FracFM™ (FR01-B3-W-0-055) – Mobile FM Antenna

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.

FracFM™

FR01-B3-W-0-055

Fractus Antennas products are protected by Fractus patents.

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

ISO 9001: 2015 Certified

RoHS 2002/95/EC

INDEX OF CHAPTERS

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1. ANTENNA DESCRIPTION

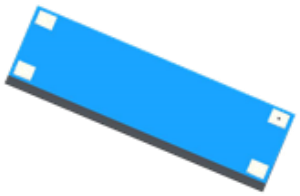
The FracFM™ is an off-the-shelf internal antenna solution specifically designed for general handheld devices and applications operating in the FM band.

FracFM™ minimizes your product development cost and time. With its compact size and high performance, the FracFM™ internal antenna is the optimal choice for your portable FM application.

With its superior performance, small form factor, modularity and high isolation, the FracFM™ antenna solution meets and exceeds all your customer requirements for an internal compact and modular antenna.

TOP

BOTTOM



Material: The FracFM™ antenna is built on glass epoxy substrate.

APPLICATIONS

- Personal Media Player (PMP)
- Ultra Mobile PC (UMPC)
- Private Mobile Radio (PMR) (Walkie Talkie)
- Laptops

BENEFITS

- Reduced Form Factor
- Modularity - SMD
- Superior Performance
- Easy to use (pick and place)

2. QUICK REFERENCE GUIDE

Technical Features	
Frequency Range	78 – 108 MHz
Gain Curve	See page 6
Radiation Pattern	Omnidirectional
Flatness	< 2 dB gain variation
Weight (approx.)	1.1 g
Temperature	-40 to 85º C
Impedance	50 Ω
Dimensions(L x W x H)	32.0 mm x 11.0 mm x 1.6 mm

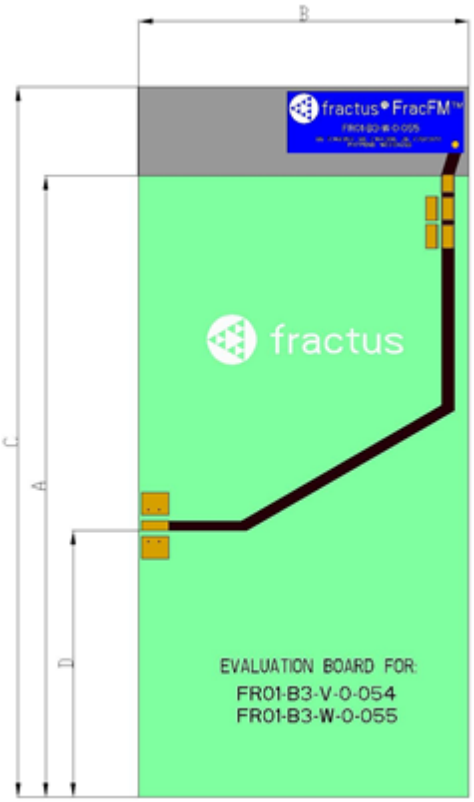
Table 1 – Technical Features. Measures from the evaluation board. See Figure 1.

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

3. ELECTRICAL PERFORMANCE

3.1. FracFM™ EVALUATION BOARD

The configuration used in testing the FracFM™ antenna is displayed in Figure 1.



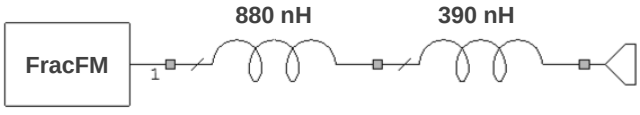
Measure	mm
A	112.0
B	60.0
C	128.0
D	47.5

Tolerance: ±0.2mm

Material: The evaluation board is built on laminated substrate 1.0 mm thick (2 layers).

Figure 1 – EB_FR01-B3-W-0-055. FracFM™ Evaluation Board.

Matching network required:



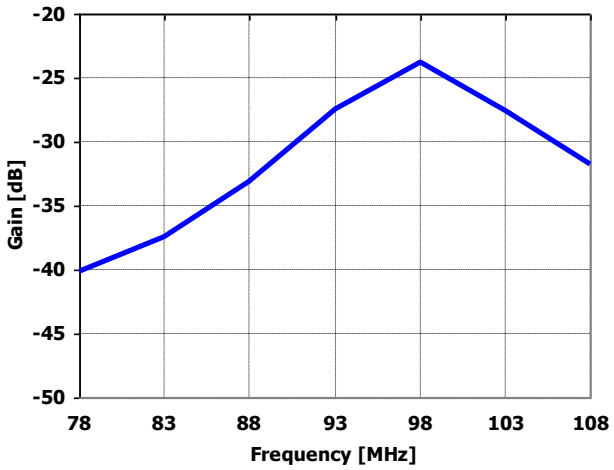
Value	Part Number
880 nH	LQH31HNR88J03L
390 nH	LQH31HNR39J03L

Figure 2 – Matching network implemented in the Evaluation Board.

Note: Optimal matching network values may vary depending on the antenna environment. Please, contact info@fractusantennas.com for additional support to integrate the antenna in a specific application.

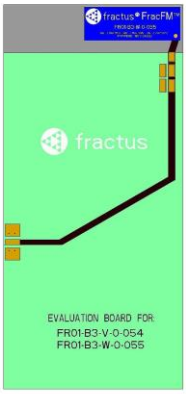
3.2. RADIATION PATTERNS AND GAIN

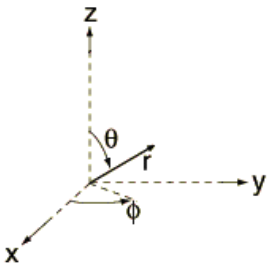
GAIN

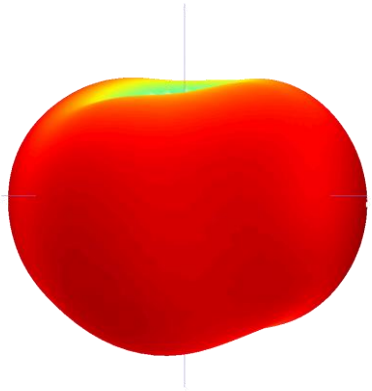


Note: Please notify that this antenna is designed for reception.

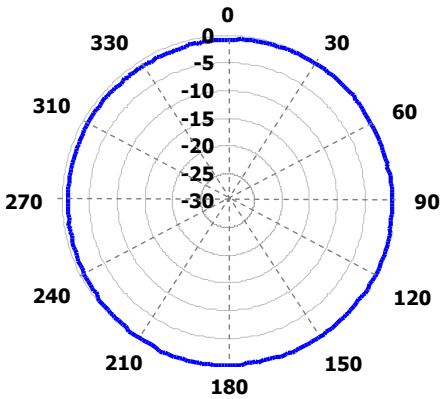
Radiation Pattern







Radiation Pattern

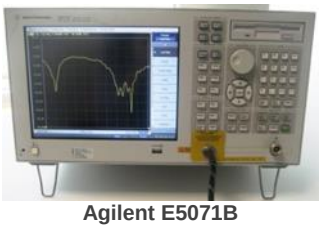


98 MHz

Table 2 – Typical antenna Gain across FM bandwidth.

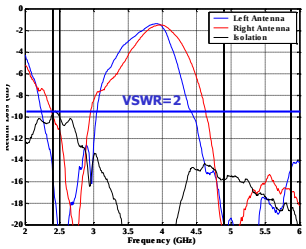
3.3. CAPABILITIES AND MEASUREMENT SYSTEMS

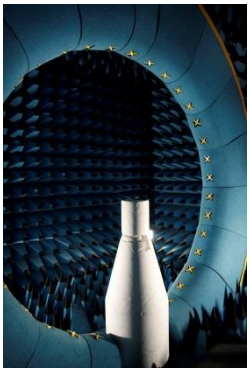
Fractus Antennas specializes in the design and manufacture of optimized antennas for wireless applications, and with the provision of RF expertise to a wide range of clients. We offer turn-key antenna products and antenna integration support to minimize your time requirements and maximize return on investment 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

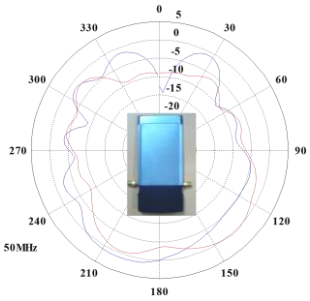
VSWR
&
S Parameters





SATIMO STARGATE 32

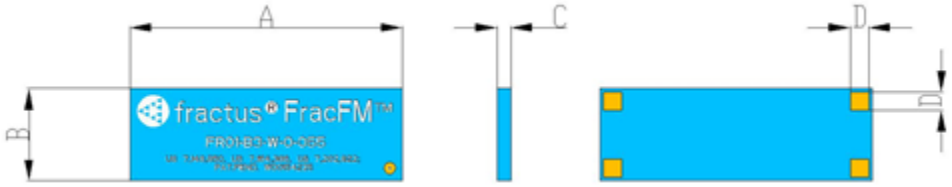
Radiation
Pattern
&
Efficiency



Anechoic chambers and full equipped in-house lab

4. MECHANICAL CHARACTERISTICS

4.1. DIMENSIONS AND TOLERANCES



TOP SIDE BOTTOM

Note: all antenna pads (feed point and mounting pads) have the same dimensions.

The yellow hole on the front of the antenna provides a visual cue to mounting the antenna. It is located above the feed point of the antenna and is included to decrease possible manufacturing error.

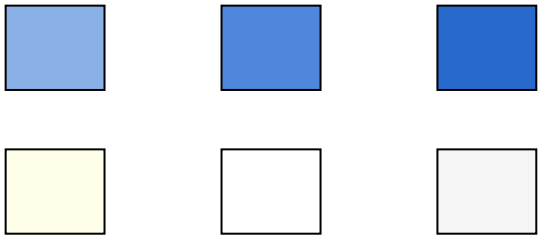
Measure	mm	Measure	mm
A	32.0 ± 0.2	**C**	1.6 ± 0.2
B	11.0 ± 0.2	**D**	2.0 ± 0.1

Figure 3 – Antenna Dimensions and Tolerances.

The FracFM™ antenna is compliant with the restriction of the use of hazardous substances (**RoHS**).

4.2. SPECIFICATIONS FOR THE INK

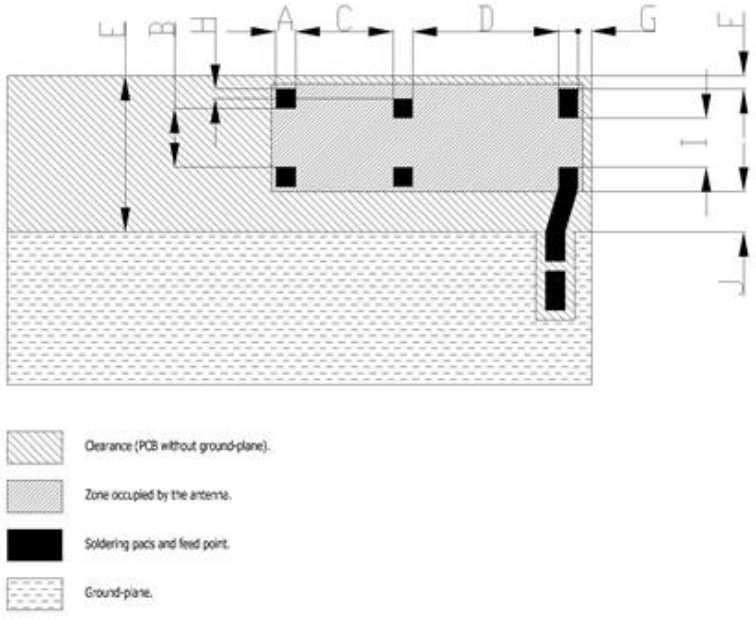
Next figure shows the correct colors of the antenna:



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.



Measure	mm
A	2.0
B	6.0
C	10.0
D	15.0
E	16.0
F	1.4
G	1.4
H	1.0
I	5.0
J	4.1

Tolerance: ±0.2 mm

Note: all the soldering pads (feed point and mounting pads) on the antenna layout have the same dimensions.

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

5. ASSEMBLY PROCESS

Figure 5 shows the back and front view of the FracFM™ antenna, and indicates the location of the feeding point and the mounting pads:

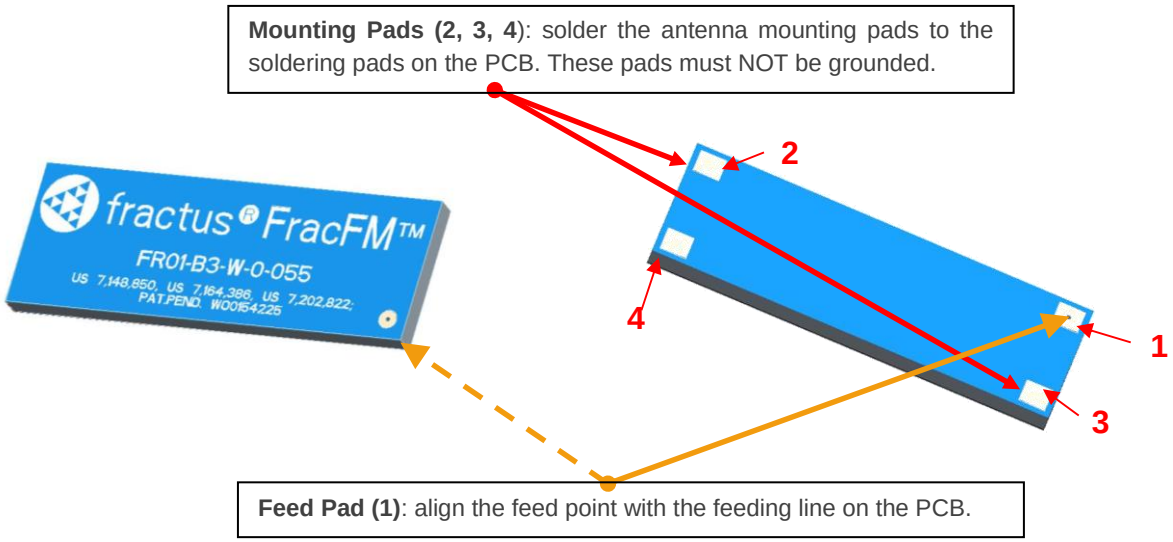


Figure 5 – Pads of the FracFM™ chip antenna.

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:

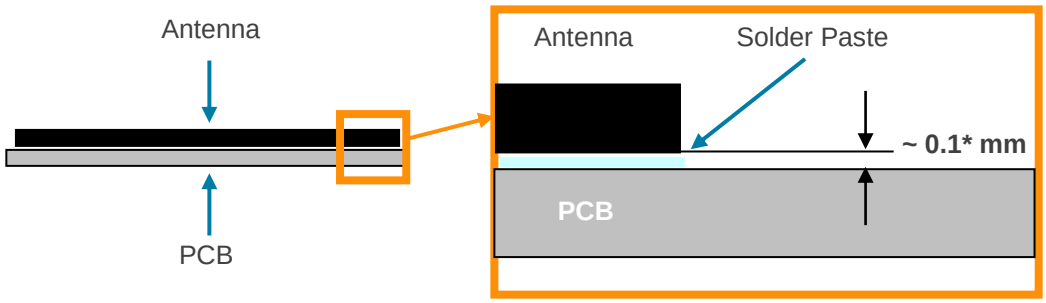


Figure 6 – Soldering Details.

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 FracFM™ 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)
RAMP-UP	Avg. Ramp-up Rate (Tsmax to Tp)	3 ºC / second (max.)
PREHEAT	- Temperature Min (Tsmin) - Temperature Max (Tsmax) - Time (tsmin to tsmax)	150 ºC 200 ºC 60-180 seconds
REFLOW	- Temperature (TL) - Total Time above TL (tL)	217 ºC 60-150 seconds
PEAK	- Temperature (Tp) - Time (tp)	260 ºC 20-40 seconds
RAMP-DOWN	Rate	6 ºC/second max
Time from 25 ºC to Peak Temperature		8 minutes max

Table 3 – Recommended soldering temperatures.

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

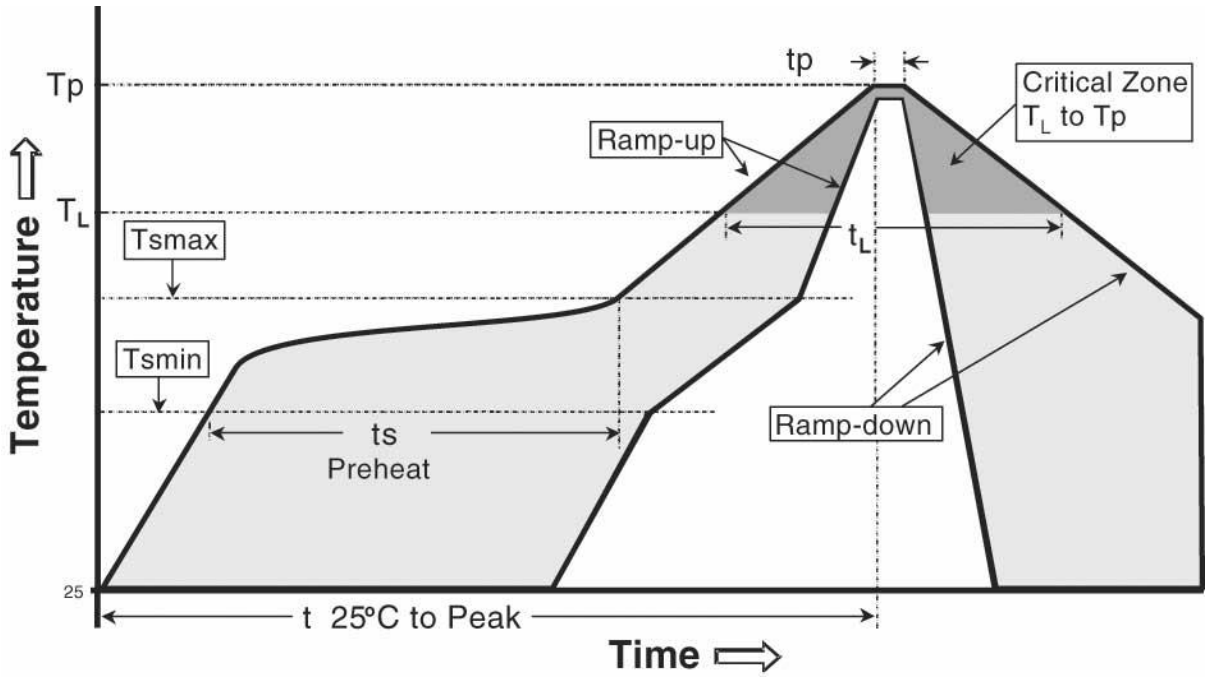
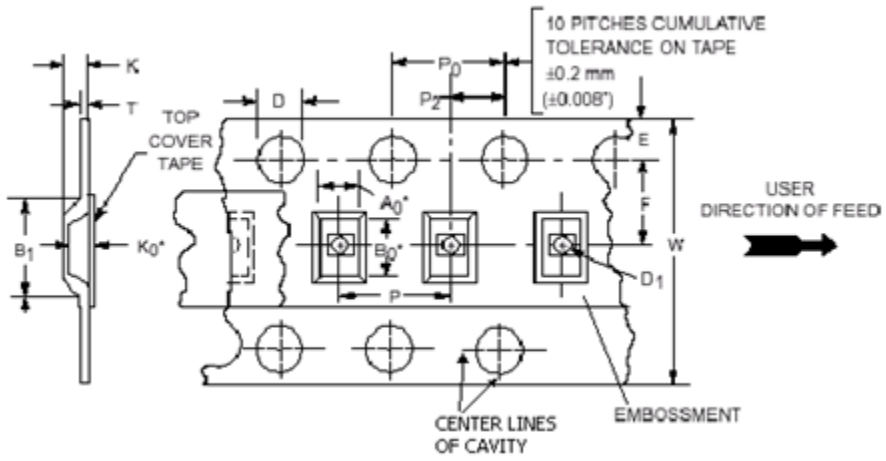


Figure 7 – Temperature profile.

6. PACKAGING

The FracFM™ chip antenna is available in tape and reel packaging.

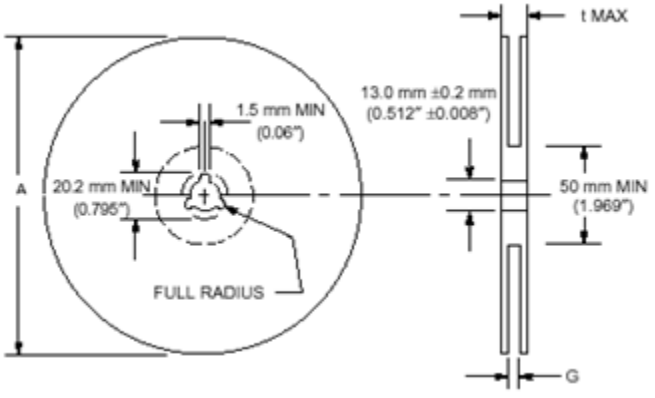


Measure	mm
W	44.0
A0	12.8
B0	34.0
K0	2.1
B1	34.0 max
D	1.6
D1	2.1 min
Wmax	44.3
E	1.6
F	19.8
K	2.4 max
P	16.0
P0	4.5
P2	2.0

Tolerance: ±0.2 mm

Figure 8 – Tape Dimensions.

Figure 9 – Image of the tape.



Measure	mm
A max	330.0
G	44.4
t max	49.8

Tolerance: ±0.2 mm

Reel Capacity: 1800 antennas

Figure 10 – Reel Dimensions and Capacity.

Mouser Electronics

Authorized Distributor

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Ignion:
EB_FR01-B3-W-0-055