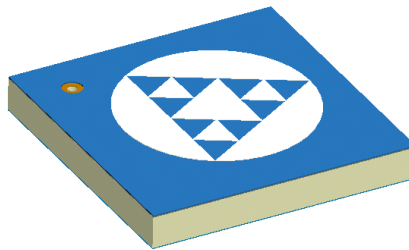




Fractus Reach Xtend™

Bluetooth® , Zigbee® , 802.11 b/g/n WLAN

Chip Antenna



**Antenna Part Number:
FR05-S1-N-0-001**

This product is protected by at least the following patents PAT. US 7,148,850, US 7,202,822 and other domestic and international patents pending. Any update on new patents linked to this product will appear in <http://www.fractus.com/index.php/fractus/patents>

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Fractus is an ISO 9001:2008 certified company. All our antennas are lead-free and RoHS compliant.





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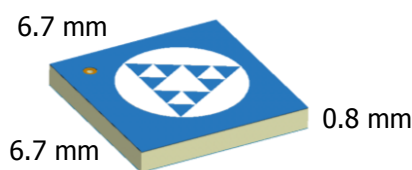
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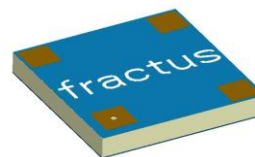
1. ANTENNA DESCRIPTION

Fractus® Reach Xtend™ Bluetooth®, 802.11 b/g/n WLAN chip antenna is engineered specifically for Bluetooth®, WLAN 802.11 b/g/n and other wireless devices operating at the ISM 2.4 GHz band.

Reach Xtend combines robustness and high efficiency with gain and integration flexibility to improve the communication range of your Bluetooth and WLAN devices and minimise your product development effort.



TOP



BOTTOM

APPLICATIONS

- Headsets
- Modules WiFi, Bluetooth, Zigbee...
- Sensors (Temperature, access control...)
- USB Dongles

BENEFITS

- High efficiency and gain
- Cost-effective
- Small form factor
- Easy-to-use (pick and place)

2. QUICK REFERENCE GUIDE

Technical Features	
Frequency range	2.4 GHz - 2.5 GHz
Average Efficiency	74.0 %
Peak Gain	1.3 dB
Radiation Pattern	Omnidirectional
VSWR	< 2:1
Polarization	Linear
Weight (approx.)	0.1 g
Temperature	-40 to +85 °C
Impedance	50 Ω
Dimensions (L x W x H)	6.7 mm x 6.7 mm x 0.8 mm

Please contact info@fractus.com if you require additional information on antenna integration or optimisation on your PCB.

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Table 1 - Technical Features. Measures from the evaluation board (48.0 mm x 23.0 mm x 1.0 mm PCB). See picture in page 5.



3. ELECTRICAL PERFORMANCE

3.1. FRACTUS EVALUATION BOARD

The configuration used in testing Fractus Reach Xtend antenna is displayed in Figure 1.

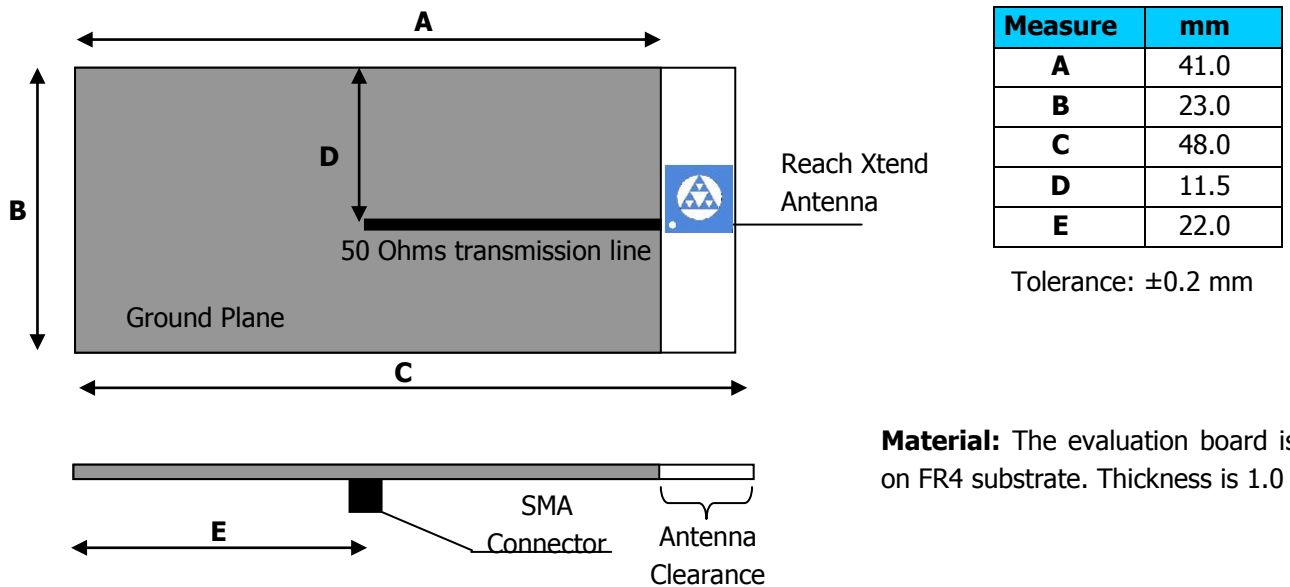
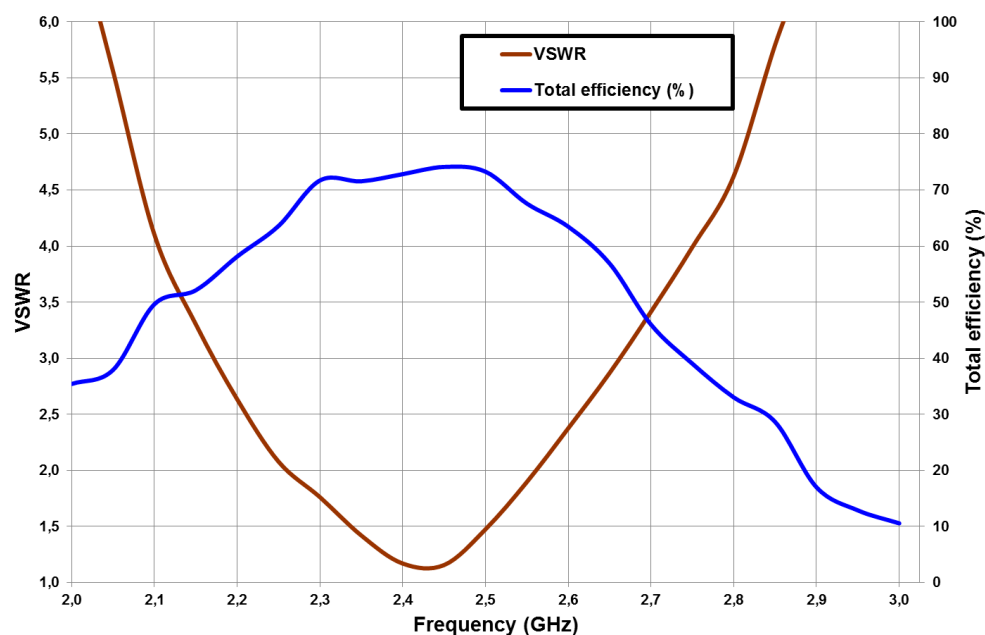


Figure 1 – Reach Xtend Evaluation Board. See picture in page 5

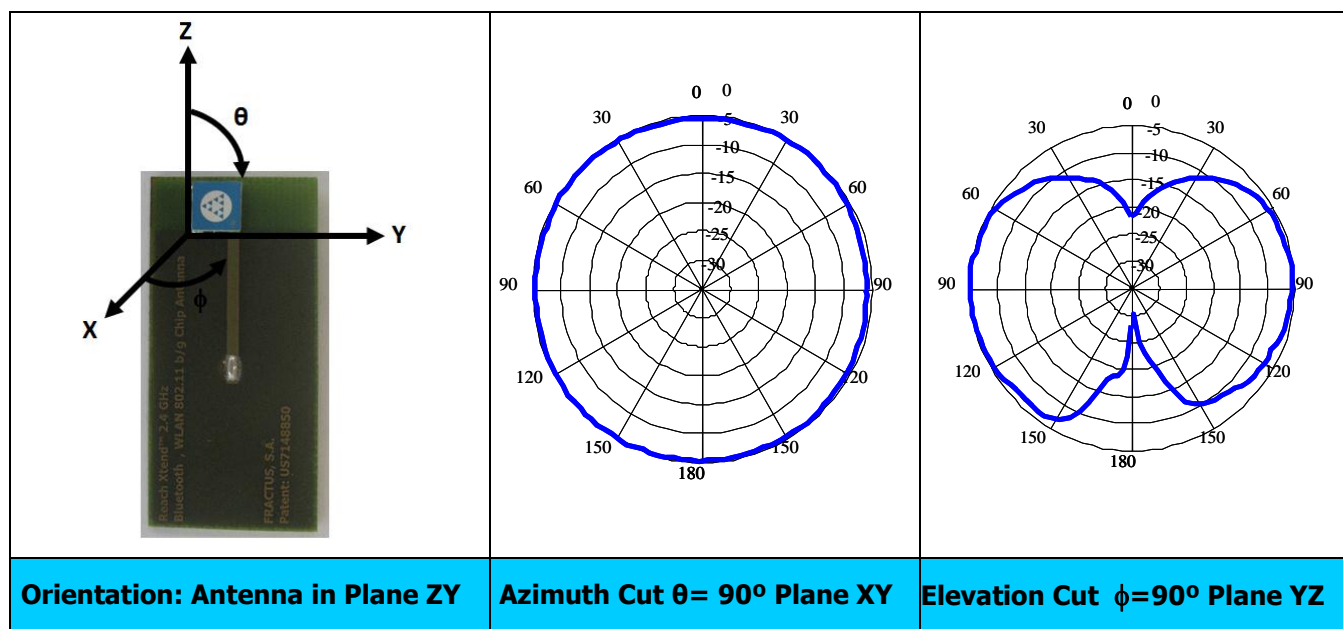
3.2. VSWR AND EFFICIENCY



Graph 1 - VSWR (Voltage Standing Wave Ratio) and Efficiency (%) vs. Frequency



3.3. RADIATION PATTERNS (at 2.45 GHz), GAIN AND EFFICIENCY



Gain	Peak Gain	1.3 dB
	Average Gain across the band	1.2 dB
	Gain Range across the band (min, max)	1.0 dB <-> 1.3 dB
Efficiency	Peak Efficiency	76.1 %
	Average Efficiency across the band	74.0 %
	Efficiency Range across the band	71.7 % - 76.1 %

Table 2 – Antenna Gain and Efficiency within the 2.4-2.5 GHz band. Measured results from the evaluation board in a Satimo Stargate 32 anechoic chamber.



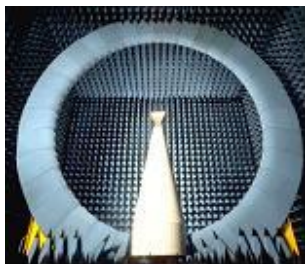
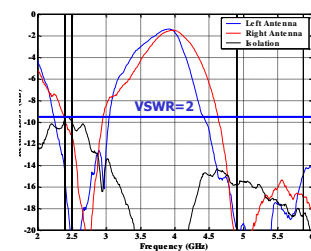
3.4. CAPABILITIES AND MEASUREMENT SYSTEMS

Fractus specialises in designing and manufacturing multi-band and miniature antennas for wireless applications and providing our clients with RF expertise. We offer turn-key antenna products and antenna integration support to minimise 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.



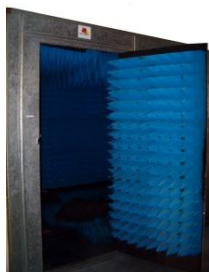
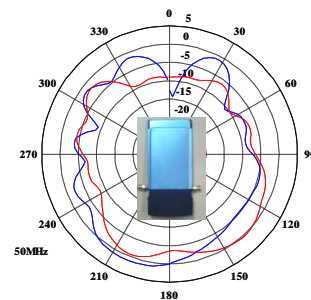
Agilent E5071B

VSWR
&
S Parameters



SATIMO's STARGATE 32

Radiation
Pattern
&
Efficiency



Anechoic and semi-anechoic chambers and full equipped in-house lab



4. MECHANICAL CHARACTERISTICS

4.1. DIMENSIONS, TOLERANCES & MATERIALS

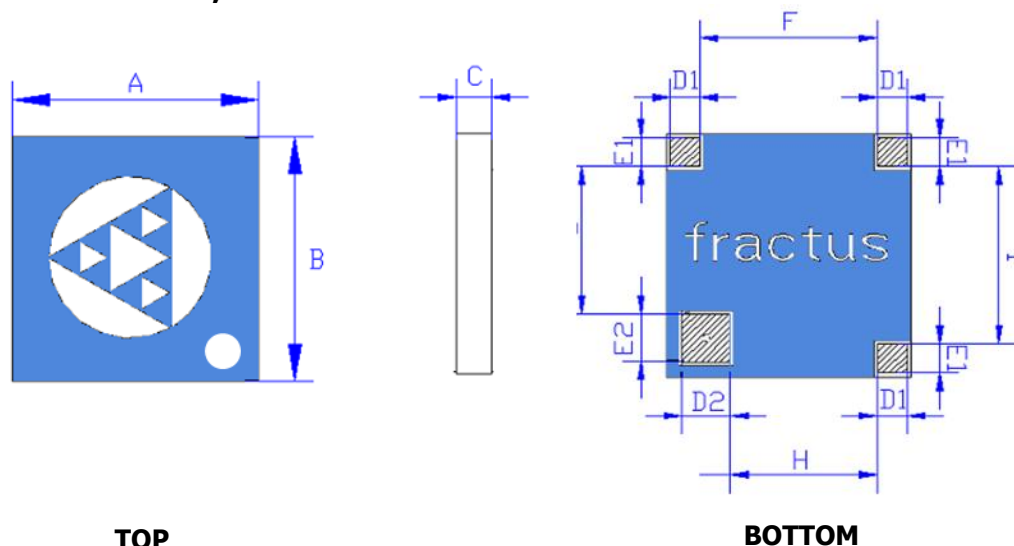


Figure 2 – Antenna Dimensions and Tolerances

Measure	mm	Measure	mm
A	6.7 ± 0.2	D2	1.3 ± 0.1
B	6.7 ± 0.2	E2	1.3 ± 0.1
C	0.8 ± 0.2	F	4.0 ± 0.2
D1	1.2 ± 0.1	G	3.7 ± 0.2
E1	1.2 ± 0.1	H	3.7 ± 0.2

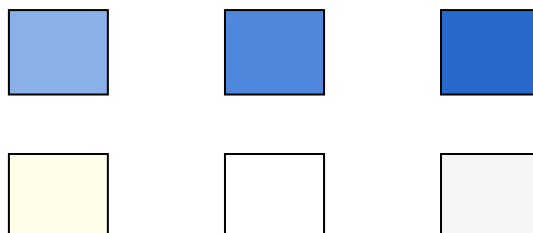
The white circle located on the top side of the antenna indicates the feed pad.

Fractus Reach Xtend chip antenna is compliant with the directive **2002/95/EC** on the restriction of the use of hazardous substances (**RoHS**).

The RoHS certificate can be downloaded from <http://www.fractus.com/index.php/fractus/documentation>

4.2. COLOUR RANGE FOR THE INK

The next figure shows the range of the colours in the antenna:

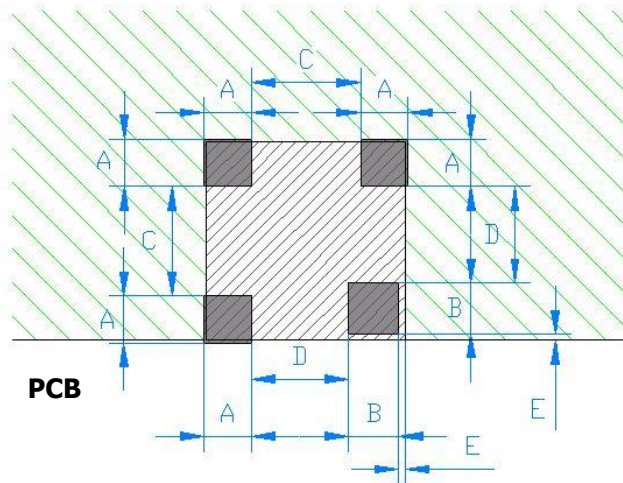





Acceptable colour range



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

This antenna footprint applies for the reference evaluation board described in page 4 of this User Manual.



-  Zone occupied by the antenna
-  Soldering pads and feed point
-  Clearance (PCB area without ground-plane)

Measure	mm
A	1.6
B	1.7
C	3.7
D	3.3
E	0.2

Tolerance: ± 0.2 mm

Figure 3 – 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@fractus.com

5. MATCHING NETWORK

The specs of a Fractus 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 to place 0402 pads 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 4 shows the back and front view of the Reach Xtend chip antenna, which indicates the location of the feeding point and the mounting pad:

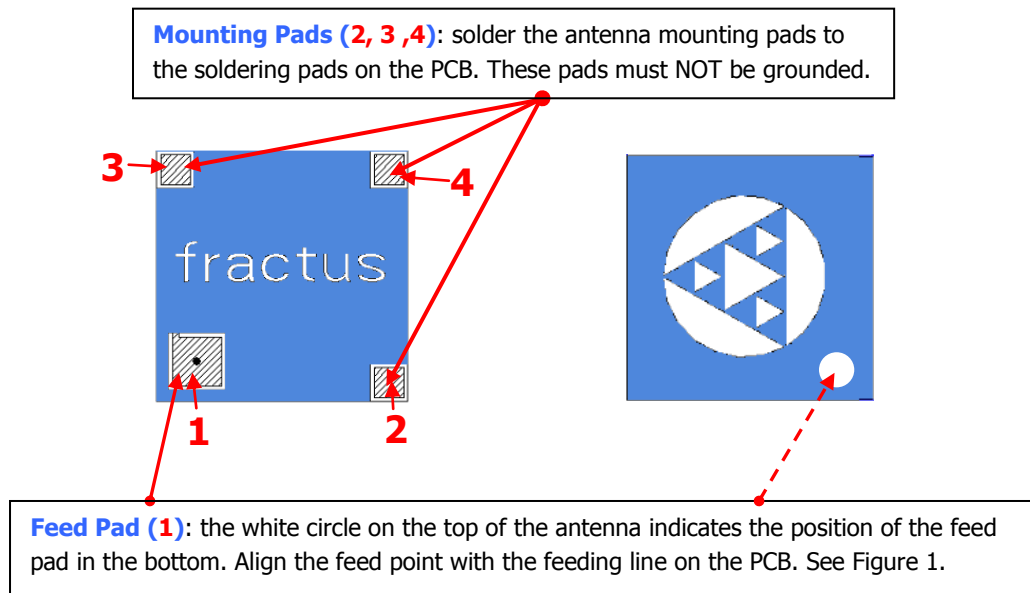


Figure 4 – Pads of the Reach Xtend Chip Antenna.

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 on 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 6 of page 10.
3. After soldering the antenna to the circuit board, perform a cleaning process to remove any residual flux. Fractus 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:

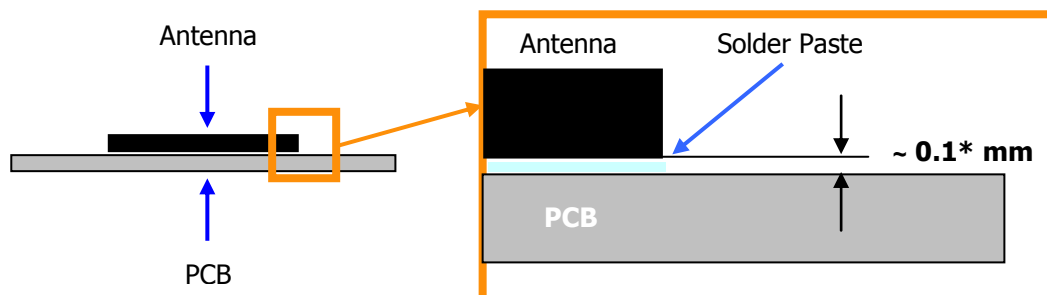


Figure 5 - Soldering Details

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.



Fractus Reach Xtend chip antenna 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 3 – Recommended soldering temperatures

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

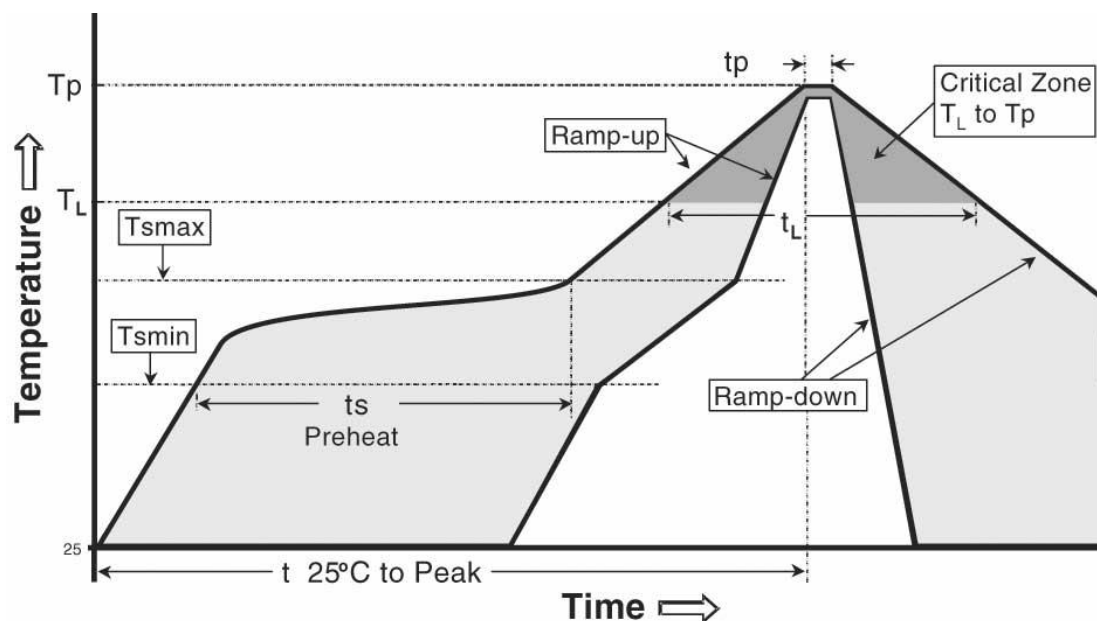


Figure 6 – Temperature profile



7. PACKAGING

The Fractus Reach Xtend chip antenna is available in tape and reel packaging.

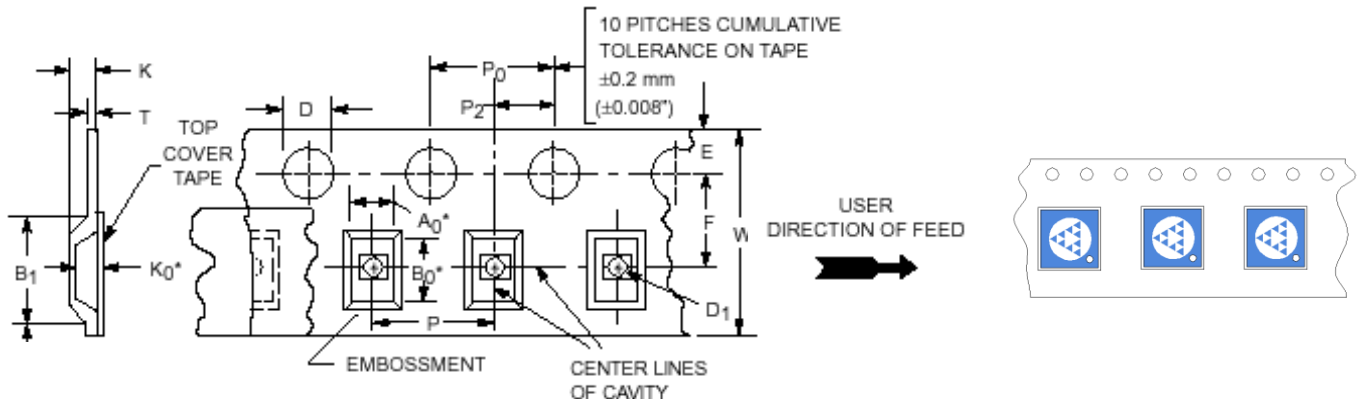
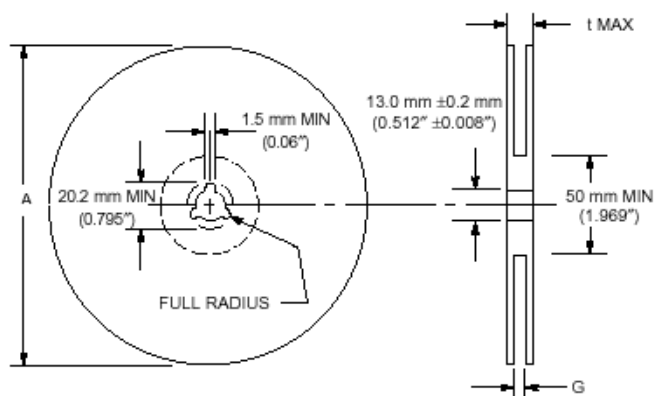
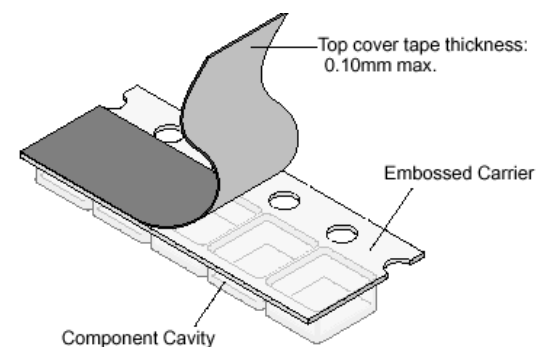


Figure 7 –Tape dimensions & image including antennas

Measure	mm	Measure	mm
TAPE WIDTH (W)	16.0 ± 0.3	Wmax	16.3
A0	7.5 ± 0.1	E	1.7 ± 0.1
B0	7.5 ± 0.1	F	7.5 ± 0.1
K0	1.1 ± 0.1	K	1.4 ± 0.1
B1	8.1 ± 0.1	P	12.0 ± 0.1
D	2 ± 0.1	P0	4.0 ± 0.1
D1	2 ± 0.1	P2	2.0 ± 0.1



Measure	mm
A	330 ± 1
G	17.5 ± 0.2
t max	21.5 ± 0.2

Reel Capacity: 2500 antennas.

Figure 8 – Reel Dimensions and Capacity