



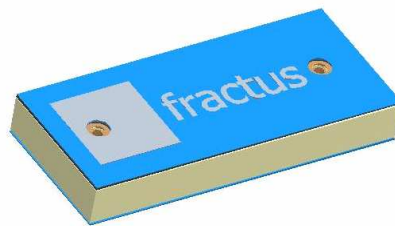
fractus

Optimised Antennas
for Wireless Devices

User Manual

Fractus Slim Reach Xtend™

Bluetooth® *Chip Antenna*



**Antenna Part Number:
FR05-S1-N-0-104**

ISO 9001
BUREAU VERITAS
Certification





TABLE OF CONTENTS

NOTES	2
ANTENNA DESCRIPTION	3
QUICK REFERENCE GUIDE	3
ELECTRICAL PERFORMANCE	4
FRACTUS EVALUATION BOARD	4
CAPABILITIES AND MEASUREMENT SYSTEMS	6
MECHANICAL CHARACTERISTICS	7
DIMENSIONS, TOLERANCES & MATERIALS	7
SPECIFICATIONS FOR INK	8
ASSEMBLY PROCESS	9
PCB FOOTPRINT DETAILS	11
PACKAGING	12

Fractus is an **ISO 9001:2000** certified company
All our antennas are lead-free and **RoHS** compliant

NOTES

The product described in this document is protected worldwide by the following Patents and Patent Applications owned by Fractus: US7148850, US7164386, US7202822; PAT.PEND.WO0154225. Any update on new patents linked to this product will appear in <http://www.fractus.com/index.php/fractus/patents>

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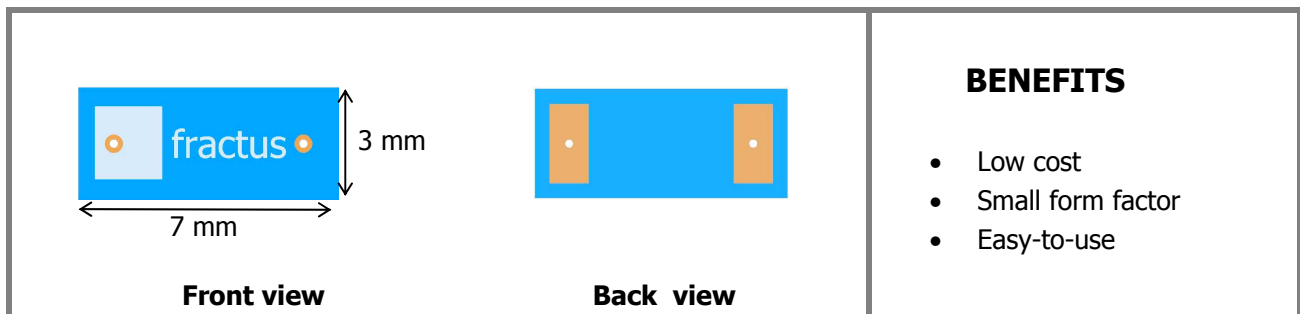


ANTENNA DESCRIPTION

Fractus® Slim Reach Xtend™ chip antenna is engineered specifically for wireless headsets(*) using Bluetooth® and other wireless standards operating at the ISM 2.4 GHz band.

The Slim Reach Xtend™ antenna has been designed to resonate at 2.65 GHz in free space conditions. This has been done purposely because the human head and plastic housing produce a frequency downshift of 150-250 MHz in the resonance frequency of the antenna. Based on our research and development in this area, you are not forced to test multiple antennas with different resonant frequencies.

Fractus® Slim Reach Xtend™ antenna minimises your product development costs and integration efforts. It combines a small form factor with robust performance making Slim Reach Xtend an optimal choice for your headset.



(*) Although the antenna has been primarily conceived for use in wireless headsets, it can also be implemented in wireless handsets and USB dongles. For more information or to receive the application notes please contact wireless@fractus.com.

QUICK REFERENCE GUIDE

Technical Features	
Frequency range	2600-2700 MHz ⁽¹⁾
Radiation Efficiency	> 50% ⁽²⁾
Peak Gain	> 0 dBi
Radiation Pattern	Omnidirectional
VSWR	< 2:1
Polarization	Linear
Weight	0.05 g
Temperature	-40 to + 85°C
Impedance	50Ω
Dimensions	7x3x1 mm (L x W x H)

Please contact your sales representative at wireless@fractus.com if you require additional information on antenna integration or optimisation on your headset.

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Table 1 - Technical Features

Notes:

- (1) Results measured in a reference evaluation board of 40x20 mm in free space, described in the following section. The design of the antenna takes into consideration the downshift effect of plastics and human head.
- (2) Antenna efficiency measured without considering the effect of the human head.



ELECTRICAL PERFORMANCE

FRACTUS EVALUATION BOARD

The configuration used in testing the Slim Reach Xtend chip antenna is displayed in Figure 1.

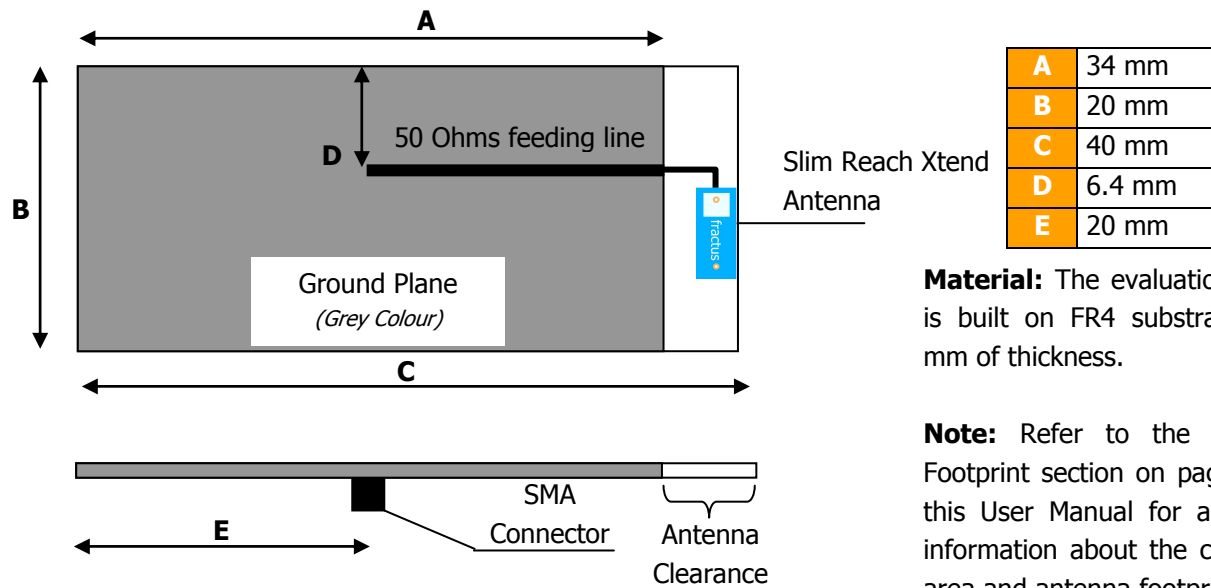
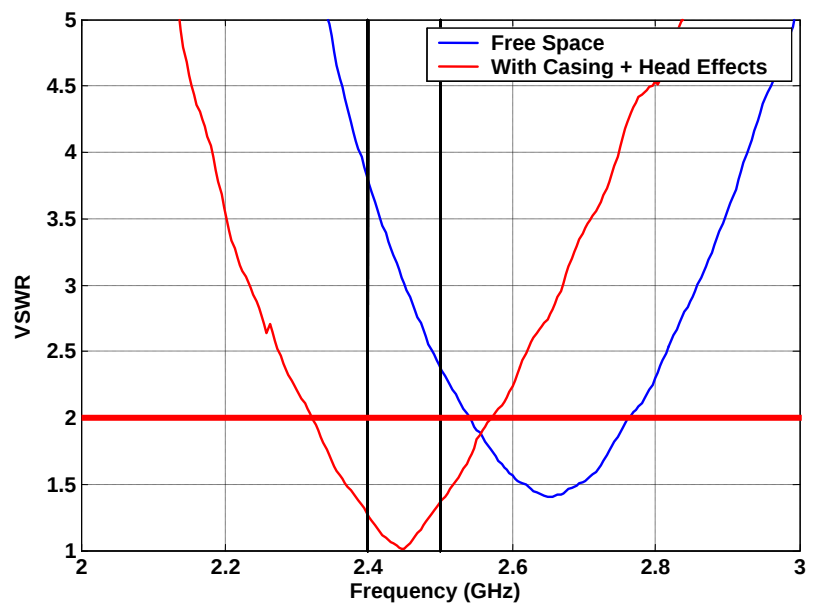


Figure 1 – Slim Reach Xtend Evaluation Board

VSWR

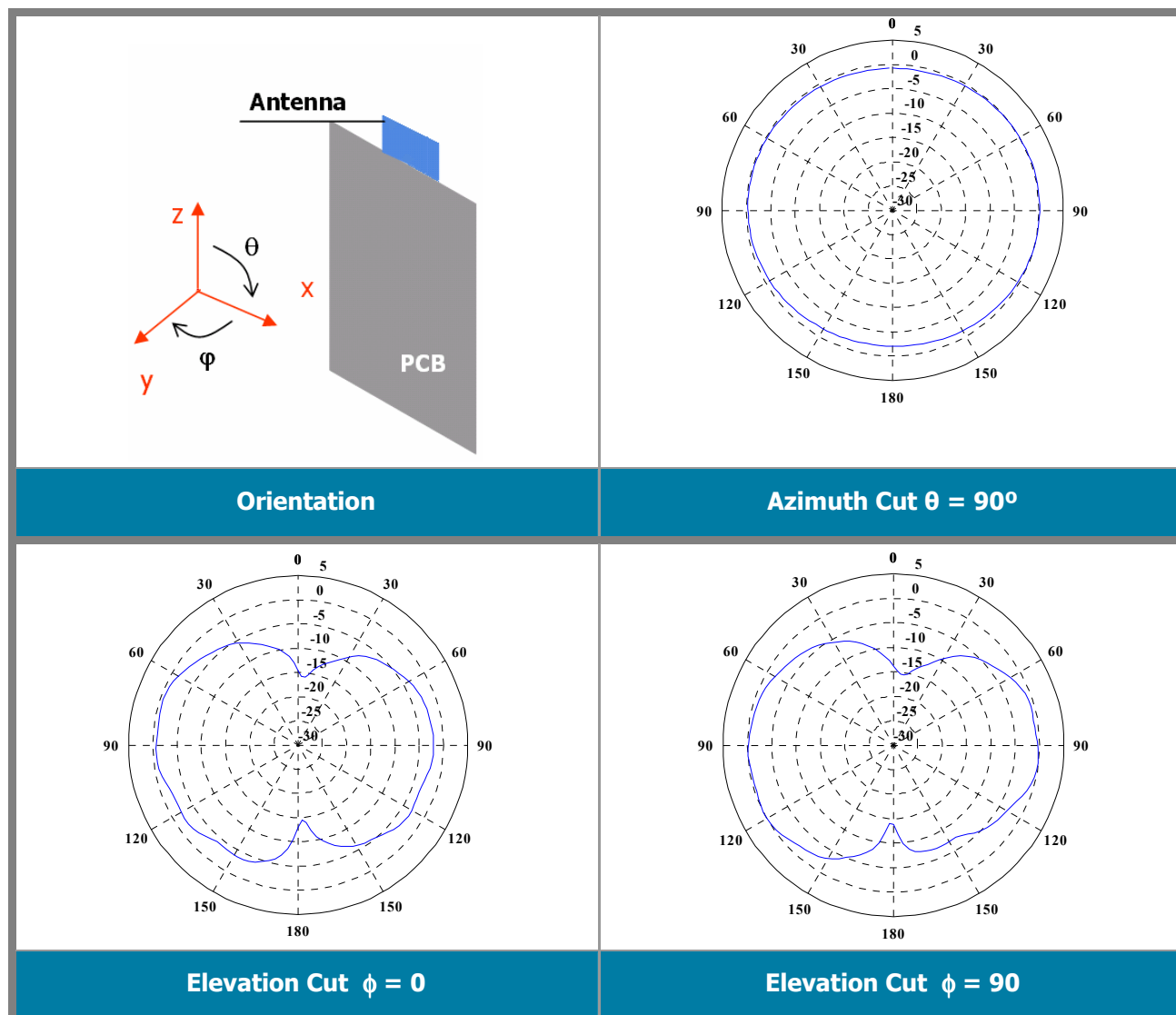
VSWR (Voltage Standing Wave Ratio)
versus Frequency (GHz)

- <2:1 within the ISM-2.4 GHz band
 - o 2.4-2.483 in US and Europe
 - o 2.471-2.497 in Japan





Radiation Pattern, Gain and Efficiency



Gain	Peak Gain	0.3 dBi
	Average Gain	-2.3 dBi
Efficiency	Peak Efficiency	61 %
	Average Efficiency	55 %

Table 2 – Antenna Gain and Efficiency within the 2.6-2.7 GHz (Free Space).



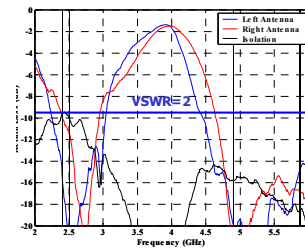
CAPABILITIES AND MEASUREMENT SYSTEMS

Fractus specialises in designing and manufacturing optimised 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.



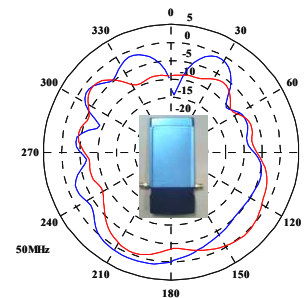
R&S VNA 20KHz-8GHz ZVCE

VSWR
&
S Parameters



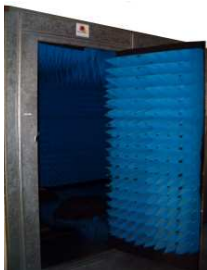
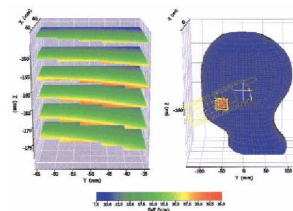
SATIMO's STARGATE 32

Radiation
Pattern
&
Efficiency



DASY-4 (SPEAG)

SAR Levels



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



MECHANICAL CHARACTERISTICS

DIMENSIONS, TOLERANCES & MATERIALS

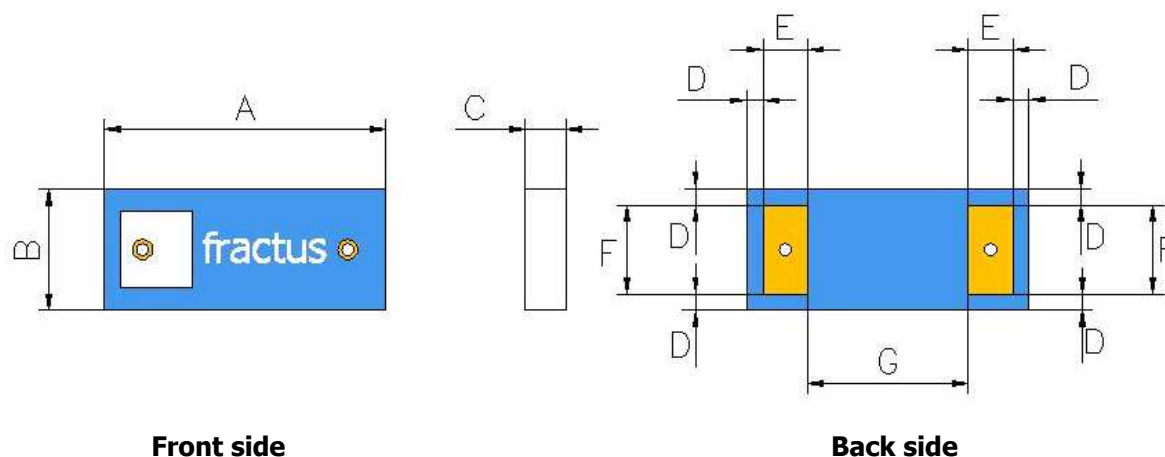


Figure 2 – Antenna Dimensions and Tolerances

A	7.00 ± 0.20	E	1.100 ± 0.10
B	3.00 ± 0.20	F	2.200 ± 0.10
C	1.00 ± 0.20	G	4.000 ± 0.20
D	0.40 ± 0.15		

All dimensions are in millimetres (mm)

The white square on the left front side of the antenna provides you with a visual cue to mount the antenna. It is located physically above the feed point of the antenna and has been included to decrease possible manufacturing error.

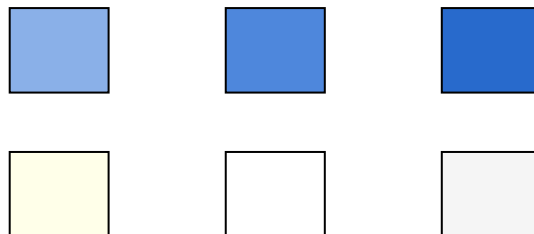
Fractus Slim Reach Xtend chip antenna is compliant with the directive **2002/95/EC** on the restriction of the use of hazardous substances (**RoHS**). Should you require a green certificate (RoHS report), please contact your sales representative at wireless@fractus.com.



SPECIFICATIONS FOR INK

Blue (pantone 312)	• 50% Blue CARAPACE EMP 110-3245 • 50% White ink CARAPACE
White	• White ink CARAPACE
Black (solder mask)	• Black Taiyo PSR4000

Next figure shows the correct colours of the antenna:



Acceptable colour range



ASSEMBLY PROCESS

Figure 3 shows the back and front view of the Slim Reach Xtend chip antenna, which indicates the location of the feeding point and the mounting pad:

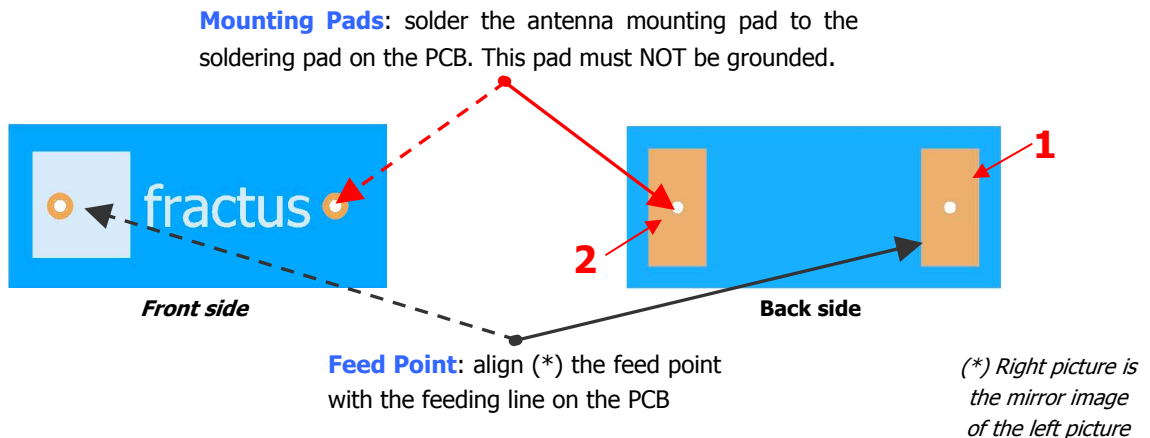


Figure 3 – Views of the Slim Reach Xtend Chip Antenna

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 and figure 5 of page 9.
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:

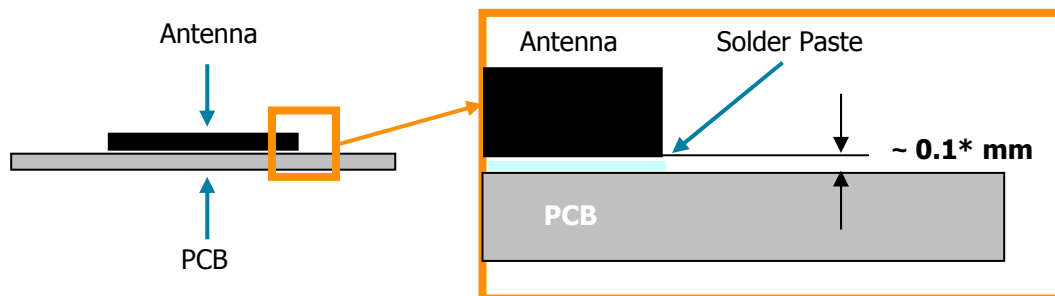


Figure 4 - Soldering Details

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 Slim Reach Xtend chip antenna can 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	Sn-Pb Assembly	Pb-Free Assembly (SnAgCu)
RAMP-UP	Avg. Ramp-up Rate (T_{smax} to T_p)	3 °C / second (max.)	3 °C / second (max.)
PREHEAT	- Temperature Min (T_{smin}) - Temperature Max (T_{smax}) - Time (t_{smin} to t_{smax})	100 °C 150 °C 60-120 seconds	150°C 200°C 60-180 seconds
REFLOW	- Temperature (T_L) - Total Time above T_L (t_L)	183 °C 60-150 seconds	217 °C 60-150 seconds
PEAK	- Temperature (T_p) - Time (t_p)	235 °C 10-30 seconds	260 °C 20-40 second
RAMP-DOWN	Rate	6 °C / second max.	6 °C/second max.
Time from 25 °C to Peak Temperature		6 minutes max.	8 minutes max.

Table 3 – Recommended soldering temperatures

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

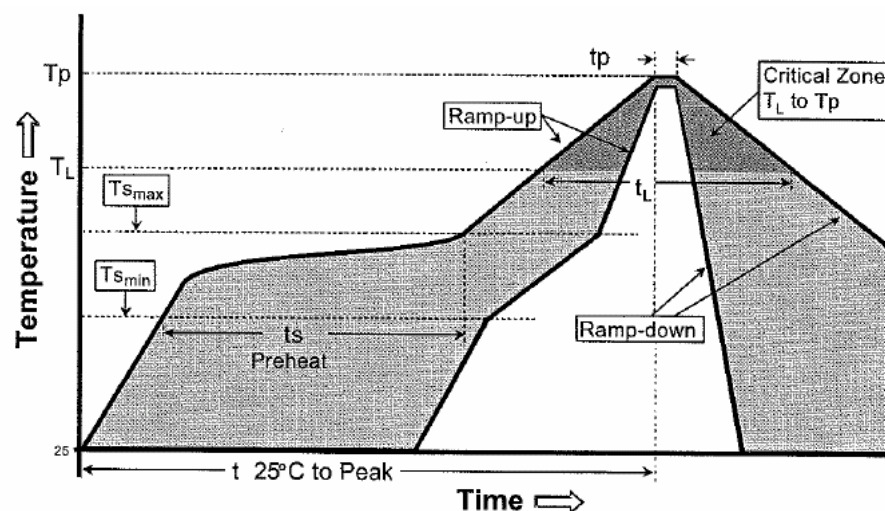
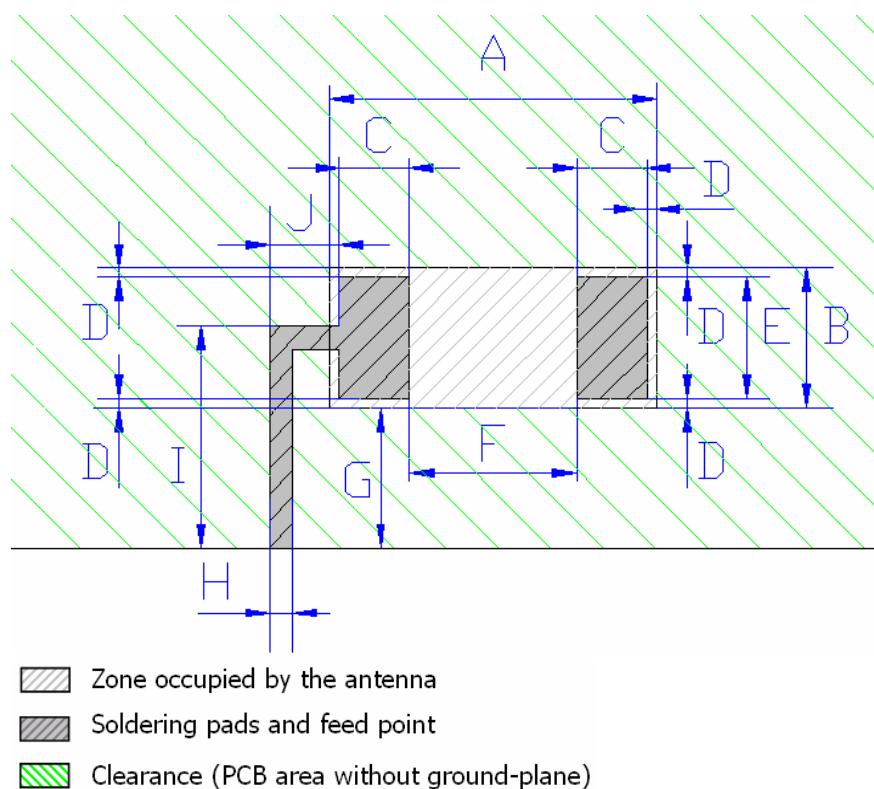


Figure 5 – Temperature profile



PCB FOOTPRINT DETAILS

This antenna footprint applies for the reference evaluation board described in page 4 of this User Manual. Feeding line dimensions over the clearance zone described in figure 5 applies for a 1 mm thickness FR4 PCB.



Letter	Meas.
A	7.00
B	3.00
C	1.50
D	0.20
E	2.60
F	3.60
G	3.00
H	0.50
I	4.75
J	1.50

*All dimensions are in
millimetres.*

Figure 6 – 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 industrial design, we would be pleased to assist you with this design process.

Please, contact your sales representative at wireless@fractus.com to get additional information on recommended configurations for different devices.

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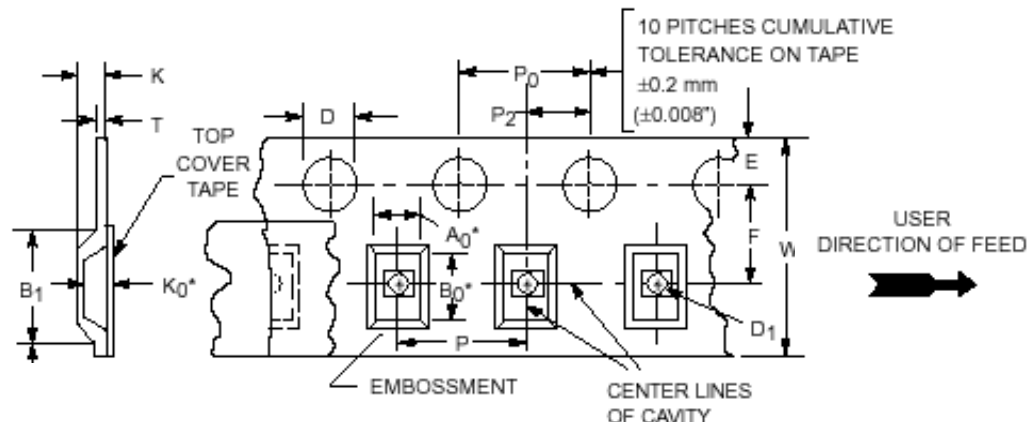
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PACKAGING

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



TAPE WIDTH	16	Wmax	16.3
A0	3.8	E	1.7
B0	7.8	F	7.5
K0	1.2	K	1.5 max
B1	8.0 max	P	8.0
D	1.5	P0	4.0
D1	1.5 min	P2	2.0

All dimensions are in mm

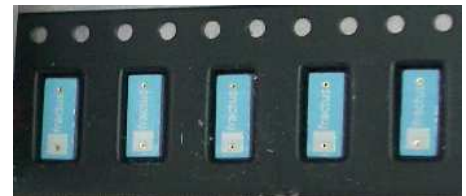
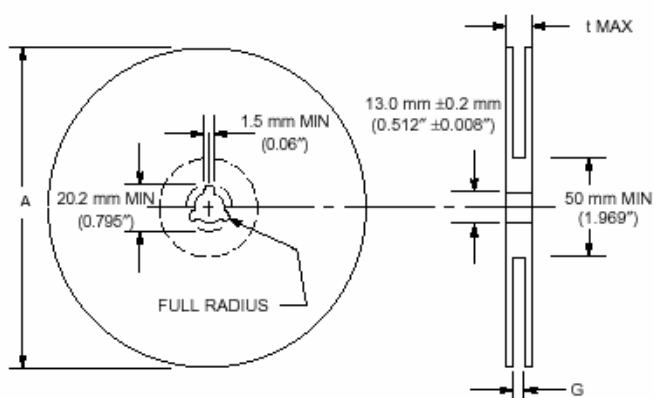


Figure 7 – Tape dimensions & real image including antennas



All dimensions listed in millimetres
(mm)

A max	330
G	16.4
T max	22.4

Figure 8 – Reel Dimensions and Capacity