i-FlexPIFA™ Mini Series 2400-2480 MHz

Mini Inverted Flexible PIFA Antenna

Datasheet *v2.0*

1 Features and Benefits

- Quick and easy installation
- Smallest form factor i-FlexPIFA™
- Adhesive holds to surface during humidity exposure and hot/cold cycles
- RoHS-compliant
- Radiation direction maximized on adhesive side for outward-facing orientation
- Patent Number: 9450307
- Can be installed in the following ways:
  - On different non-conductive surfaces and thicknesses
  - On flat or curved surfaces
  - MIMO array element
  - On the front or top face of an enclosure interior (alternative placement to FlexPIFA)

Specifications	
Frequency (MHz)	2400 - 2480
Peak Gain (dBi)	+2.0
Average Efficiency (dB)	> -2.5
VSWR (MHz)	< 2.5:1
Impedance (Ω)	50
Polarization	Linear

Mechanical Specifications	
Antenna Type	Inverted Ground Flexible Planar Inverted F Antenna (i-FlexPIFA)
Dimensions – mm (inches)	35.9 x 11.0 x 2.9 (1.41 x 0.43 x 0.114)
Weight – g (oz.)	1.10 (0.039)
Color	Clear yellow
Adhesive	3M 100MP
Connector Mating Height (max) – mm	MHF1 (U.FL) 2.5 MHF4L 1.4

Environmental Specifications	
Operating Temperature – °C (°F)	-40 to +85°C (-40 to +185°F)
Material Substance Compliance	RoHS

2 Configuration

Part Number	Cable Length	Connector
EFG2401A3S-10MHF1	100 mm	MHF1
EFG2401A3S-10MH4L	100 mm	MHF4L

Note: Specifications are based on the 100mm cable length, standard antenna version with MHF1 / U.FL connector. Varying the cable length or type or connector will cause variations in these antenna specifications.

3 Mechanical Drawing

3.1 Physical Dimensions (in mm) of the EFG2401A with a 100mm Long Cable

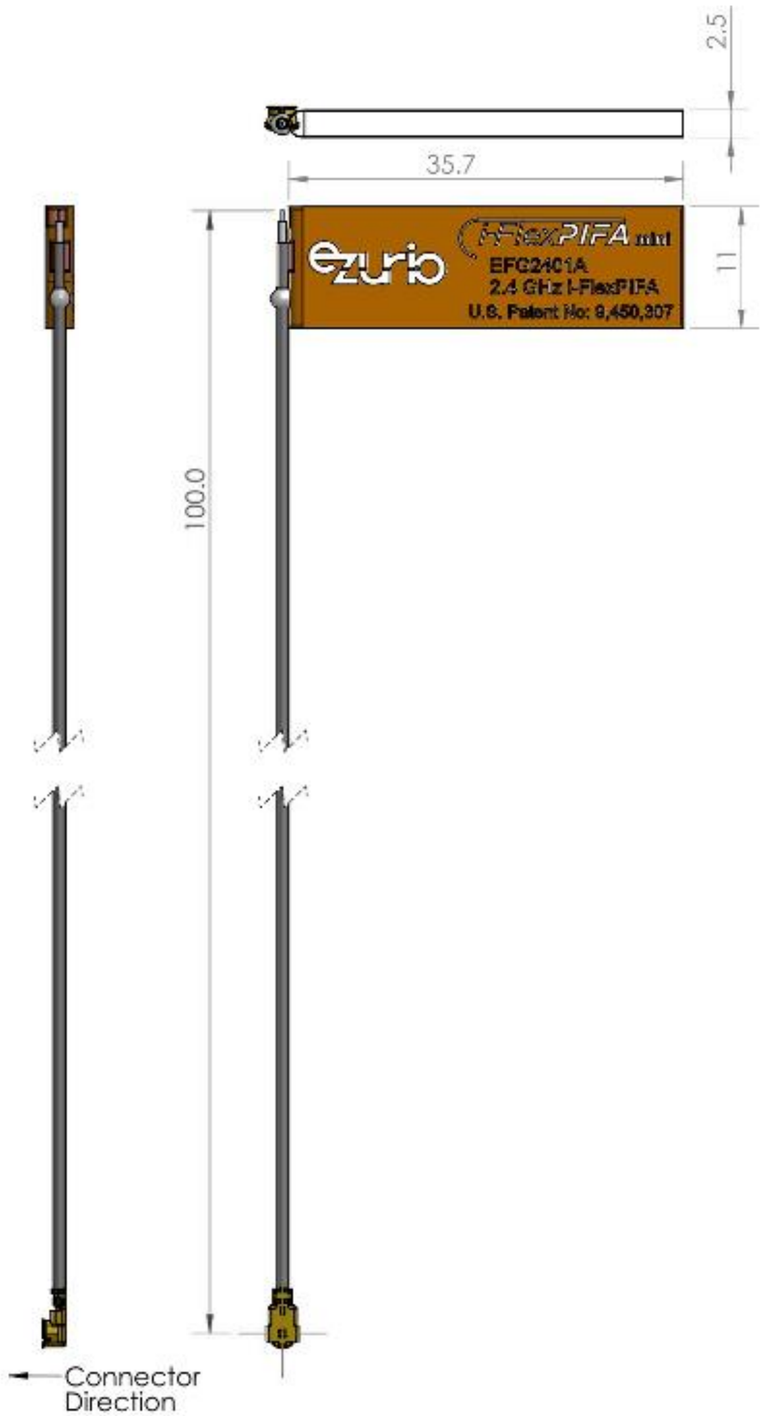


Figure 1: i-FlexPIFA$_{mini}$ mechanical drawing of EFG2401A Antenna

4 Flat Surface Antenna Measurements

Flat surface measurements were performed with the antenna centered on a 1.6 mm-thick plate of polycarbonate.

4.1 VSWR

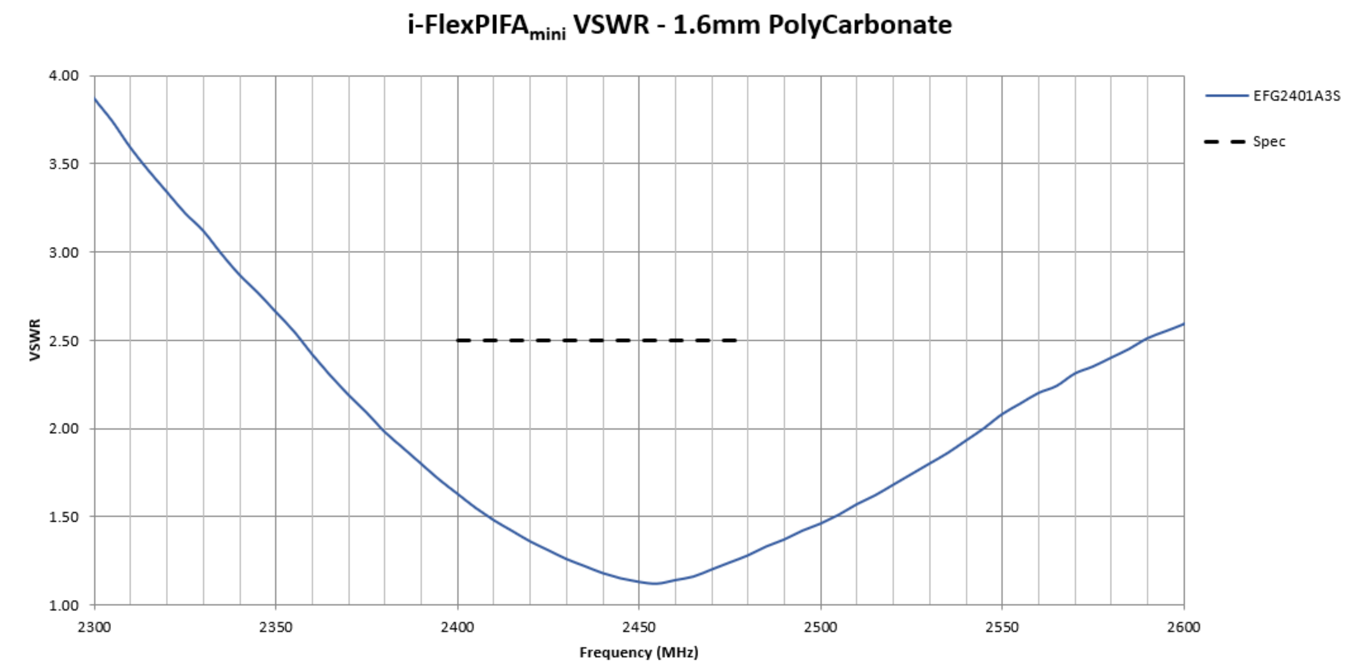


Figure 2: Antenna VSWR measured on a 1.6 mm-thick plate of polycarbonate with a nominal value of 1.27 across the operating frequency

4.2 RETURN LOSS

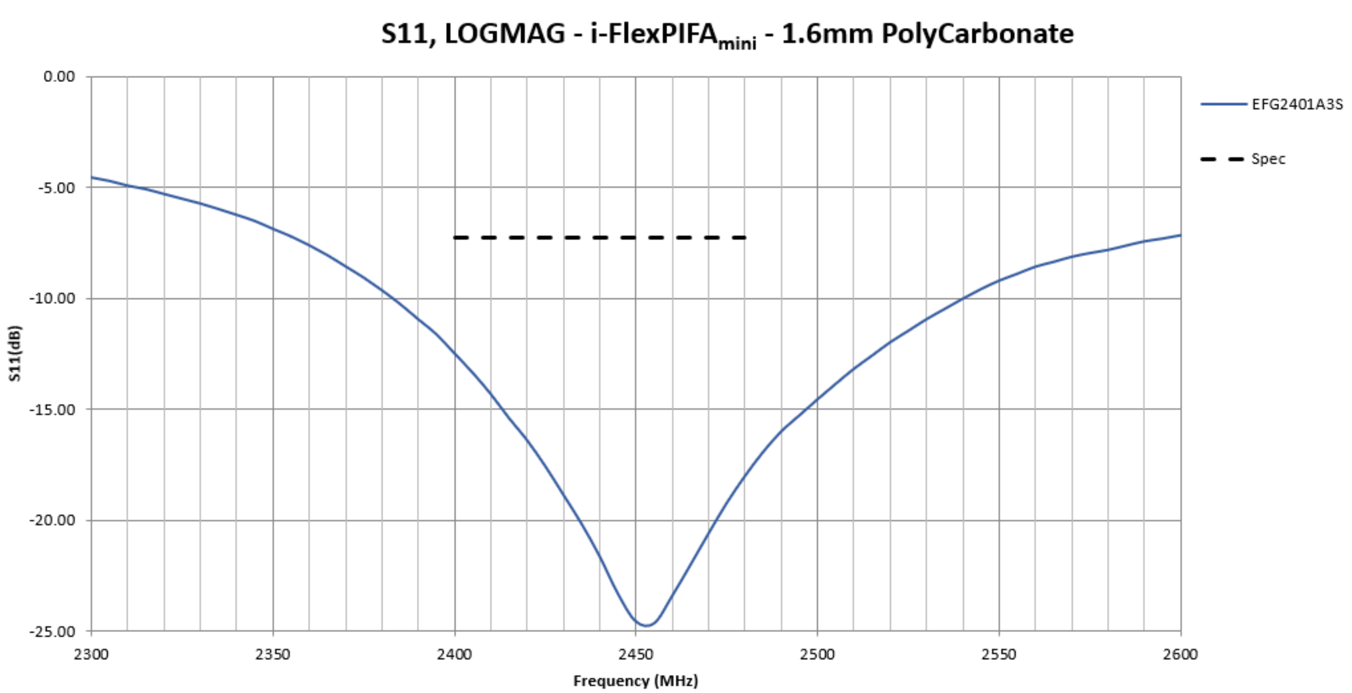


Figure 3: Antenna Return Loss measured on a 1.6 mm-thick plate of polycarbonate with a nominal value of -17.6dB across the operating frequency

5 Antenna Chamber Test Setup

Antenna measurements such as VSWR and S11 were measured with an Agilent E5071C vector network analyzer. Radiation patterns were measured with a Rohde & Schwarz ZNB8-4PORT vector network analyzer in a Howland Company 3100 chamber equivalent. Phase center is nine inches above the Phi positioner.

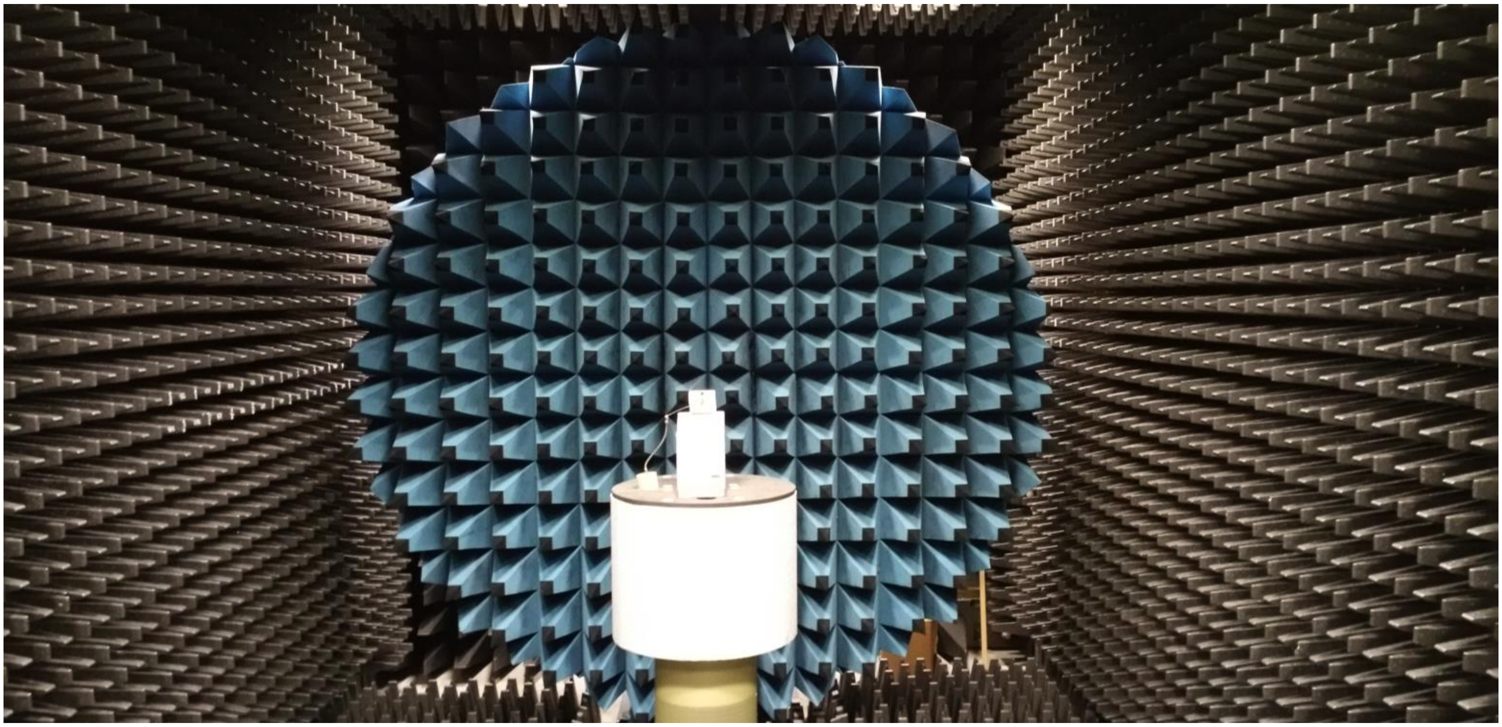


Figure 4: Howland Company 3100 Antenna chamber

6 Antenna Radiation Performance

6.1 FlexPIFA centered on a 1.6 mm-thick plate of polycarbonate

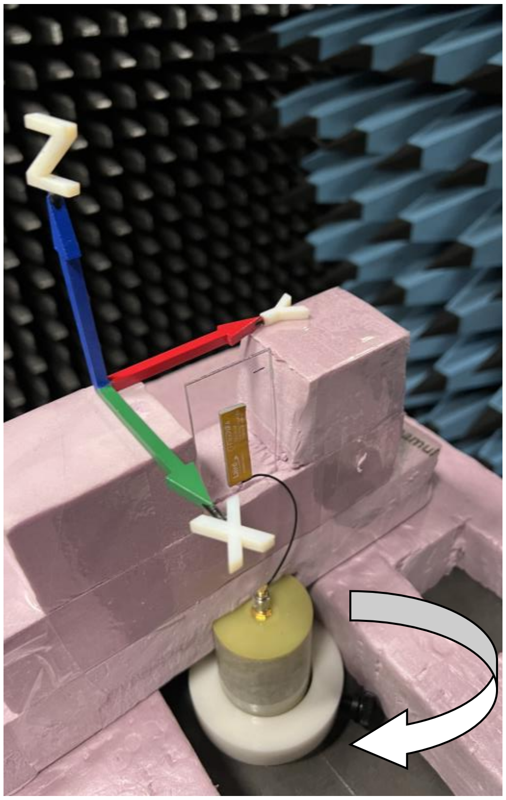
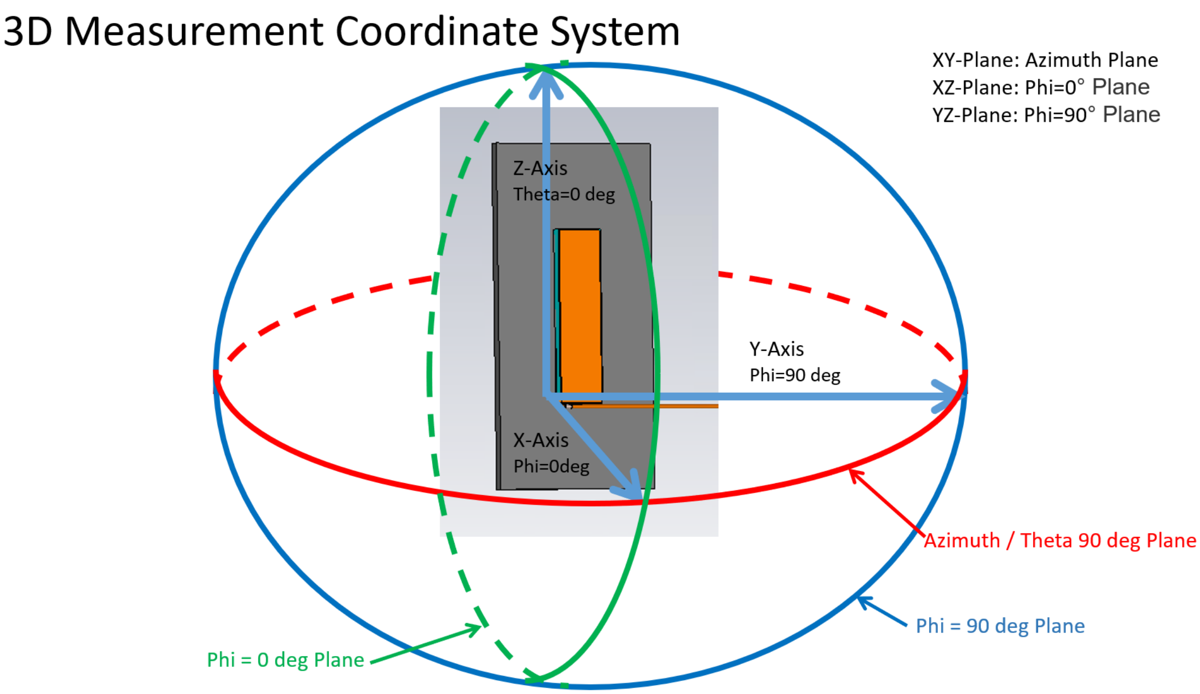
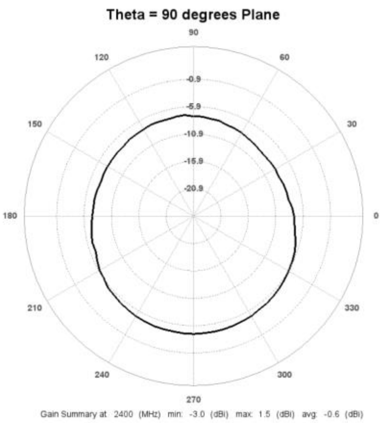


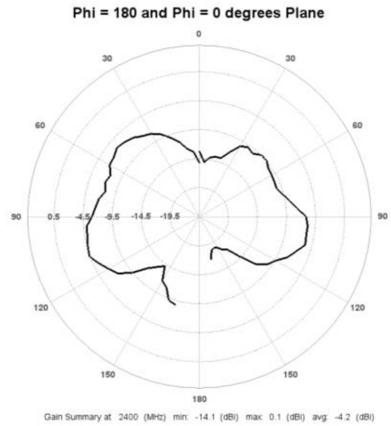
Figure 5: Flat surface setup

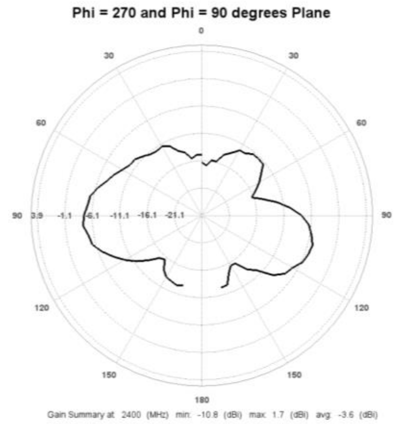


6.2 Radiation Patterns – 2D Plots

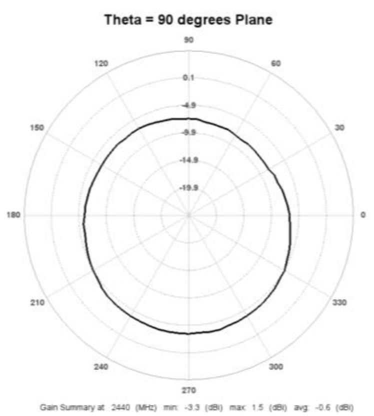
6.2.1 2D Plots at 2400 MHz

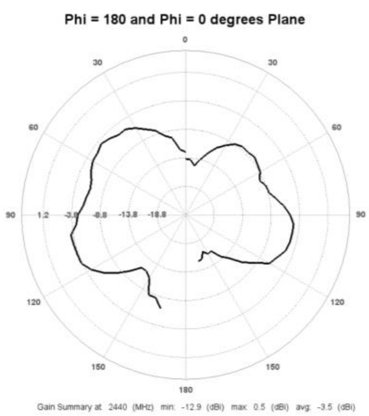


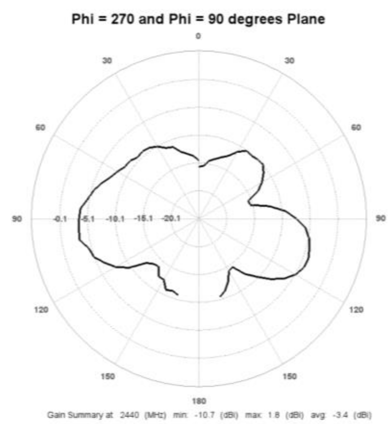




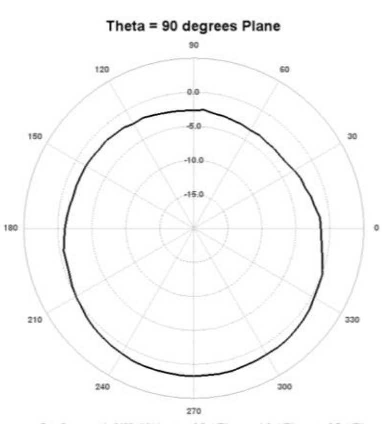
6.2.2 2D Plots at 2440 MHz

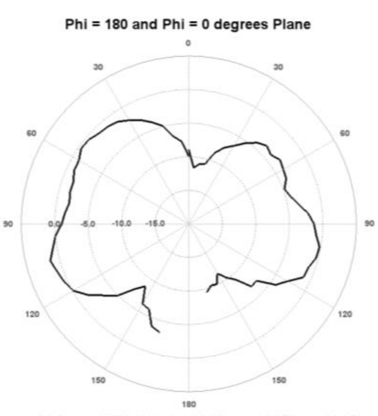


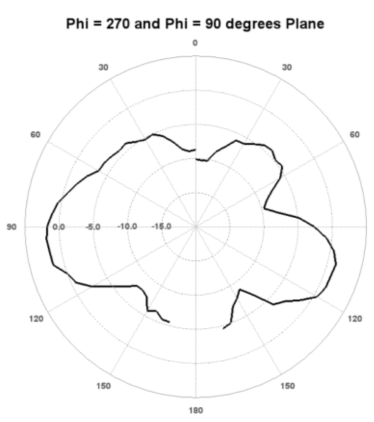




6.2.3 2D Plots at 2480 MHz







6.3 Radiation Patterns – 3D Plots

6.3.1 3D Plots at 2400 MHz

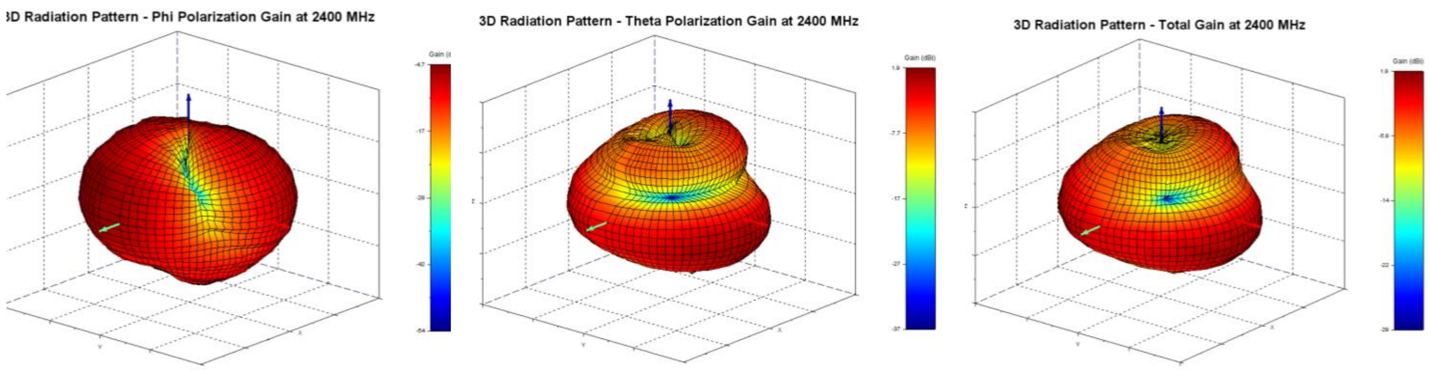


Figure 6: Phi polarization, Theta polarization and, and total gain plots – 2400 MHz

6.3.2 3D Plots at 2440 MHz

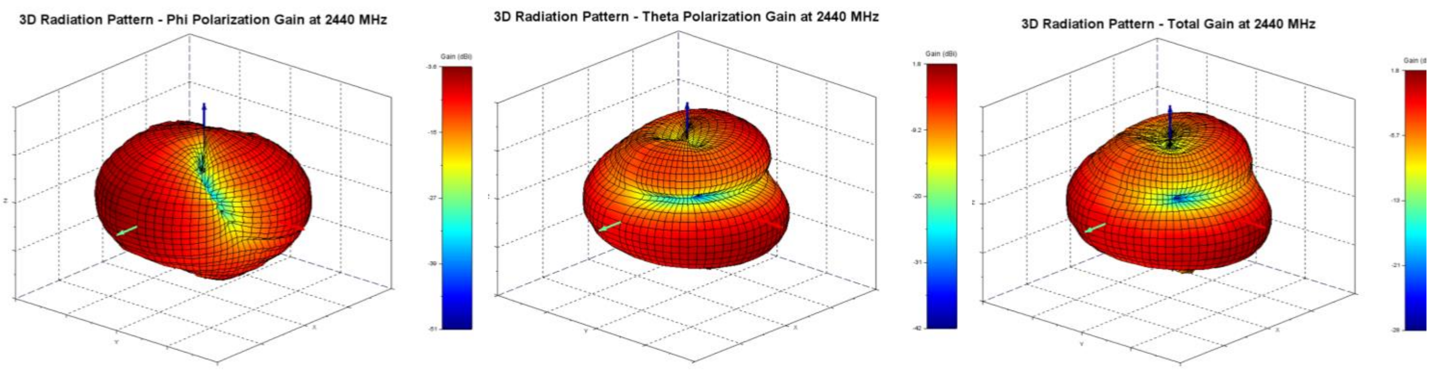


Figure 7: Phi polarization, Theta polarization and, and total gain plots – 2440 MHz

6.3.3 3D Plots at 2480 MHz

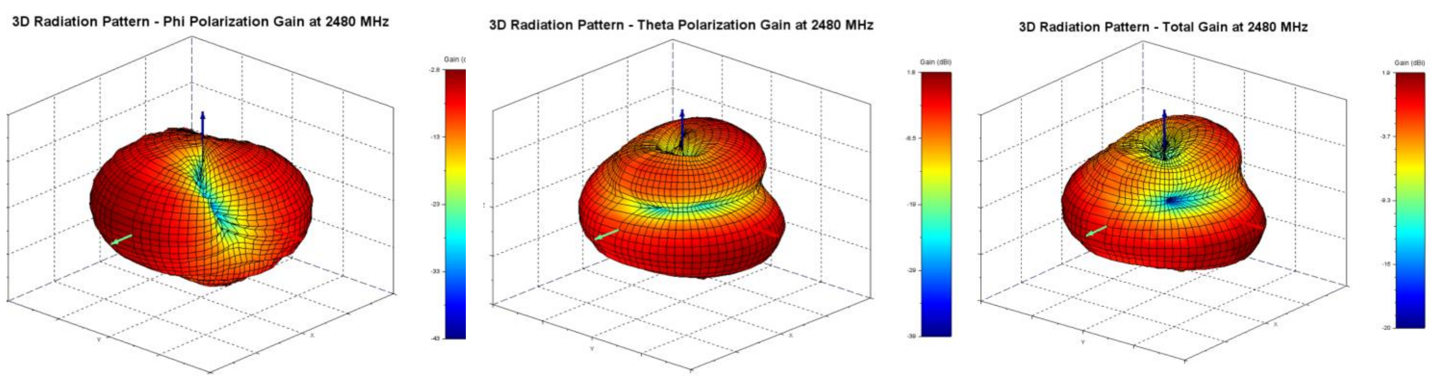


Figure 8: Phi polarization, Theta polarization and, and total gain plots – 2480 MHz

6.4 Efficiency

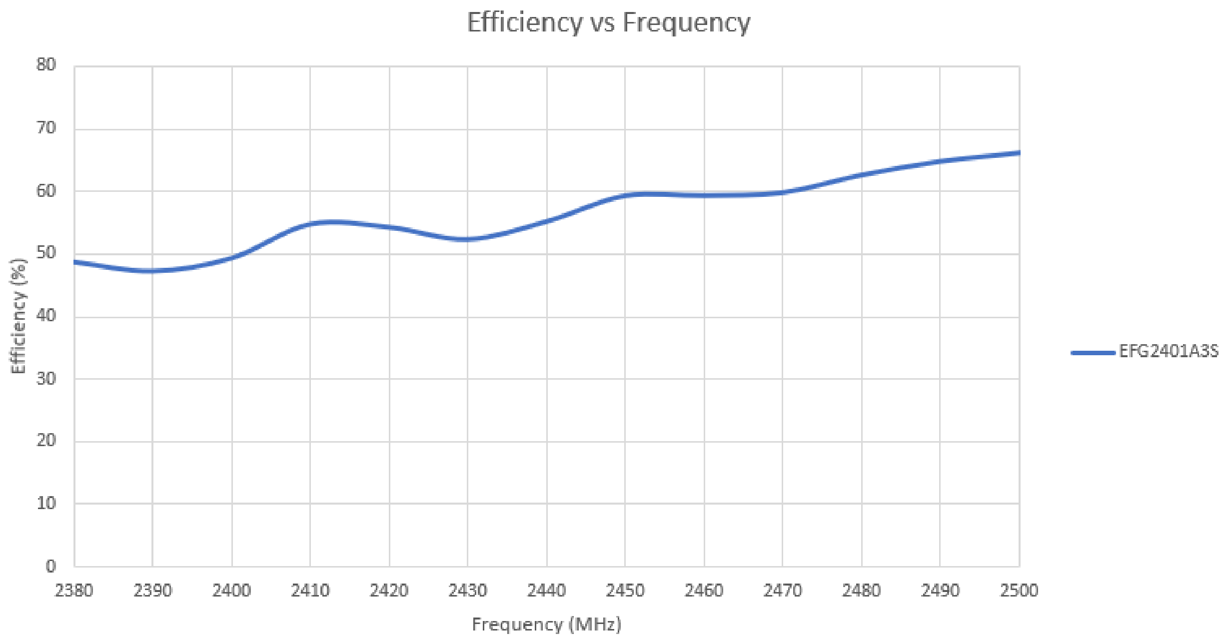


Figure 9: Antenna Efficiency measured on a 1.6 mm-thick plate of polycarbonate with a nominal value of -2.5dB across the operating frequency

6.5 Antenna Gain

Total Gain vs. Frequency (as per IEEE definition)

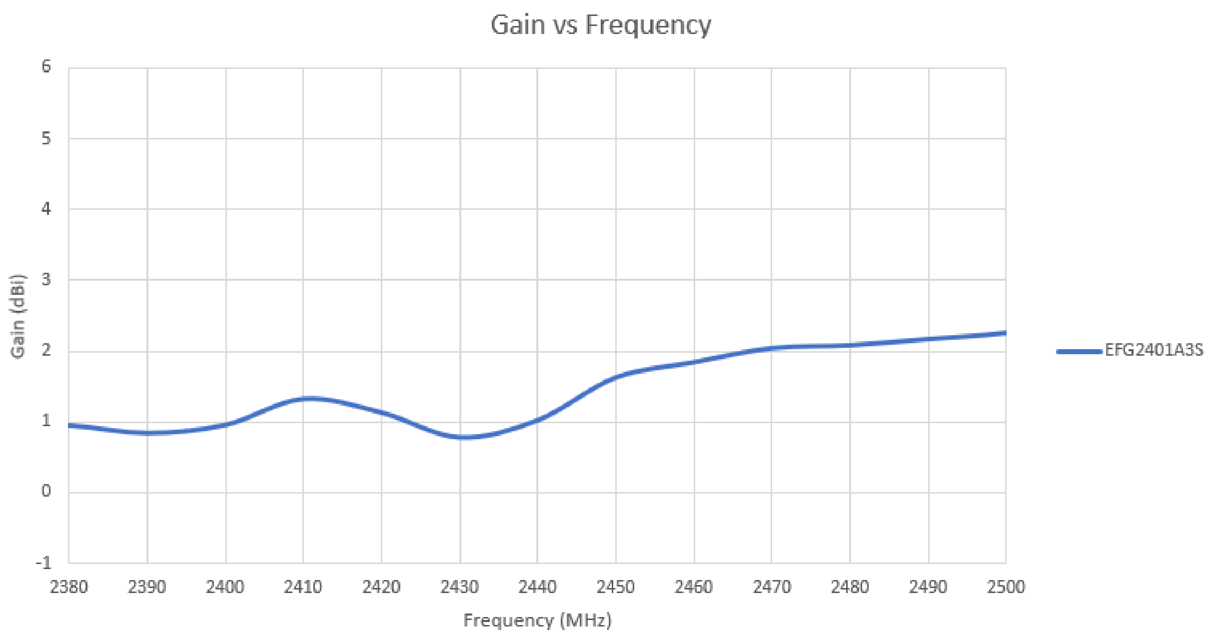
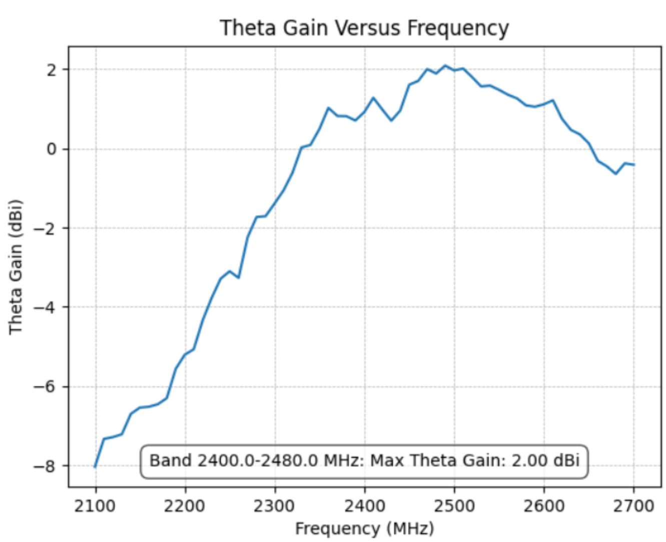


Figure 10: Antenna Gain measured on a 1.6 mm-thick plate of polycarbonate with a nominal value of 1.4dBi across the operating frequency

Peak Gain from Theta and Phi Polarization vs. Frequency



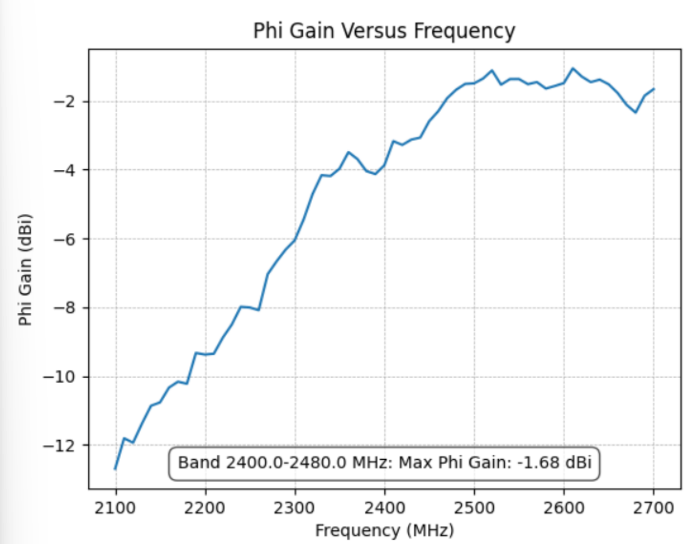


Figure 11: Peak Theta Polarization Gain and Phi Polarization Gain vs Frequency, measured on a 1.6mm-thick plate of polycarbonate

7 Antenna Placement & Keep Out Region

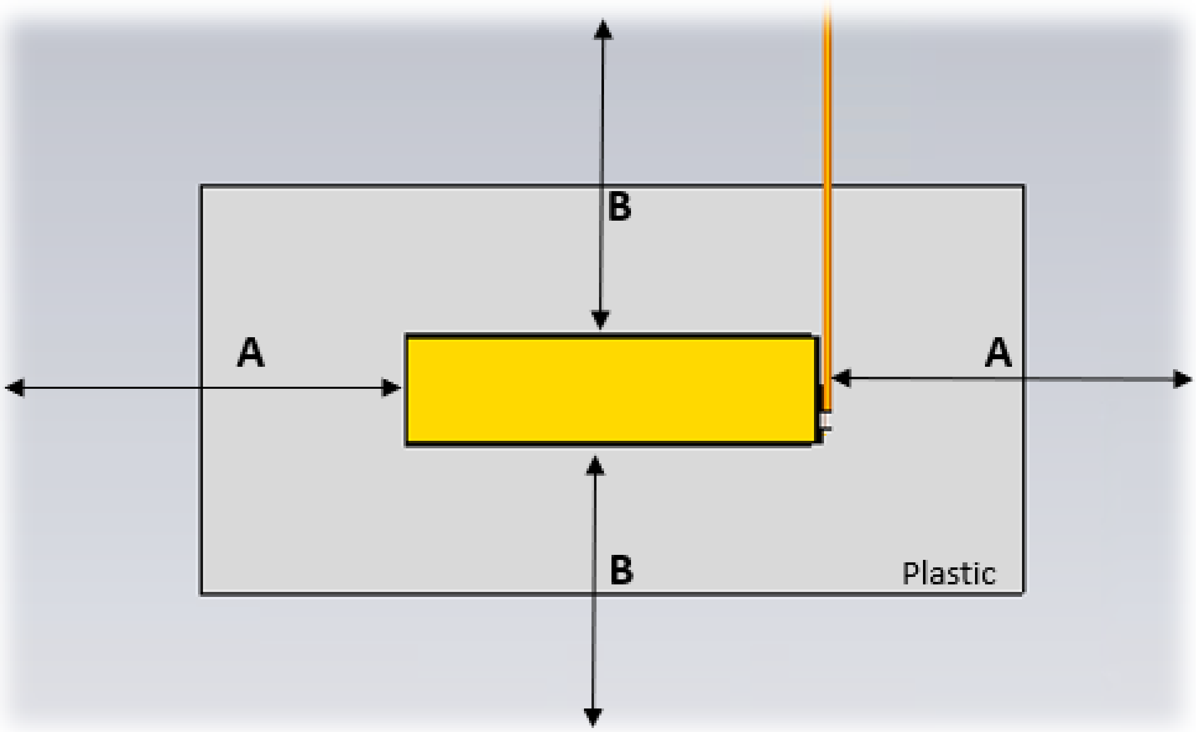
7.1 Antenna Placement

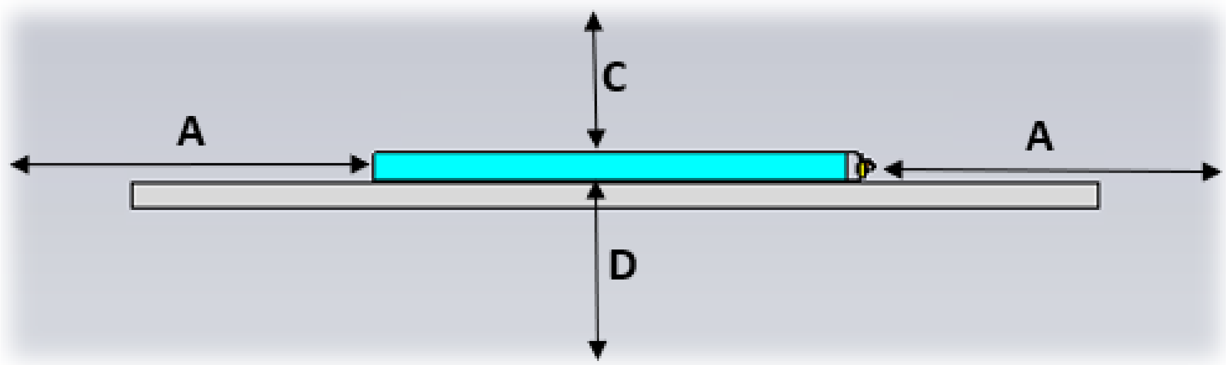
The i-FlexPIFA is designed to be attached to dielectric surfaces encountered in plastic packaging of wireless communications devices. The nominal attachment surface used in its design and characterization is an 80 mm x 40 mm, 1.6-millimeter thick, Polycarbonate sheet.

The VSWR of the i-FlexPIFA$_{mini}$ is shown below for the following materials and thicknesses **outside** of these specifications:

2.4GHz i-FlexPIFA$_{mini}$		
Material	thickness(mm)	Max VSWR
Polycarbonate	1.0	2.5
Polycarbonate	1.6	1.6
Polycarbonate	3.1	2.1
Polycarbonate	6.1	2.8
ABS	1.6	1.6
ABS	3.3	1.9
Nylon	1.6	1.4
Nylon	3.2	2.4
Acrylic	1.5	1.7
Acrylic	3.0	2.0
Delrin	1.6	1.6
Delrin	3.1	2.4
FR4	0.8	1.6
FR4	1.6	2.6
PETG	1.4	1.6
PETG	2.8	2.1
Polypropylene	1.6	2.1
Polypropylene	3.2	1.5
Polyetherimide	1.6	1.6
Polyetherimide	3.3	2.5
PVC Tube OD 61mm	4.5	2.9
PVC Tube ID 52mm	4.5	1.5

7.2 Antenna Conductive Material Keep Out Region





Keep Out Region Distance (mm)			
A	B	C	D
5	5	3	10

Notes:

- Antenna is designed to be mounted on polycarbonate with a nominal thickness of 2.25mm (1.5mm - 3mm)
- Diagram is not to scale

8 Product Labeling History

Rev 2.0 - Initial Production Release

9 Revision History

Version	Date	Notes	Approver
0.1	16 Nov 2023	Preliminary Release	Adam Engelbrecht
1.0	8 Apr 2024	Initial Release	Adam Engelbrecht
2.0	14 Aug 2024	Ezurio rebranding	Dave Drogowski

10 Additional Information

Please contact your local sales representative or our support team for further assistance:

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Technical Support	http://www.ezurio.com/resources/support
Sales Contact	http://www.ezurio.com/contact

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