User Manual



Comments:

- 1.- Electrical and Mechanical specs remain the same
- 2.- Footprint in the PCB to solder the chip antenna remains the same

Identification method

1.- The part number on the antenna is different

User Manual	<input checked="" type="checkbox"/>	Available from: May 2020
Samples	<input checked="" type="checkbox"/>	Available from: May 2020

Ignion Contact:

Sales
Name: Josep Portabella
Email: josep.portabella@ignion.io

Supply Chain
Albert Vidal
albert.vidal@ignion.io