

## Compact Dual-band Reach Xtend™ (FR05-S1-NO-1-004) – 2.4-2.5 GHz and 4.9-5.875 GHz

Fractus Antennas specializes in enabling effective mobile communications. Using Fractus 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.



Compact Dual-band Reach Xtend™

FR05-S1-NO-1-004

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

ISO 9001: 2015 Certified



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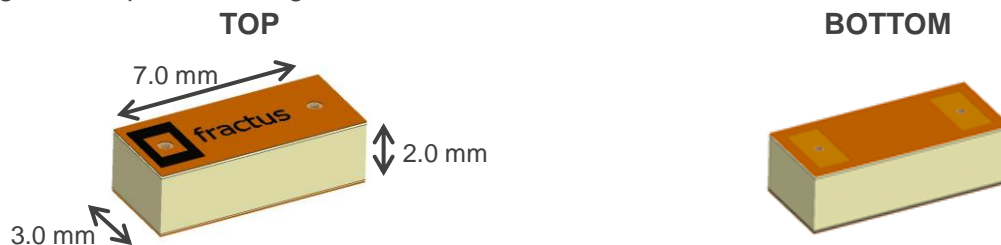
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## 1. ANTENNA DESCRIPTION

The Compact Dual-band Reach Xtend™ chip antenna is engineered specifically for high performance dual-band WLAN devices operating at both 2.4 – 2.5 GHz and 4.9 – 5.875 GHz and using 802.11 ac/a/b/g/n systems. Compact Dual-band Reach Xtend™ combines small size with high performance to improve the functionality of your wireless devices. Its small dimensions allow various configurations within the USB devices and may help Card-bus devices in the enhancement of their throughput by using MIMO algorithms with more than 2 antennas.

The Compact Dual-band Reach Xtend™ chip antenna uses space-filling properties of Fractus Antennas technology to minimize its size while maintaining a high radiation efficiency value. This directly impacts antenna reliability in achieving a greater communication range (distance) and in improving battery life. Compact Dual-band Reach Xtend™ features an omnidirectional radiation pattern optimal for highly scattered environments such as indoor environments and public spaces. Moreover, its broad bandwidth gives you design flexibility to create robust designs that operate at all global WLAN standards.



**Material:** The Compact Dual-band Xtend™ antenna is built on glass epoxy substrate.

### APPLICATIONS

- Headsets
- Wireless Phone
- Modules WLAN 802.11 ac/a/b/g/n
- USB Dongles
- Sensors (Thickness measurement...)

### BENEFITS

- High efficiency and gain
- Small footprint
- Cost-effective
- Multiband behaviour. Worldwide standard compatible
- Easy to use (pick and place)

## 2. QUICK REFERENCE GUIDE

Technical Features	802.11 b/g/n	802.11 ac/a/n
Frequency Range	2.4 – 2.5 GHz	4.9 – 5.875 GHz
Average Efficiency	66.5 %	75.9 %
Peak Gain	1.5 dBi	4.7 dBi
VSWR	< 2:1	< 2:1
Radiation Pattern	Omnidirectional	
Weight (approx.)	0.1 g	
Temperature	-40 to 85° C	
Impedance	50 Ω	
Dimensions (L x W x H)	7.0 mm x 3.0 mm x 2.0 mm	

**Table 1** – Technical Features. Measures from the evaluation board. See Figure 1 and picture in page 5.

Please contact [info@fractusantennas.com](mailto:info@fractusantennas.com) if you require additional information on antenna integration or optimization on your PCB.

3. ELECTRICAL PERFORMANCE

3.1. EVALUATION BOARD

The Fractus Antennas configuration used in testing the Compact Dual-band Reach Xtend™ Chip Antenna is displayed in Figure 1.

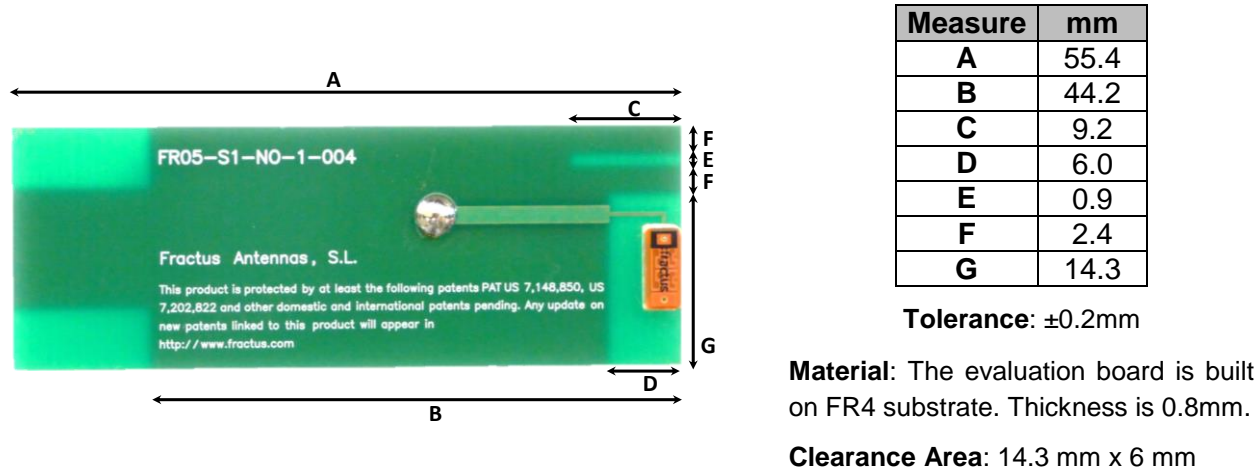


Figure 1 – EB\_FR05-S1-NO-1-004. Compact Dual-band Reach Xtend™ Evaluation Board.

3.2. VSWR AND EFFICIENCY

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

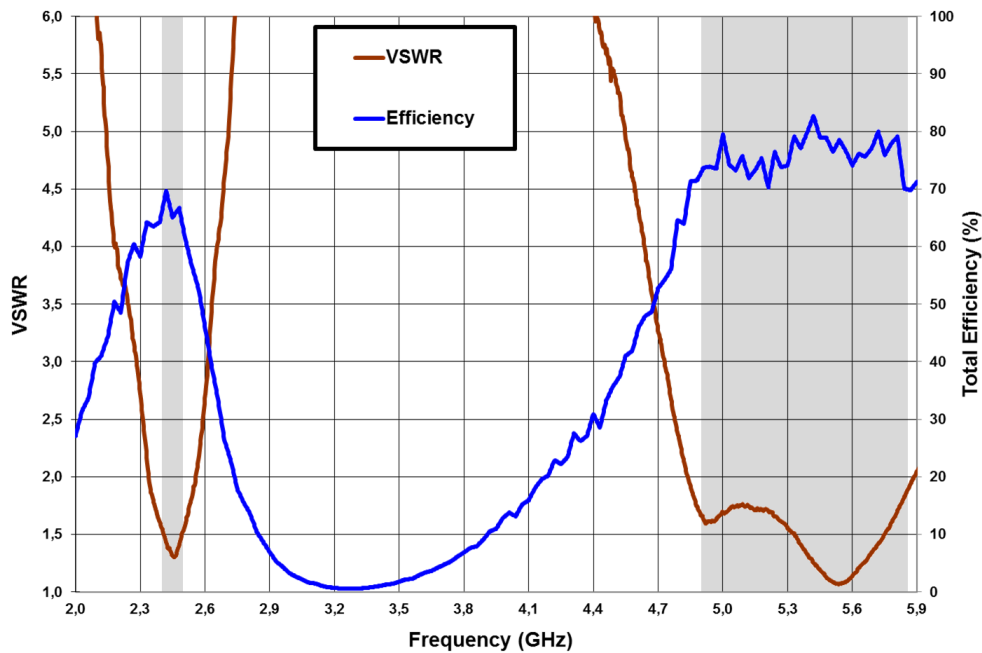
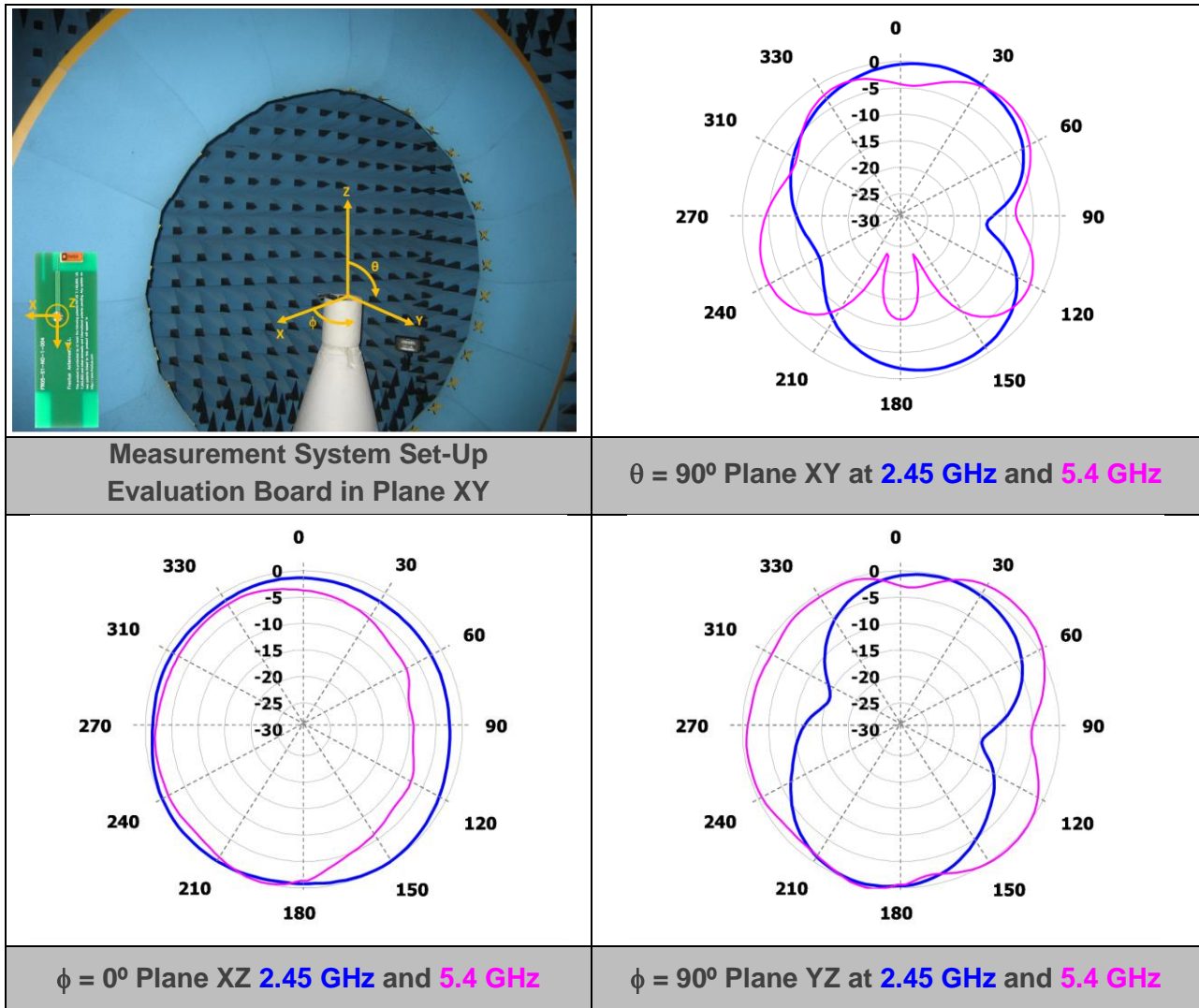


Figure 2 – VSWR and Efficiency (%) vs. Frequency (GHz).

### 3.3. RADIATION PATTERNS, GAIN, AND EFFICIENCY

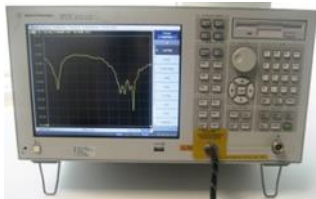


		2.4 – 2.5 GHz	4.9 – 5.875 GHz
Gain	Peak Gain	1.5 dBi	4.7 dBi
	Average Gain across the band	1.2 dBi	3.1 dBi
	Gain Range across the band (min, max)	0.8 <--> 1.5 dBi	1.5 <--> 4.7 dBi
Efficiency	Peak Efficiency	69.6 %	82.8 %
	Average Efficiency across the band	66.5 %	75.9 %
	Efficiency Range across the band (min, max)	63.0 – 69.6 %	69.8 – 82.8 %

**Table 2** – Antenna Gain and Efficiency within the 2.4 – 2.5 GHz band and the 4.9 – 5.875 GHz band. Measures made in the evaluation board and in the Satimo STARGATE 32 anechoic chamber.

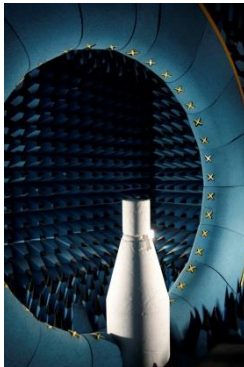
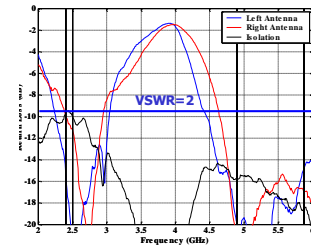
### 3.4. CAPABILITIES AND MEASUREMENT SYSTEMS

Fractus Antennas specializes in the design and manufacture of optimized antennas for wireless applications, and with the provision of RF expertise to a wide range of clients. We offer turn-key antenna products and antenna integration support to minimize your time requirements and maximize return on investment throughout the product development process. We also provide our clients with the opportunity to leverage our in-house testing and measurement facilities to obtain accurate results quickly and efficiently.



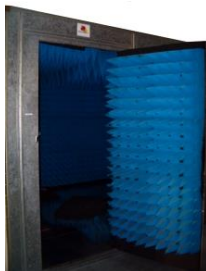
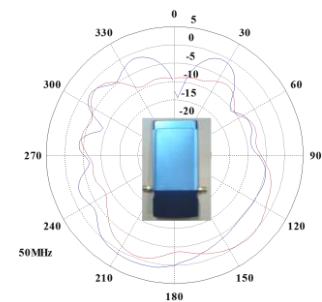
Agilent E5071B

VSWR  
&  
S Parameters



SATIMO STARGATE 32

Radiation  
Pattern  
&  
Efficiency

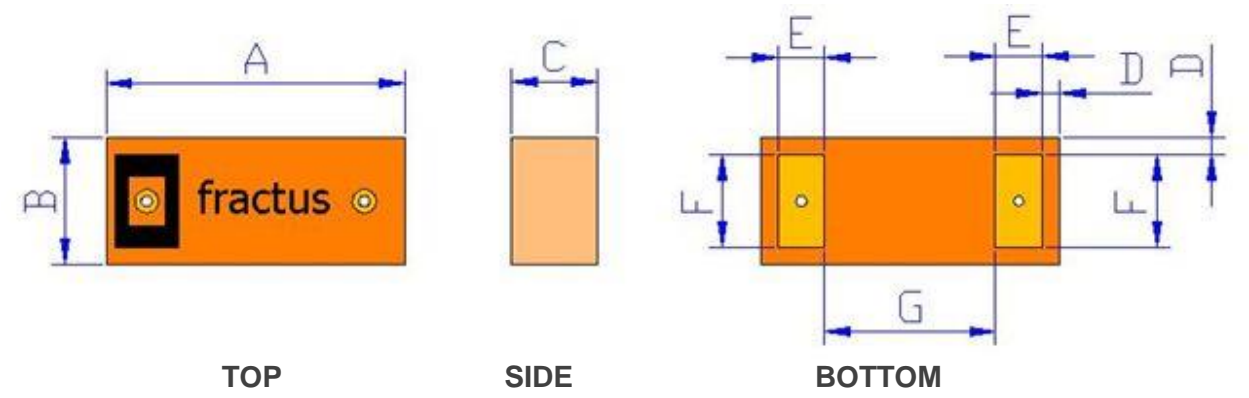


Anechoic chambers and full equipped in-house lab



4. MECHANICAL CHARACTERISTICS

4.1. DIMENSIONS AND TOLERANCES



The black square located on the top side of the antenna indicates the feed pad.

Measure	mm	Measure	mm
A	7.0 ± 0.2	E	1.1 ± 0.1
B	3.0 ± 0.2	F	2.2 ± 0.1
C	2.0 ± 0.2	G	4.0 ± 0.2
D	0.4 ± 0.15		

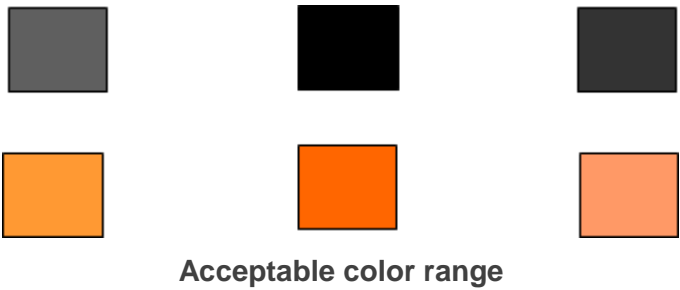
Figure 3 – Antenna Dimensions and Tolerances.

Fractus Compact Dual-band Reach Xtend™ chip antenna is compliant with the restriction of the use of hazardous substances (RoHS).

The RoHS certificate can be downloaded from [www.fractusantennas.com](http://www.fractusantennas.com).

4.2. SPECIFICATIONS FOR THE INK

Next figure shows the correct colors of the antenna:



Acceptable color range



4.3. ANTENNA FOOTPRINT (as used in the evaluation board)

This antenna footprint applies for the reference evaluation board described on page 5 of this User Manual. Feeding line dimensions over the clearance zone described in Figure 4 apply for a 0.8 mm thickness FR4 PCB.

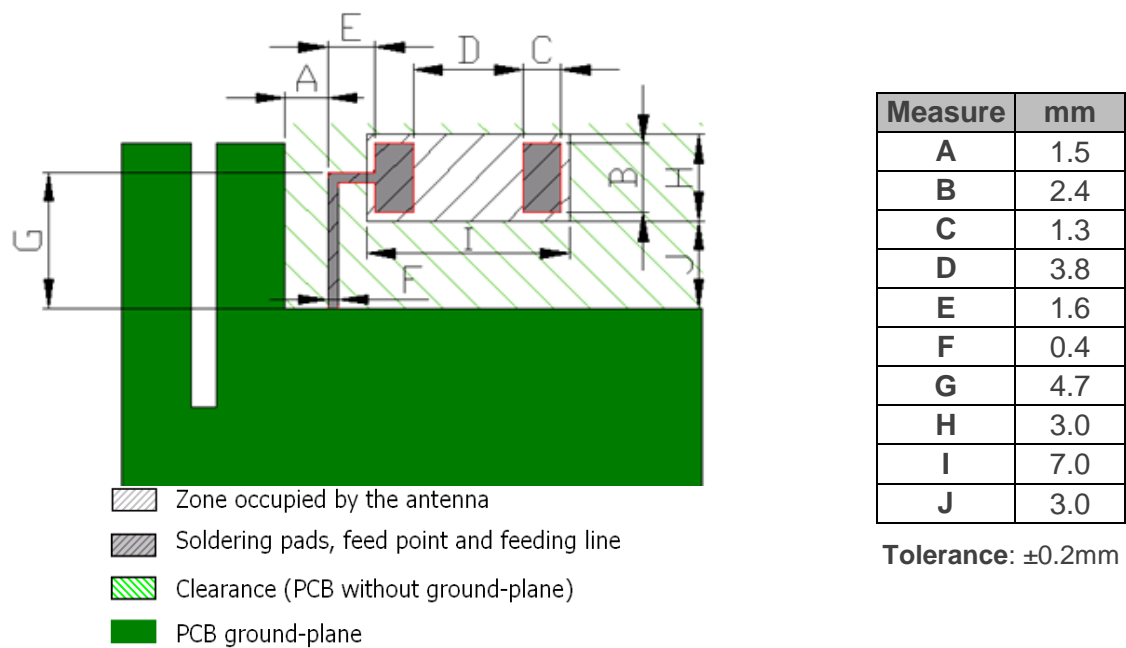


Figure 4 – Antenna Footprint Details.

Other PCB form factors and configurations may require a different feeding configuration, feeding line dimensions and clearance areas. If you require support for the integration of the antenna in your design, please contact [info@fractusantennas.com](mailto:info@fractusantennas.com)

5. MATCHING NETWORK

The specs of a Fractus Antennas standard antenna 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 PI matching network as close as possible to the antenna feeding point. Do it in the ground plane area, not in the clearance area. This is a degree of freedom to tune the antenna once the design is finished and taking into account all elements of the system (batteries, displays, covers, etc).

## 6. ASSEMBLY PROCESS

Figure 5 shows the back and front view of the Compact Dual-band Reach Xtend™ chip antenna, and indicates the location of the feeding point and the mounting pads:

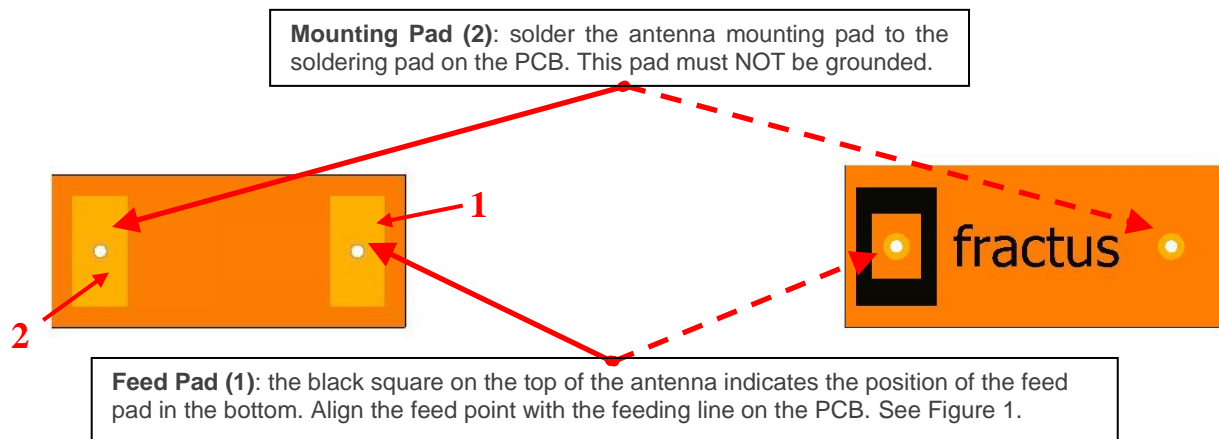


Figure 5 – Pads of the Fractus Compact Dual-band Reach Xtend™ chip antenna.

As a surface mount device (SMD), this antenna is compatible with industry standard soldering processes. The basic assembly procedure for this antenna is as follows:

1. Apply a solder paste to the pads of the PCB. Place the antenna on the board.
2. Perform a reflow process according to the temperature profile detailed in Table 3, Figure 7 on page 11.
3. After soldering the antenna to the circuit board, perform a cleaning process to remove any residual flux. Fractus Antennas 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:

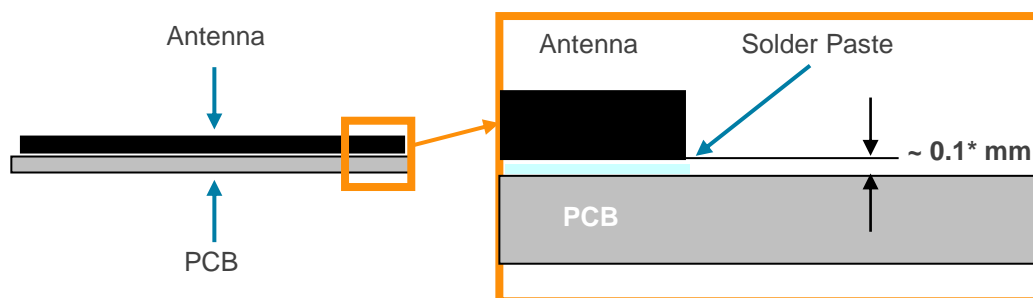


Figure 6 – Soldering Details.

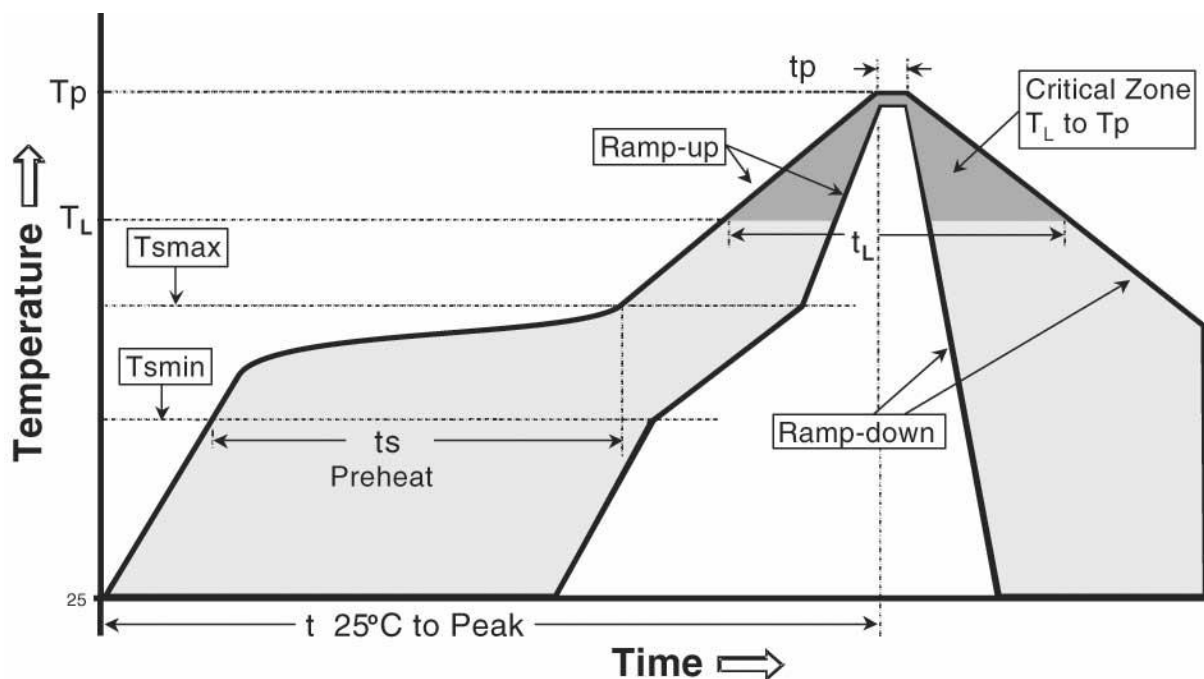
**NOTE(\*):** Solder paste thickness after the assembly process will depend on the thickness of the soldering stencil mask. A stencil thickness equal to or larger than **127 microns (5 mils)** is required.

The Fractus Compact Dual-band Reach Xtend™ antenna should be assembled following either Sn-Pb or Pb-free assembly processes. According to the Standard **IPC/JEDEC J-STD-020C**, the temperature profile suggested is as follows:

Phase	Profile features	Pb-Free Assembly (SnAgCu)
<b>RAMP-UP</b>	Avg. Ramp-up Rate (T <sub>smax</sub> to T <sub>p</sub> )	3 °C / second (max.)
<b>PREHEAT</b>	<ul style="list-style-type: none"> <li>- Temperature Min (T<sub>smin</sub>)</li> <li>- Temperature Max (T<sub>smax</sub>)</li> <li>- Time (t<sub>smin</sub> to t<sub>smax</sub>)</li> </ul>	150 °C 200 °C 60-180 seconds
<b>REFLOW</b>	<ul style="list-style-type: none"> <li>- Temperature (T<sub>L</sub>)</li> <li>- Total Time above T<sub>L</sub> (t<sub>L</sub>)</li> </ul>	217 °C 60-150 seconds
<b>PEAK</b>	<ul style="list-style-type: none"> <li>- Temperature (T<sub>p</sub>)</li> <li>- Time (t<sub>p</sub>)</li> </ul>	260 °C 20-40 seconds
<b>RAMP-DOWN</b>	Rate	6 °C/second max
<b>Time from 25 °C to Peak Temperature</b>		8 minutes max

**Table 3** – Recommended soldering temperatures.

Next graphic shows temperature profile (grey zone) for the antenna assembly process in reflow ovens.



**Figure 7** – Temperature profile.

7. PACKAGING

The Fractus Compact Dual-band Reach Xtend™ chip antenna is available in tape and reel packaging.

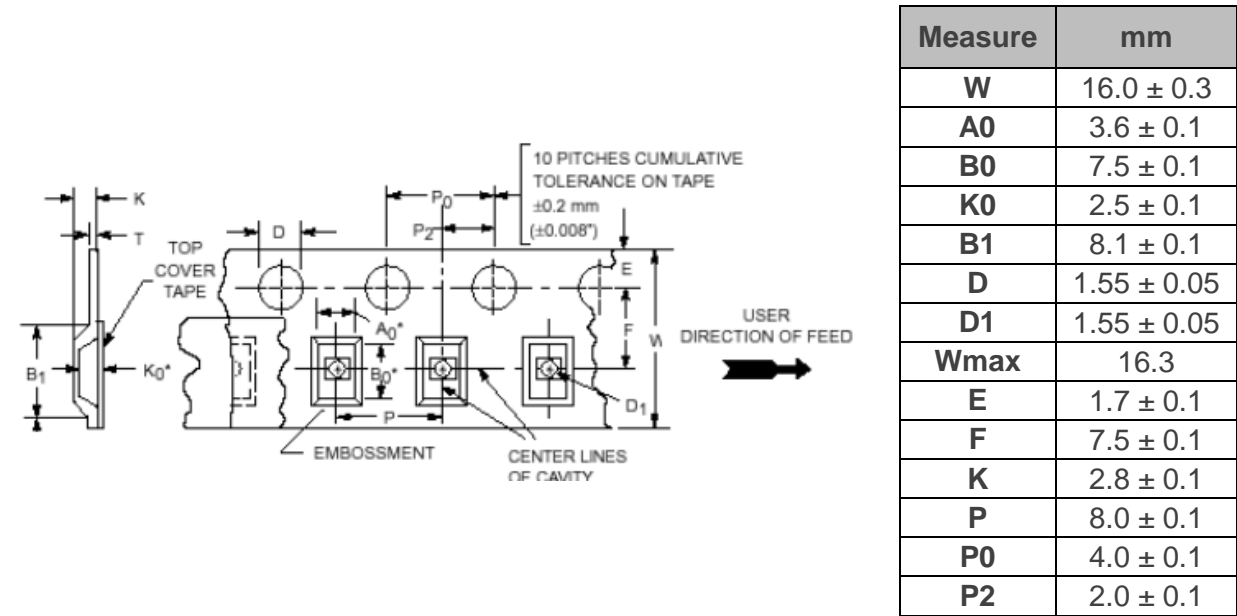
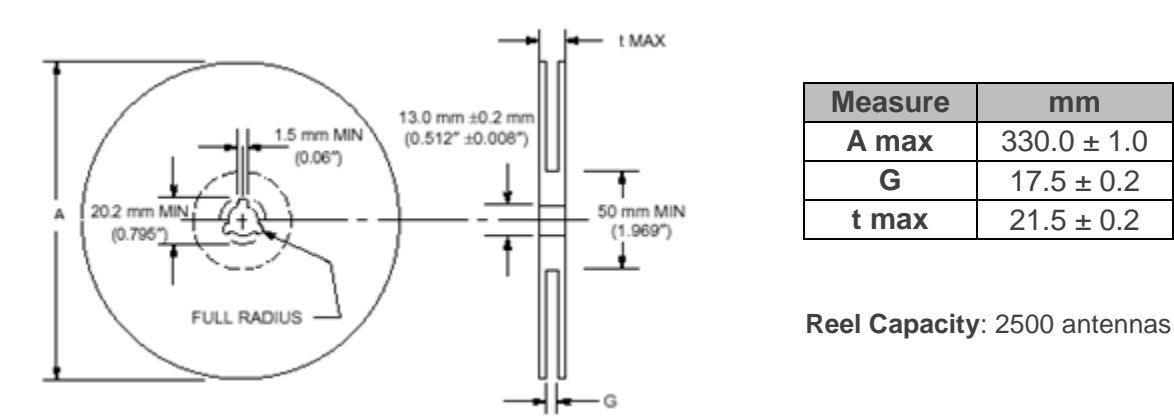


Figure 8 – Tape Dimensions and Tolerances.



Figure 9 – Images of the tape.



Reel Capacity: 2500 antennas

Figure 10 – Reel Dimensions and Capacity.