Fractus EZConnect™

Zigbee, RFID, ISM868/900

Chip Antenna

Antenna Part Number:
FR05-S1-R-0-105

ZigBee™ RFID ISO 9001 BUREAU VERITAS Certification RoHS 2002/95/EC

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

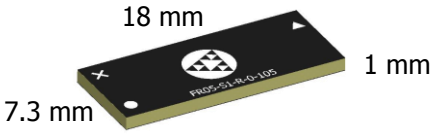
NOTES

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

ANTENNA DESCRIPTION

The Fractus® EZConnect antenna has been specifically designed for wireless devices using Zigbee, RFID and other wireless standards operating at the ISM 868/900 MHz bands.

EZConnect antenna uses the space-filling properties of fractal technology to become one of the smallest antennas for ISM868/900 applications. Additionally, the antenna maintains a high radiation efficiency that helps to improve the battery life of your devices and features an omnidirectional radiation pattern optimal for highly scattered environments such as indoor environments and public spaces.



TOP

BOTTOM

APPLICATIONS

- Home and Industrial applications using Zigbee wireless standard.
- RFID (900 MHz)
- Wide range of PCB form factors: USB Dongles, PDAs, Mobile phones, PCMCIAs

BENEFITS

- Small size
- High efficiency
- Low cost

QUICK REFERENCE GUIDE

Technical features	
Frequency range	902-928 MHz
Average Efficiency	82 %
Peak Gain	1.67 dB
Radiation Pattern	Omnidirectional
VSWR	< 2:1
Polarization	Linear
Weight	0.2 g
Temperature	-40 to + 85ºC
Impedance	50Ω
Dimensions (L x W x H)	18 mm x 7.3 mm x 0.8 mm

Table 1 -Technical Features. Measures from the evaluation board (121 mm x 48 mm x 0.8 mm PCB)

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

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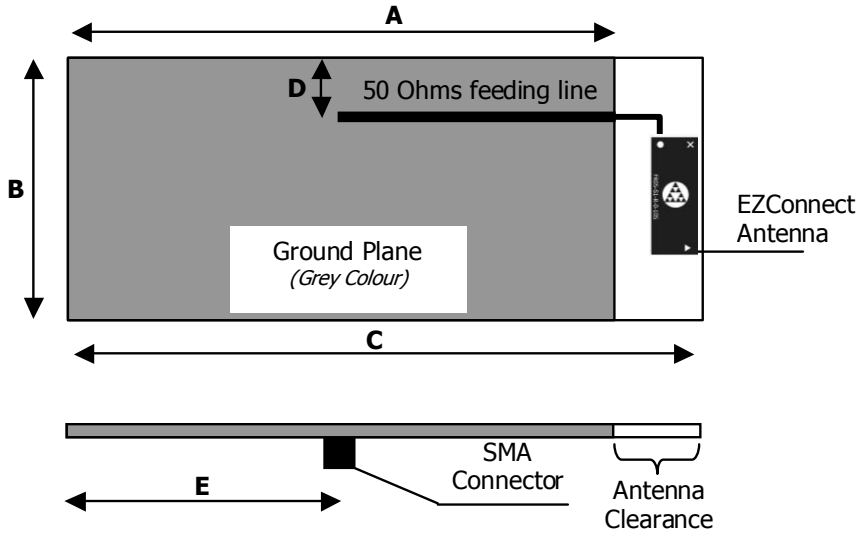
ELECTRICAL PERFORMANCE

FRACTUS EVALUATION BOARD

The configuration used in testing the EZConnect chip antenna is displayed in Figure 1.



Measure	mm
A	105
B	48
C	121
D	11
E	53.5

Tolerance: ±0.2 mm

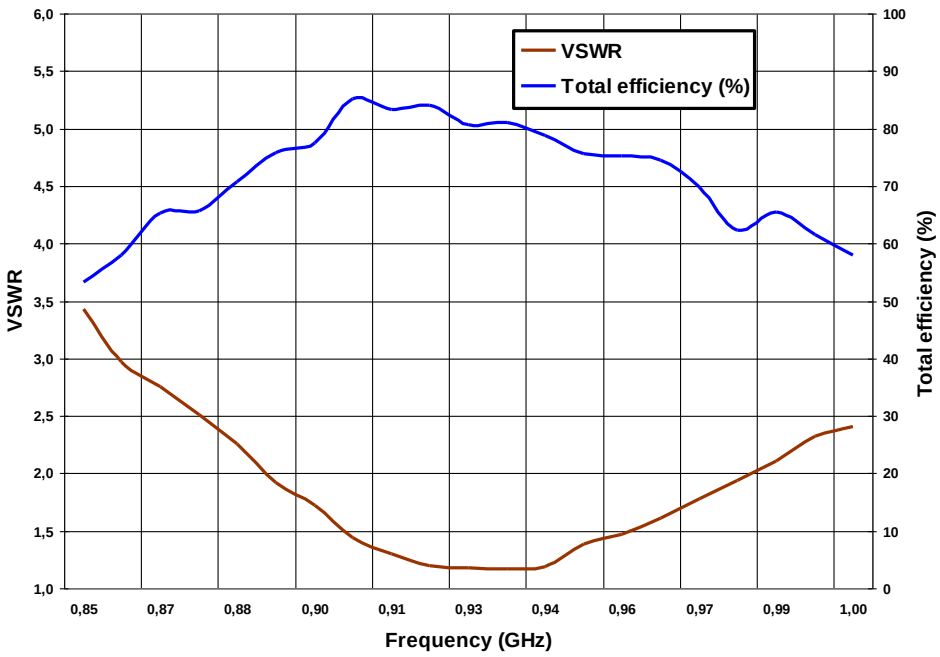
Material: The evaluation board is built on FR4 substrate of 0.8 mm of thickness.

Figure 1 – EZConnect Evaluation Board

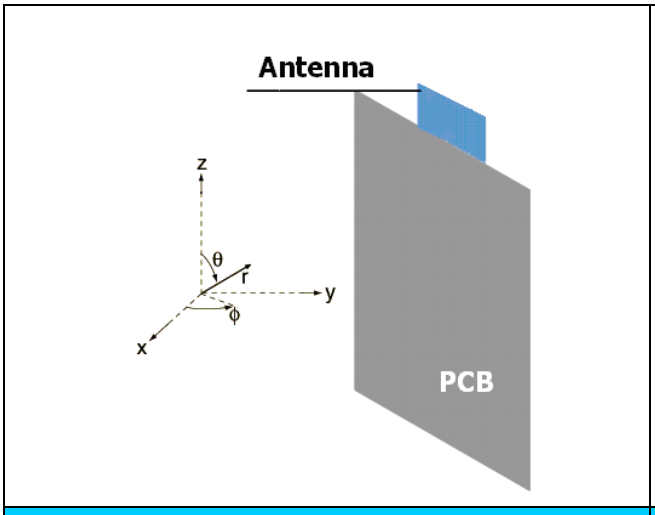
VSWR and Efficiency

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

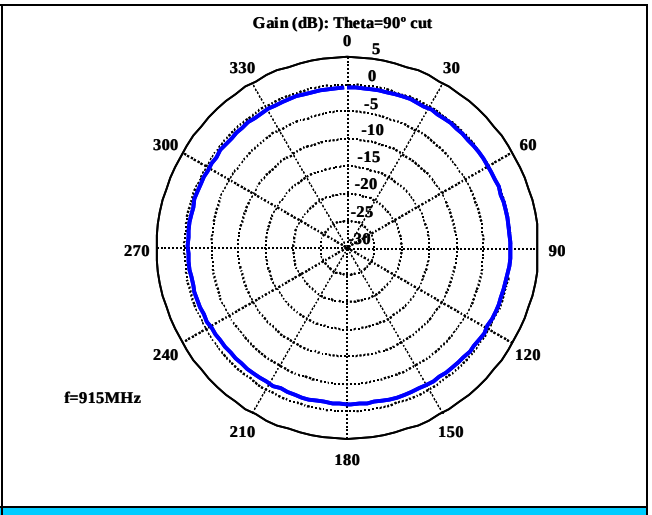
Please, contact info@fractus.com to receive additional details of the antenna configurations for the ISM 868MHz band.



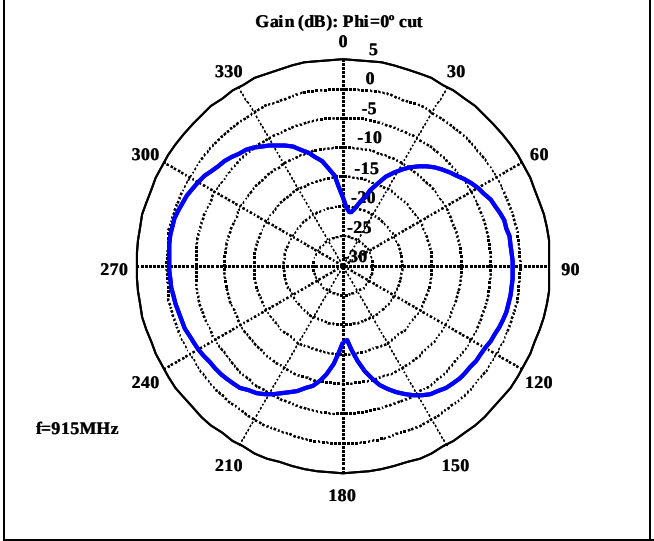
RADIATION PATTERN, GAIN AND EFFICIENCY



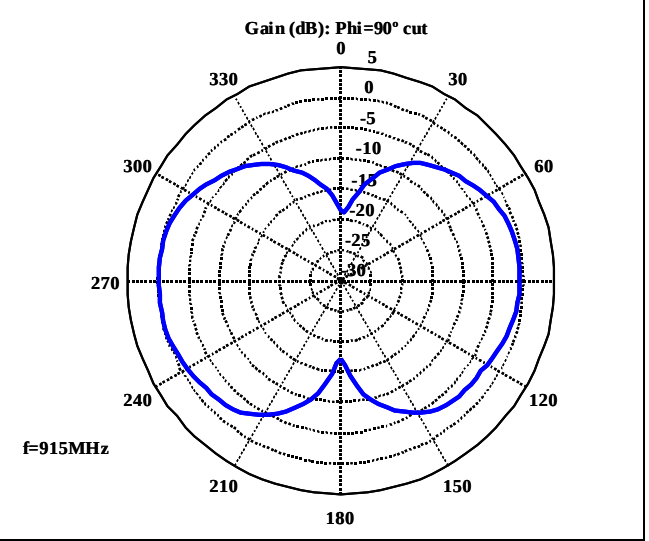
Orientation



Azimuth Cut θ=90º Plane XY



Elevation Cut ϕ = 0º Plane XZ



Elevation Cut ϕ = 90º Plane YZ

Gain	**Peak Gain**	1.67 dB
	Average Gain across the band	1.61 dB
	Gain Range across the band (min, max)	1.59 dB , 1.67 dB
Efficiency	**Peak Efficiency**	85.2 %
	Average Efficiency across the band	82.8 %
	Efficiency Range across the band	80 % - 85.2 %

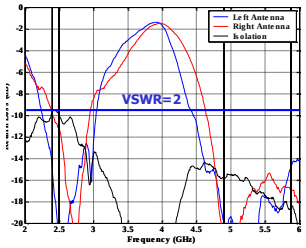
Table 2 – Antenna Gain and Efficiency within the 902-928 MHz band. Measures made in the evaluation board and in the Satimo STARGATE 32.

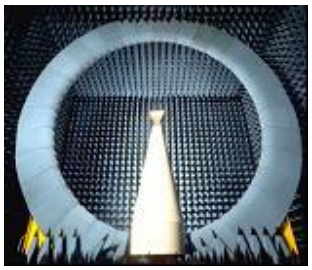
CAPABILITIES AND MEASUREMENT SYSTEMS

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.

Agilent E5071B

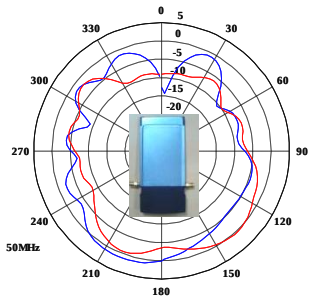
VSWR
&
S Parameters





SATIMO's STARGATE 32

Radiation
Pattern
&
Efficiency



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

MECHANICAL CHARACTERISTICS

DIMENSIONS, TOLERANCES & MATERIALS

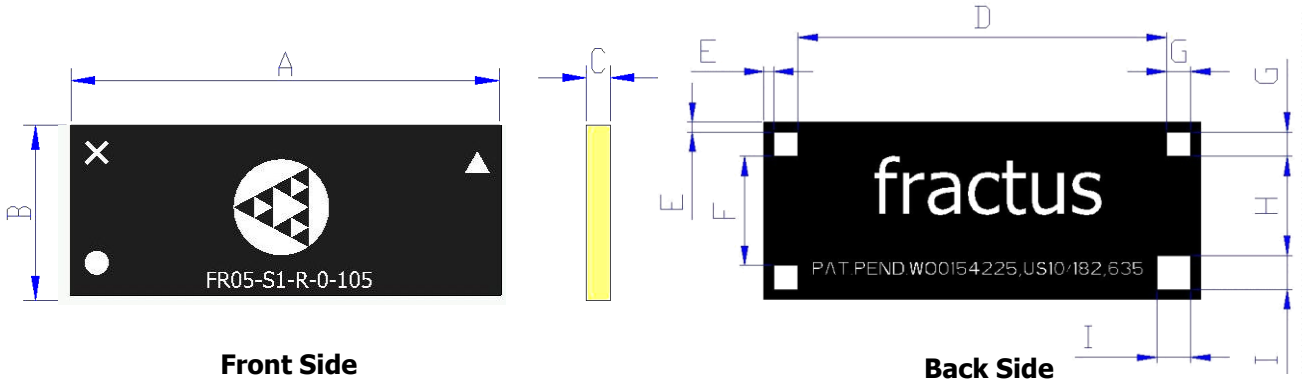


Figure 2 – Antenna Dimensions and Tolerances

Dimension	mm	Dimension	mm
A	18 ± 0.2	**F**	4.5 ± 0.1
B	7.3 ± 0.2	**G**	1 ± 0.05
C	1 ± 0.2	**H**	4.1 ± 0.10
D	15.2 ± 0.2	**I**	1.4 ± 0.05
E	0.4 ± 0.1		

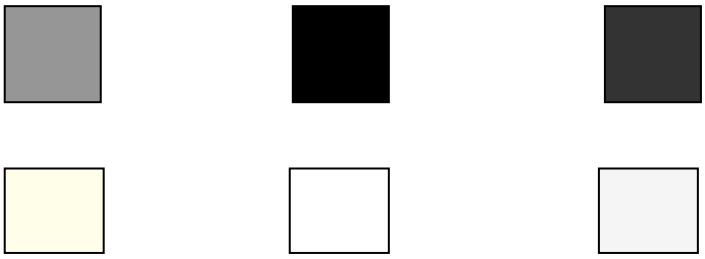
The white circle located on the lower left corner of the front side of the antenna provides you with a visual cue to mount the antenna. It is located physically above the main feed point of the antenna and has been included to decrease possible manufacturing error.

Fractus EZConnect 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 info@fractus.com.

SPECIFICATIONS FOR INK

Black	• Black Taiyo PSR4000 EG23
White	• Lektrachem Technimask ISR1000E/900S

Next figure shows the correct colours of the antenna:



Acceptable colour range

ASSEMBLY PROCESS

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

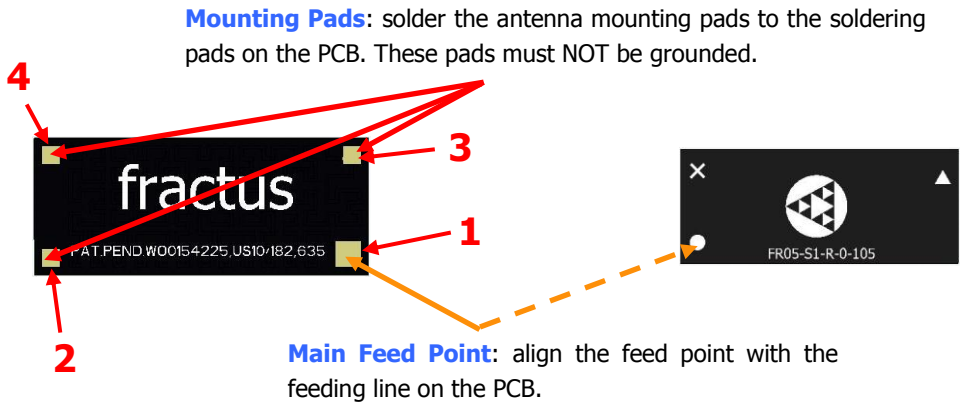


Figure 3 – Views of the EZConnect Chip Antenna

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:

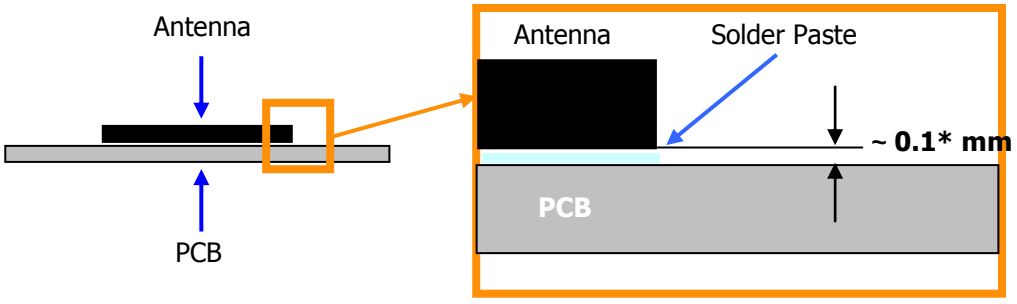


Figure 4 - Soldering Details

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 EZConnect 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 Tp)	3 ºC / second (max.)	3 ºC / second (max.)
PREHEAT	- Temperature Min (T_{smin}) - Temperature Max (T_{smax}) - Time (t_{smin} to t_{smax})	100 ºC 150 ºC 60-120 seconds	150ºC 200ºC 60-180 seconds
REFLOW	- Temperature (T_L) - Total Time above T_L (t_L)	183 ºC 60-150 seconds	217 ºC 60-150 seconds
PEAK	- Temperature (T_p) - Time (tp)	235 ºC 10-30 seconds	260 ºC 20-40 second
RAMP-DOWN	Rate	6 ºC / second max.	6 ºC/second max.
Time from 25 ºC 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 reflow ovens.

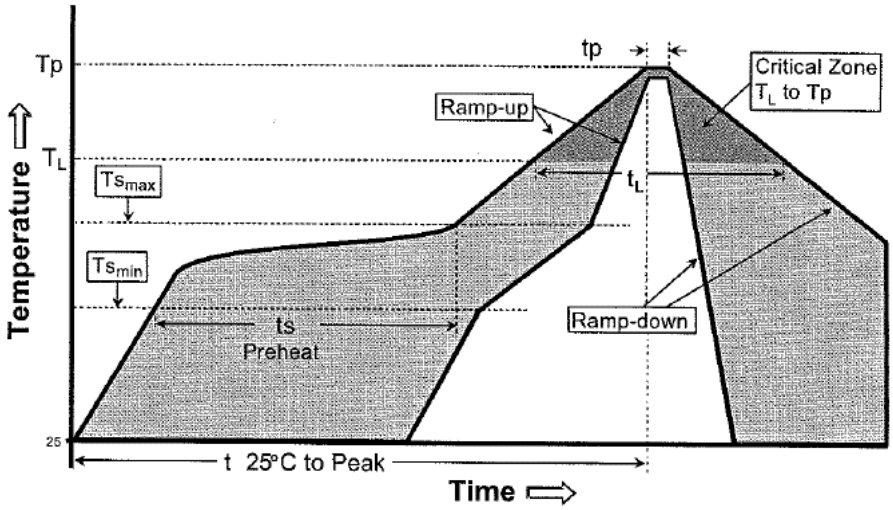
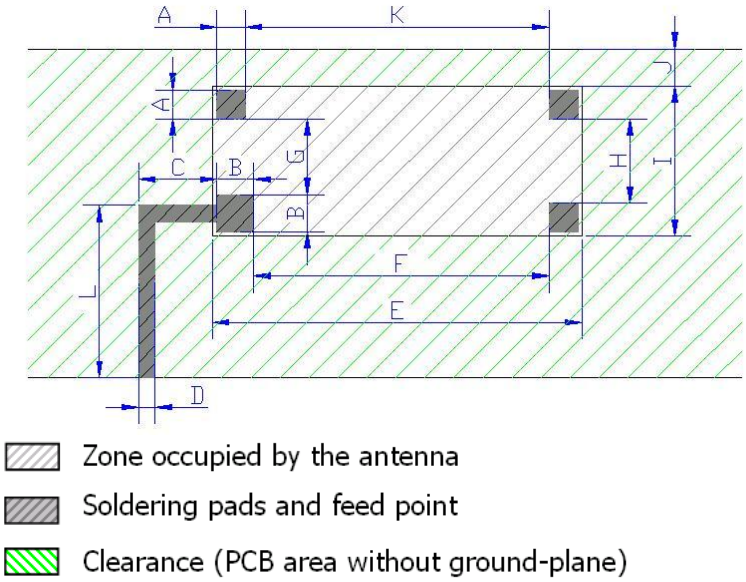


Figure 5 – Temperature profile

ANTENNA FOOTPRINT

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 0.8 mm thickness FR4 PCB.



Measure	mm
A	1.40
B	1.80
C	3.80
D	0.80
E	18.00
F	14.40
G	3.70
H	4.10
I	7.30
J	1.80
K	14.80
L	8.40

Tolerance: ±0.2 mm

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 info@fractus.com to get additional information on recommended configurations for different devices:

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PACKAGING

The EZConnect chip antenna is available in tape and reel packaging.

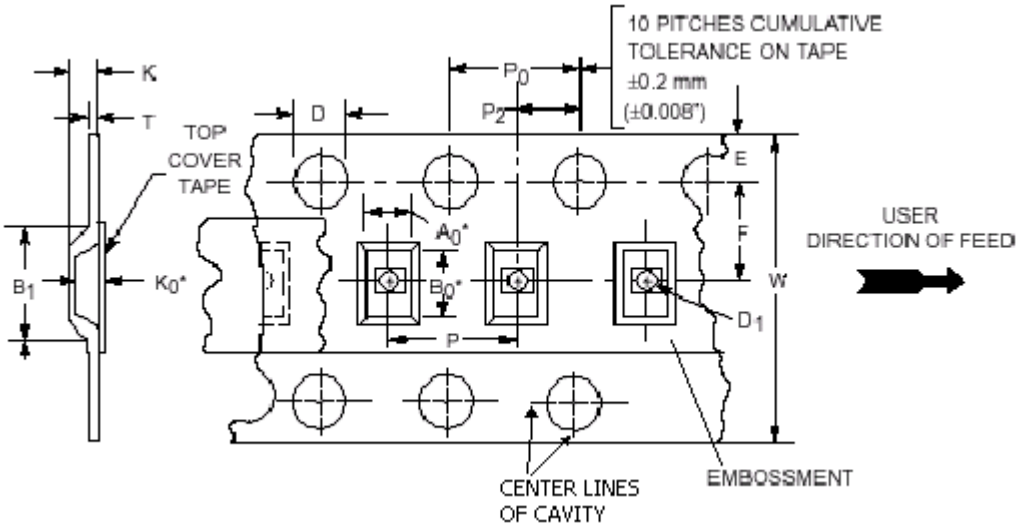
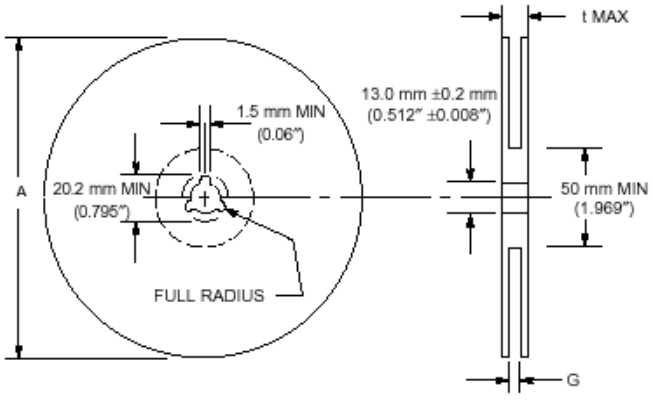


Figure 6 –Tape Dimensions

Dimension	mm	Dimension	mm
TAPE SIZE	32	**Wmax**	32.3
A0	8.0	**E**	1.8
B0	19.0	**F**	14.2
K0	1.1	**K**	1.4 max
B1	19.0 max	**P**	12.0
D	1.6	**P0**	4.7
D1	2.1 min	**P2**	1.6

Tolerance: ±0.2 mm



Measure	mm
A max	330
G	32.4
t max	38.4

Tolerance: ±0.2 mm

Reel Capacity: 2500 antennas.

Figure 7 – Reel Dimensions and Capacity