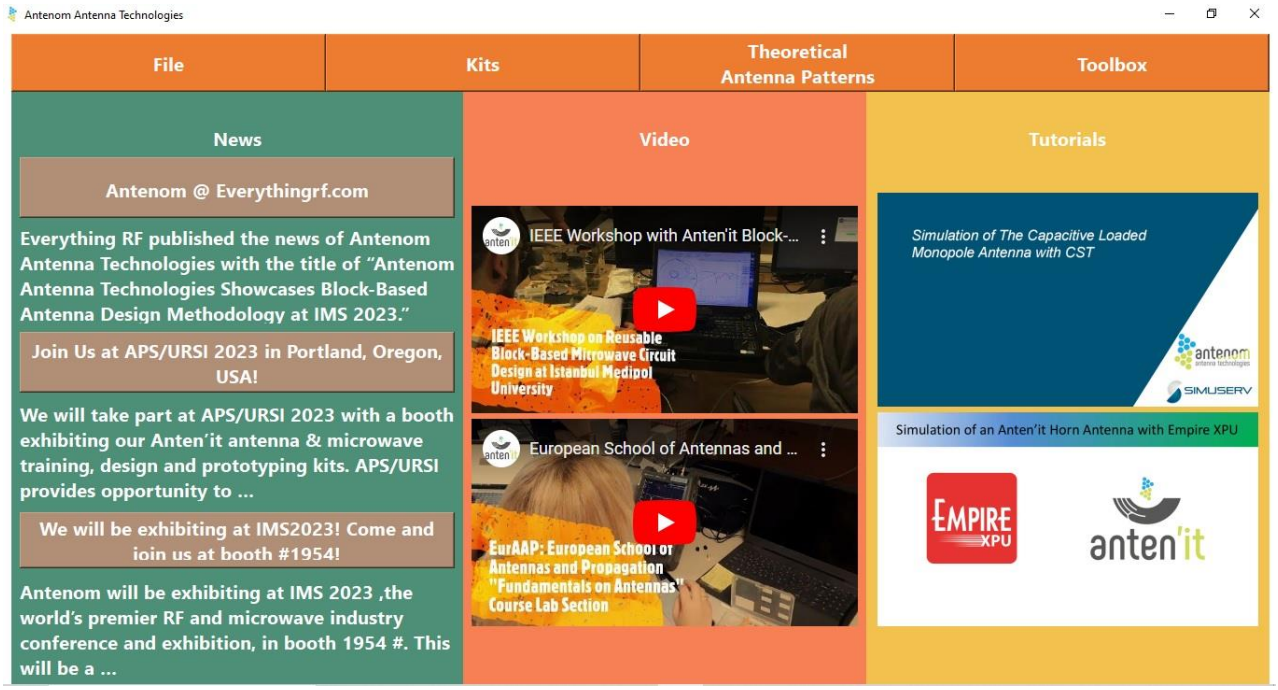
1. MAIN PAGE OF ANTEN'IT LIBRARY SOFTWARE

On the home page of Anten'it Library Software you can see the latest news about our company and Anten'it products, as well as the events we participate in and organize. You can have advance information about the exhibitions we have announced that we will attend.



2. WHAT ARE ANTEN'IT KITS ?

There are 8 different kits in the Anten'it product family. These are basically training kits and design & prototyping kits.

Antenna / Microwave Training Kits include experiment boxes and experiment sheets for each antenna or microwave component type.

Antenna / Microwave Research Kits are the academic version of the Antenna/Microwave Design and Prototyping Kits. These kits are organized as metal blocks, 3 different types of dielectric blocks with 2.6, 4.4 and 8 dielectric constants, electromagnetic absorber blocks, ground planes and connectors. You can assemble the blocks by hand and build your structures. You can also iterate your design easily.

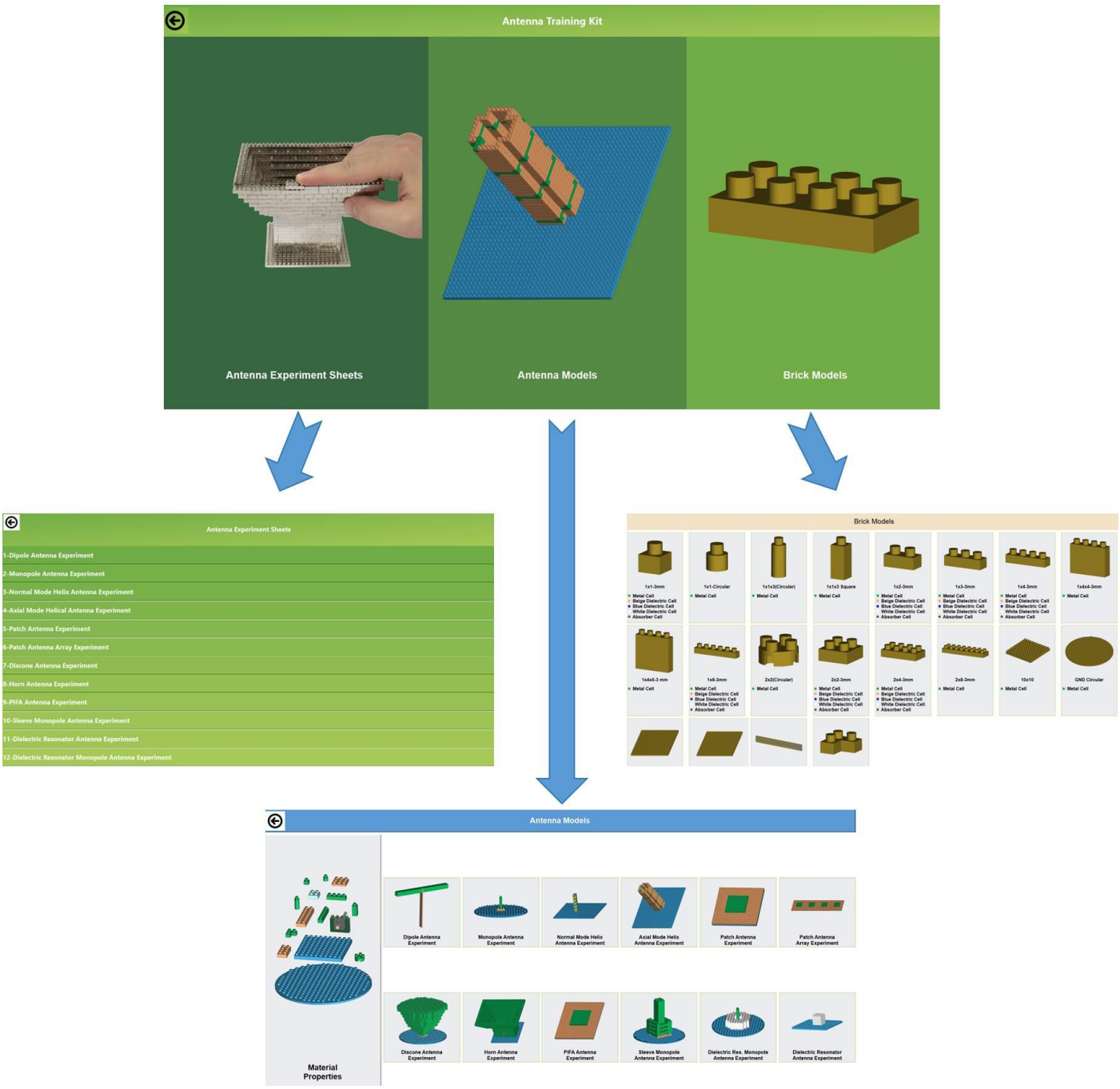
Anten'it Multi-Antenna/Microwave Kits are for system engineers or researchers who are not antenna/microwave engineers but are users. You can find the appropriate antenna/microwave components for their application, follow the building instructions and build the antenna/microwave. After finishing the work, you can disassemble the blocks and make them ready for another project.

2.1. Anten’it Antenna Training Kit

Anten’it Antenna Training Kit consists of 12 different antenna design experiments. These experiments are shown in Table 1.

Table 1. Antenna Experiments

1. Dipole Antenna Experiment
2. Monopole Antenna Experiment
3. Normal Mode Helix Antenna Experiment
4. Axial Mode Helical Antenna Experiment
5. Patch Antenna Experiment
6. Patch Antenna Array Experiment
7. Discone Antenna Experiment
8. Horn Antenna Experiment
9. PIFA Antenna Experiment
10. Sleeve Monopole Antenna Experiment
11. Dielectric Resonator Antenna Experiment
12. Dielectric Resonator Monopole Antenna Experiment



You can access all documents related to antenna experiments under the title "Antenna Experiment Sheets".

You can click on "Antenna Models", download all 3D CAD files in STEP format or CST Studio models or IMST Empire XPU models of these experiments. You can import the 3D CAD files into any simulation software and simulate the antennas. In this case, you need to use "Material Properties", assign ports and do the simulation settings.

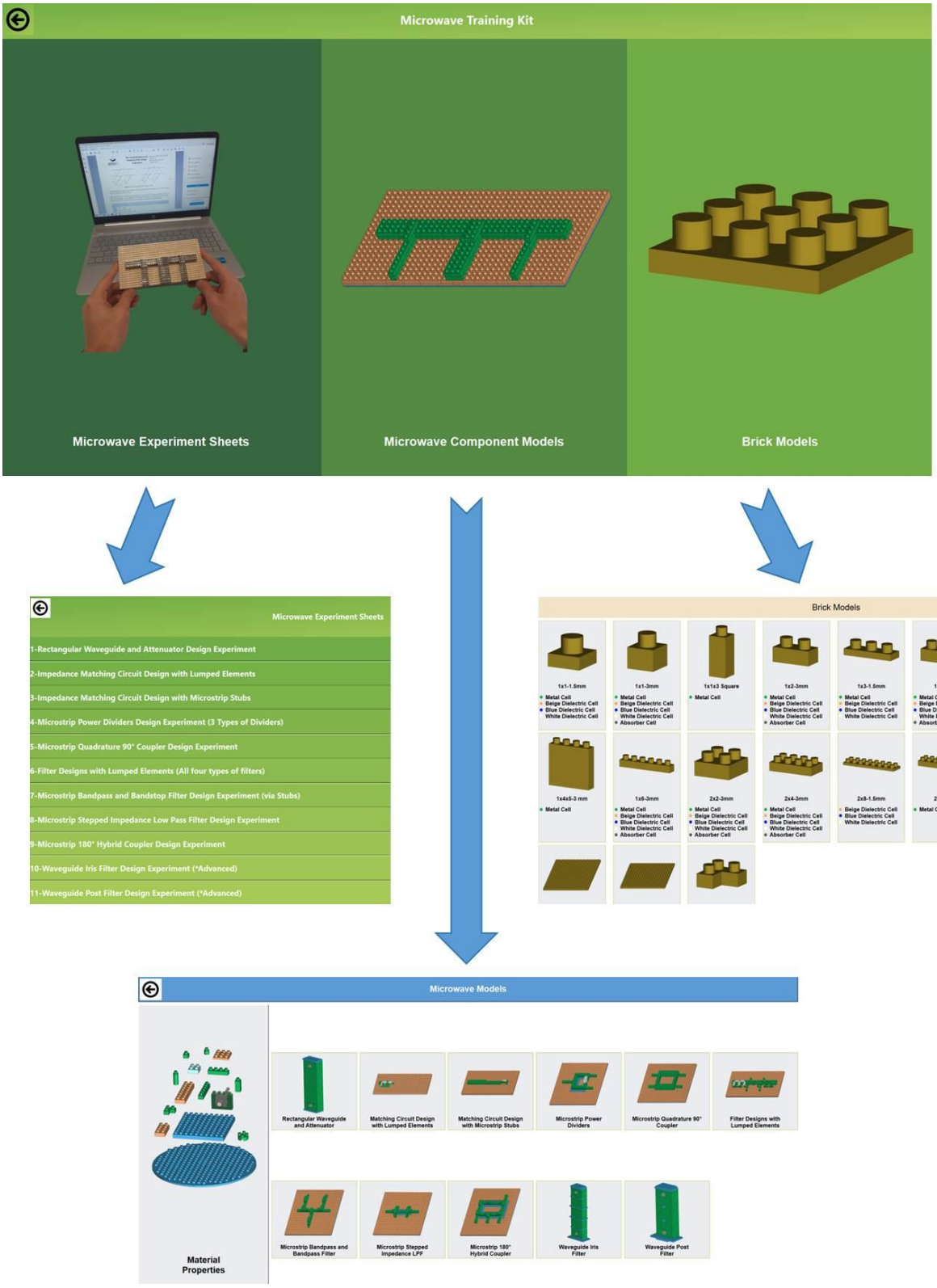
In "Brick Models", you can access all the blocks used in Anten'it Antenna Training Kit and download their STEP files to view their 3D models. If you want to build a novel structure, you can use the block models directly.

2.2. Anten'it Microwave Training Kit

Anten'it Microwave Training Kit consists of 11 different microwave component design experiments. These are microstrip and waveguide components. These experiments are shown in Table 1.

Table 2. Microwave Experiments

1. Rectangular Waveguide and Attenuator Design Experiment
2. Impedance Matching Circuit Design with Lumped Elements
3. Impedance Matching Circuit Design with Microstrip Stubs
4. Microstrip Power Dividers Design Experiment
5. Microstrip Quadrature 90° Coupler Design Experiment
6. Filter Designs with Lumped Elements
7. Microstrip Bandpass and Bandstop Filter Design Experiment
8. Microstrip Stepped Impedance Low Pass Filter Design Experiment
9. Microstrip 180° Hybrid Coupler Design Experiment
10. Waveguide Iris Filter Design Experiment
11. Waveguide Post Filter Design Experiment



You can access all documents related to microwave experiments under the title "Microwave Experiment Sheets".

You can click on "Microwave Component Models", download all 3D CAD files in STEP format or CST Studio models or IMST Empire XPU models of these experiments. You can import the 3D CAD files into any simulation software and simulate the microwave components. In this case, you need to use "Material Properties", assign ports and do the simulation settings.

In "Brick Models", you can access all the blocks used in Anten'it Microwave Training Kit and download their STEP files to view their 3D models. If you want to build a novel structure, you can use the block models directly.

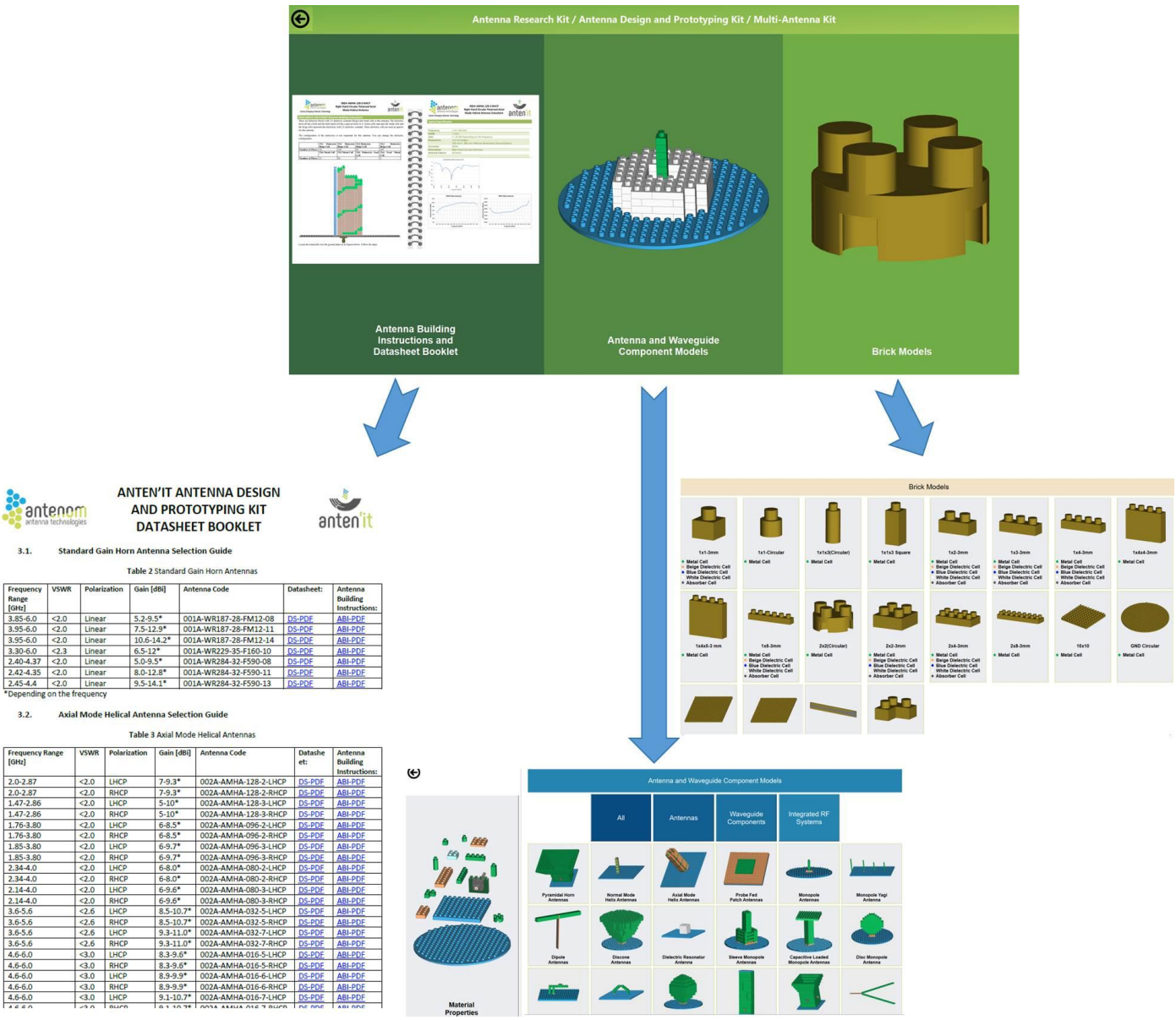
2.3. Anten'it Antenna Research Kit / Anten'it Antenna Design and Prototyping Kit / Multi-Antenna Kit

There are 18 antenna types, 6 waveguide component types and an integrated model (a waveguide component and two antennas together) in the Anten'it Library Software which can be built with Anten'it Antenna Research Kit and Anten'it Antenna Design and Prototyping Kit. They are shown in Table 3.

The number of antennas, antenna and waveguide component types will increase in the next versions.

Table 3. Antenna and Waveguide Component Models

1. Pyramidal Horn Antennas
2. Normal Mode Helix Antennas
3. Axial Mode Helix Antennas
4. Probe Fed Patch Antennas
5. Monopole Antennas
6. Monopole Yagi Antenna
7. Dipole Antennas
8. Discone Antennas
9. Dielectric Resonator Antennas
10. Sleeve Monopole Antennas
11. Capacitive Loaded Monopole Antennas
12. Disc Monopole Antenna
13. Inverted-F Antenna
14. Loop Antenna
15. Monocone Antenna
16. Slotted Waveguide Antenna
17. Square Horn Antenna
18. Vee Dipole Antenna
19. Monopulse Horn Antenna
20. Waveguides
21. Waveguide Filters
22. Waveguide Directional Coupler
23. Waveguide Power Divider
24. Waveguide Magic Tee
25. Waveguide Absorber



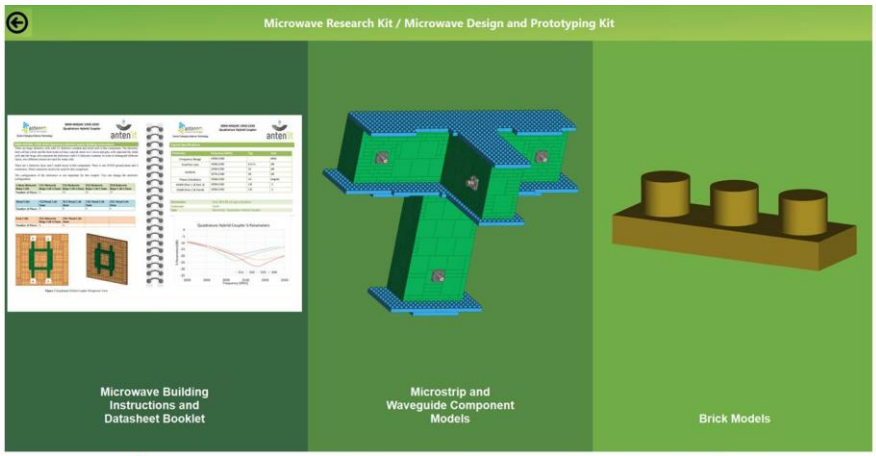
2.4. Anten'it Microwave Research Kit / Anten'it Microwave Design and Prototyping Kit / Multi-Microwave Kit

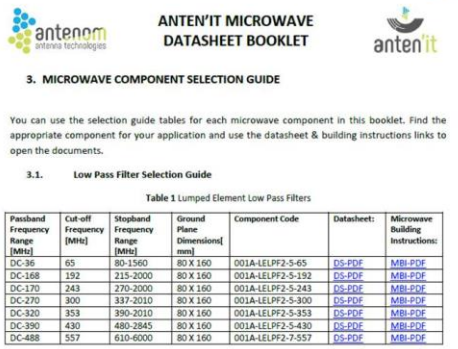
There are 12 microstrip component types, 6 waveguide component types and an integrated model (a waveguide component and two antennas together) in the Anten'it Library Software which can be built with Anten'it Microwave Research Kit, Anten'it Microwave Design and Prototyping Kit and Multi-Microwave Kit. They are shown in Table 4. The number of microwave components and the component types will increase in the next versions.

Table 4. Microwave Component Models

1. Lumped Element Low Pass Filters
2. Stepped Impedance Low Pass Filters
3. Lumped Element High Pass Filters
4. Microstrip Stub High Pass Filters

5. Lumped Element Band Pass Filters
6. Microstrip Stub Band Pass Filters
7. Lumped Element Band Stop Filters
8. Microstrip Stub Band Stop Filters
9. Microstrip Quadrature 90° Couplers
10. Microstrip 180° Hybrid Couplers
11. Microstrip Directional Couplers
12. Microstrip Wilkinson Power Dividers
13. Monopulse Horn Antenna
14. Waveguides
15. Waveguide Filters
16. Waveguide Directional Coupler
17. Waveguide Power Divider
18. Waveguide Magic Tee
19. Waveguide Absorber




ANTEN'IT MICROWAVE DATASHEET BOOKLET

3. MICROWAVE COMPONENT SELECTION GUIDE

You can use the selection guide tables for each microwave component in this booklet. Find the appropriate component for your application and use the datasheet & building instructions links to open the documents.

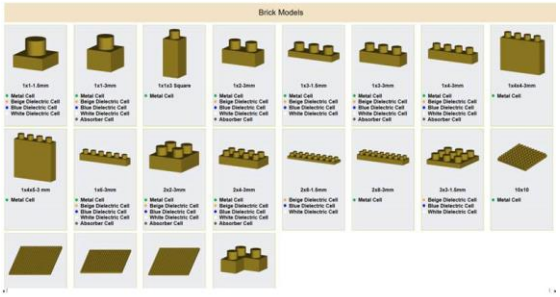
3.1. Low Pass Filter Selection Guide

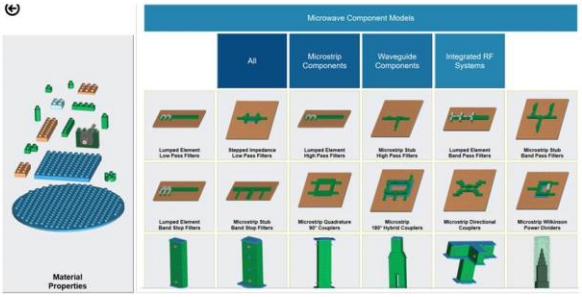
Table 1 Lumped Element Low Pass Filters

Passband Frequency Range [MHz]	Cut-off Frequency [MHz]	Stopband Frequency Range [MHz]	Ground Plane Dimensions[mm]	Component Code	Datasheet:	Microwave Building Instructions:
DC-36	65	80-1560	80 X 160	001A-LELPF2-5-65	DS-PDF	MBI-PDF
DC-168	192	215-2000	80 X 160	001A-LELPF2-5-192	DS-PDF	MBI-PDF
DC-170	243	270-2000	80 X 160	001A-LELPF2-5-243	DS-PDF	MBI-PDF
DC-270	300	337-2010	80 X 160	001A-LELPF2-5-300	DS-PDF	MBI-PDF
DC-320	353	390-2010	80 X 160	001A-LELPF2-5-353	DS-PDF	MBI-PDF
DC-390	430	480-2845	80 X 160	001A-LELPF2-5-430	DS-PDF	MBI-PDF
DC-488	557	610-6000	80 X 160	001A-LELPF2-7-557	DS-PDF	MBI-PDF

Table 2 Microstrip Stepped Impedance Low Pass Filters

Passband Frequency Range [MHz]	Cut-off Frequency [MHz]	Stopband Frequency Range [MHz]	Ground Plane Dimensions [mm]	Component Code	Datasheet:	Microwave Building Instructions:
DC-415	515	670-1485 & 1570-2890 & 3210-6000	80 X 160	002A-MSLPF2-5-515	DS-PDF	MBI-PDF
DC-620	715	855-6000	80 X 160	002A-MSLPF2-5-715	DS-PDF	MBI-PDF
DC-735	875	1100-2190 & 2380-6000	80 X 160	002A-MSLPF2-5-875	DS-PDF	MBI-PDF
DC-970	1200	1550-4430	80 X 80	002A-MSLPF-3-1200	DS-PDF	MBI-PDF
DC-1215	1500	1965-5340	80 X 80	002A-MSLPF-3-1500	DS-PDF	MBI-PDF
DC-1125	1550	2015-6000	80 X 160	002A-MSLPF2-5-1550	DS-PDF	MBI-PDF
DC-1230	1750	2500-6000	80 X 80	002A-MSLPF-4-1750	DS-PDF	MBI-PDF
DC-1400	2050	2800-4900	80 X 80	002A-MSLPF-5-2050	DS-PDF	MBI-PDF
DC-1900	2400	3040-6000	80 X 80	002A-MSLPF-5-2400	DS-PDF	MBI-PDF
DC-1950	2650	3450-6000	80 X 80	002A-MSLPF-5-2650	DS-PDF	MBI-PDF
DC-2150	2925	3740-6000	80 X 80	002A-MSLPF-5-2925	DS-PDF	MBI-PDF
DC-2410	3300	4300-6000	80 X 80	002A-MSLPF-5-3300	DS-PDF	MBI-PDF
DC-2950	3700	4325-6000	80 X 80	002A-MSLPF-5-3700	DS-PDF	MBI-PDF
DC-3800	4100	4620-6000	80 X 80	002A-MSLPF-5-4100	DS-PDF	MBI-PDF
DC-3910	4300	5050-6000	80 X 80	002A-MSLPF-5-4300	DS-PDF	MBI-PDF

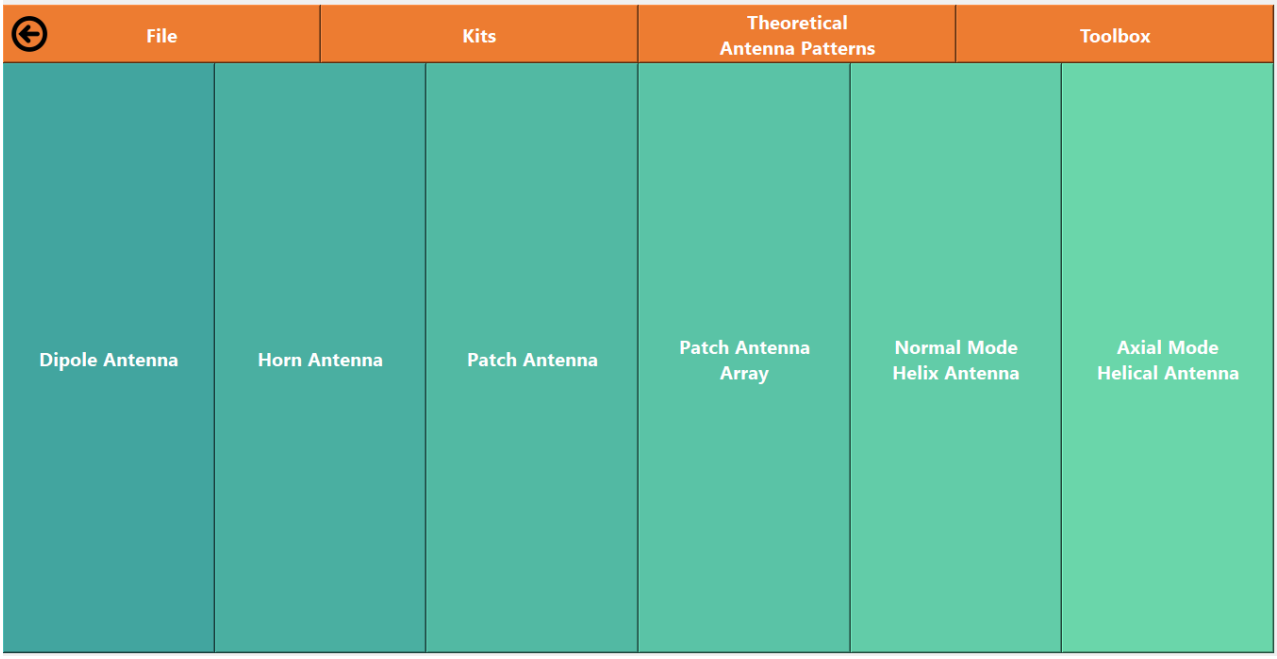




3. THEORETICAL ANTENNA PATTERNS

"Theoretical Antenna Patterns" section of the Anten'it Library Software includes Dipole, Horn, Patch, Patch Array, Normal Mode Helix, Axial Mode Helix antennas. This tool is useful for the comparison of the theory, simulation and the practice.

Students can use theoretical antenna patterns tool, compare the simulation results and experiment results and understand the essential antennas better. As engineers, we always need some basic tools to design our systems and expect some results before designing the antennas.

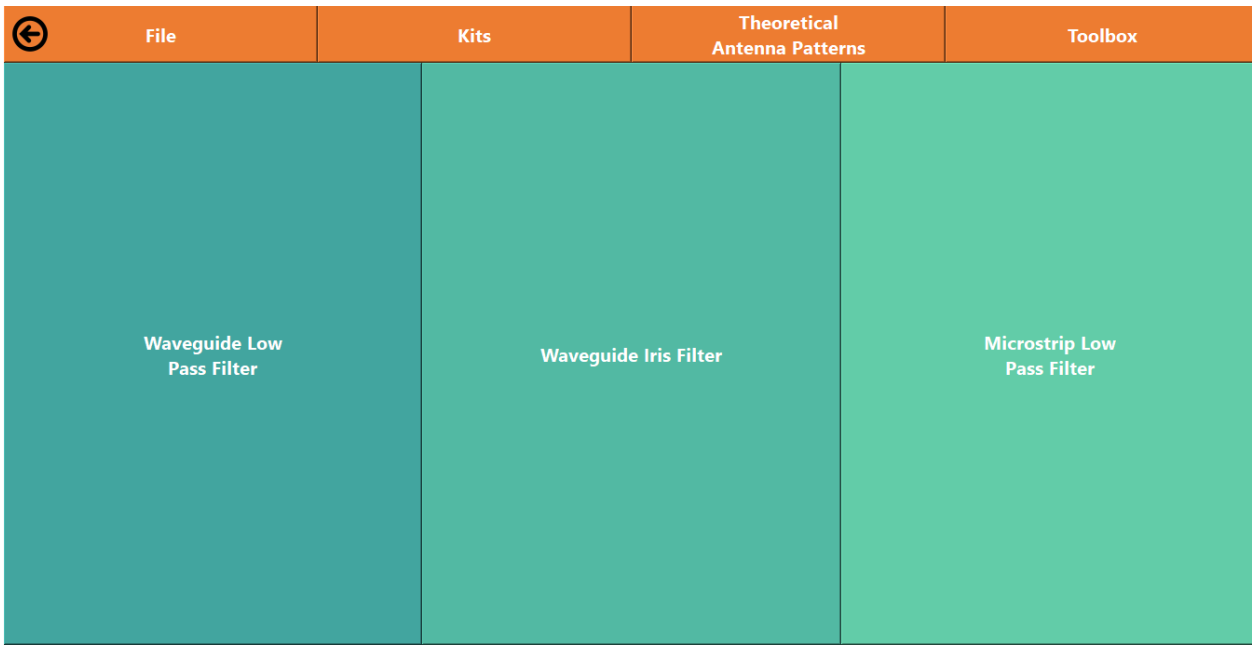


A case study is shown in the next sections of this document explaining how to use this tool.

4. TOOLBOX

The toolbox has 3 sections at the moment which are "Waveguide Low Pass Filter", "Waveguide Iris Filter Design", "Microstrip Low Pass Filter Design" tools.

Once you click on one of them, you write the inputs and get the output as a results. Instead of calculating the filter dimensions with some complex procedures, this toolbox help you to get the dimensions easily.



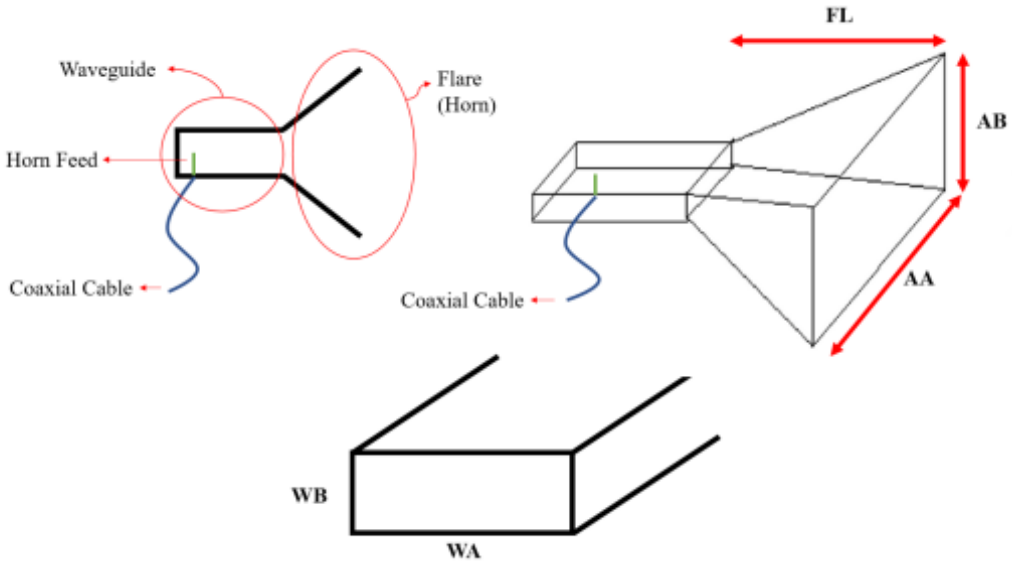
5. CASE STUDIES

There are some case studies in this section. Each of them aims to explain Anten'it Library Software.

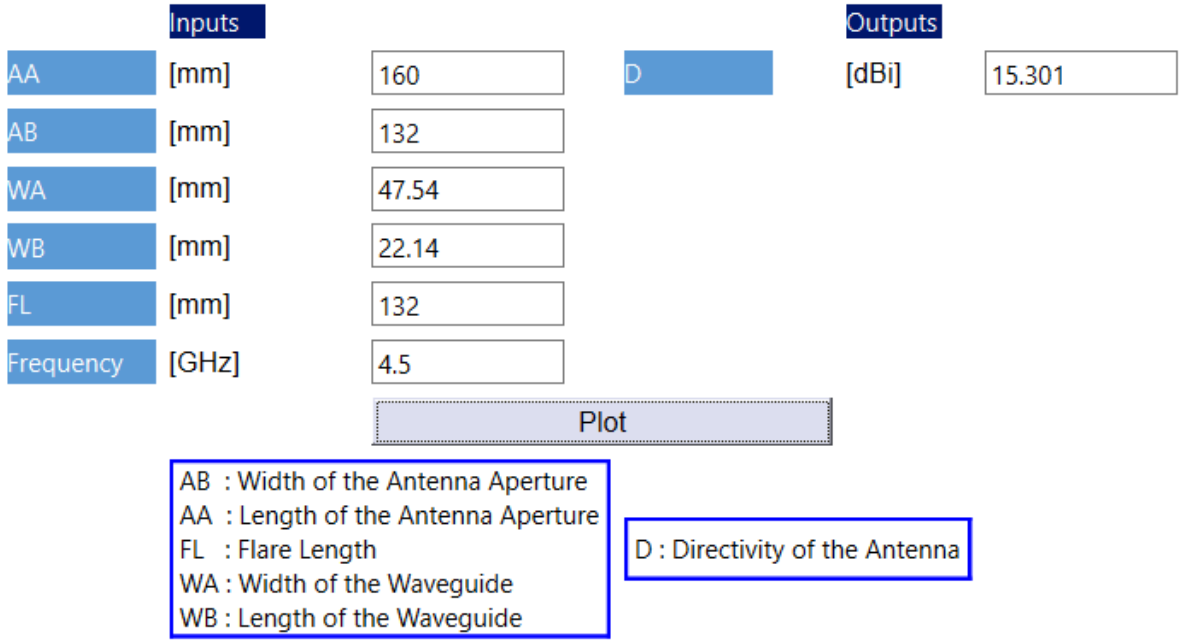
Case Study 1: Calculate the theoretical radiation pattern of a Horn Antenna

Click on Horn Antenna from the theoretical antenna patterns tool. The input parameters must be written to calculate the radiation pattern of a horn antenna. These parameters are shown below.

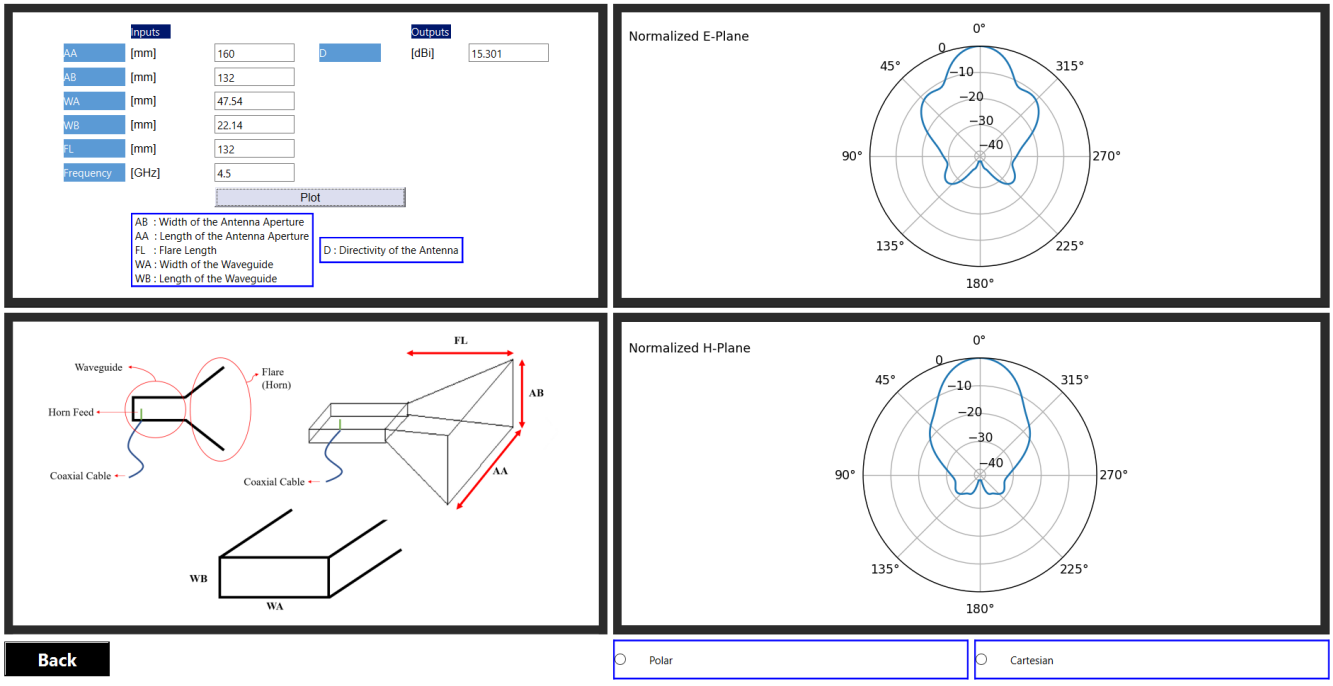
AA: Length of the Antenna Aperture
AB: Width of the Antenna Aperture
FL: Flare Length
WA: Width of the Waveguide
WB: Length of the Waveguide



The waveguide dimensions in this example, which are the size of a standard waveguide WR187, are 47.54mm x 22.14mm. The aperture dimensions of the antenna are used as 160x132mm and the flare length is used as 132mm. Therefore, we need to enter WA: 47.54mm, WB: 22.14mm, AA: 160 mm, AB: 132 mm, FL: 132mm in this tool. As a result, the 'Directivity' value is calculated as 15.301 dBi.

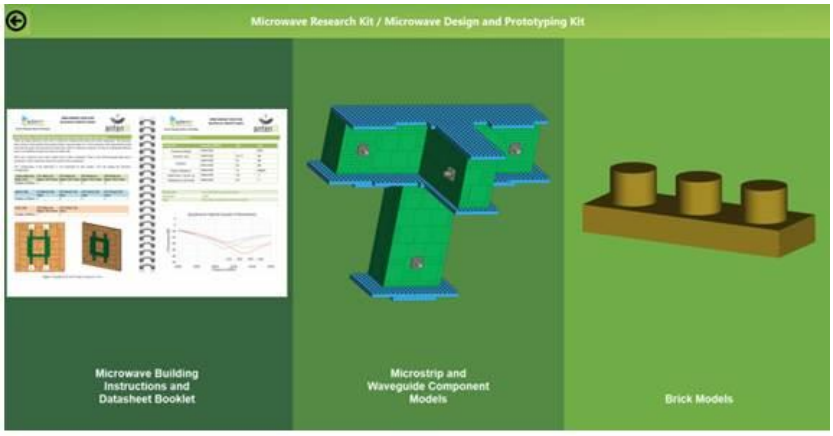


Once entering the input parameters, you receive "D" as a directivity calculation result and E-Plane and H-Plane normalized radiation patterns. They can be seen both in Cartesian and in polar coordinates.



Case Study 2: The need for a 0.15 - 1.6 GHz High Pass Filter

1. The lumped element high pass filters are part of the microwave research kit. First, we enter the microwave research kit.
2. Then, we click on the microwave building instructions and datasheet booklet where all our datasheets and antenna building instructions are collected.



3.2. High Pass Filter Selection Guide

Table 3 Lumped Element High Pass Filters

Passband Frequency Range [MHz]	Cut-off Frequency [MHz]	Stopband [20dB] Frequency Range [MHz]	Ground Plane Dimensions [mm]	Component Code	Datasheet:	Microwave Building Instructions:
135-1540	98	DC-73	80 X 160	003A-LEHPF2-5-135	DS-PDF	MBI-PDF
150-1600	130	DC-95	80 X 160	003A-LEHPF2-5-150	DS-PDF	MBI-PDF
225-1680	203	DC-140	80 X 160	003A-LEHPF2-5-225	DS-PDF	MBI-PDF
350-1740	267	DC-195	80 X 160	003A-LEHPF2-5-350	DS-PDF	MBI-PDF
425-1690	387	DC-295	80 X 160	003A-LEHPF2-5-425	DS-PDF	MBI-PDF
515-1830	440	DC-245	80 X 160	003A-LEHPF2-5-515	DS-PDF	MBI-PDF

antenom antenna technologies
Game-Changing Antenna Technology

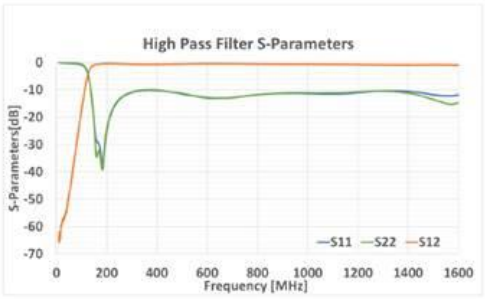
003A-LEHPF2-5-150
High Pass Filter

anten'it

Typical Specifications

Parameter		Frequency [MHz]	Typ.	Unit
Stop Band	Rejection Loss	DC-65 DC-95	40 20	dB dB
	Frequency Cut-Off	130	3	dB
	VSWR	DC-130	20	:1
Pass Band	Insertion Loss	150-1600	1	dB
	VSWR	150-1600	2	:1

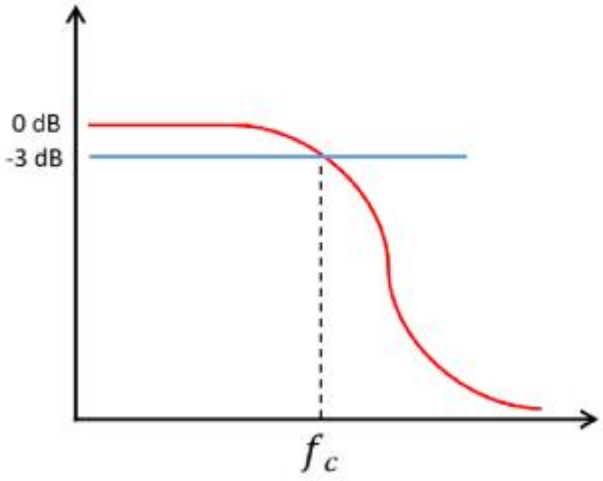
Dimensions	Over 80 X 160 mm ground plane
Connector	SSMA
Type	Lumped Element High Pass Filter
Degree	5



3. Finally, we click on the DS-PDF that appears next to the component we are looking for and access the datasheet.

Case Study 3: Calculate the dimensions of the waveguide low pass filter and compare with the simulation results

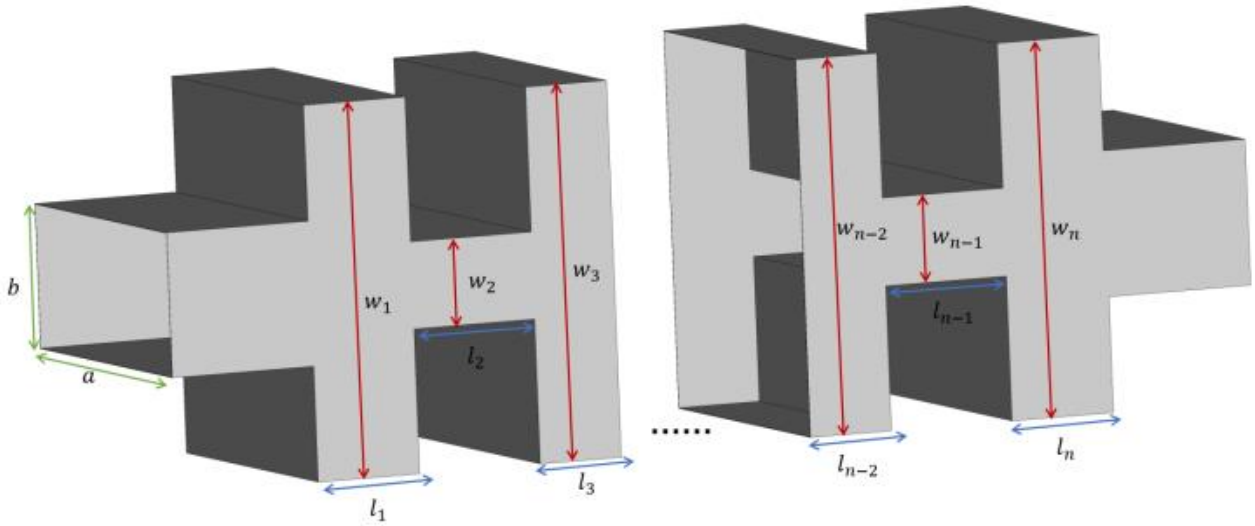
Click on "Waveguide Low Pass Filter" from the toolbox tool. The input parameters must be written to calculate the dimensions of a filter. These parameters are shown in the figures below.



Inputs
f_c : Cut-off Frequecy of the Filter
Low Impedance : Low Impedance of Waveguides
High Impadance : High Impedance of Waveguides
a : Width of the Waveguide
b : Height of the Waveguide
N : Filter Degree

Outputs
W : Width of the Waveguides
L : Length of the Waveguides

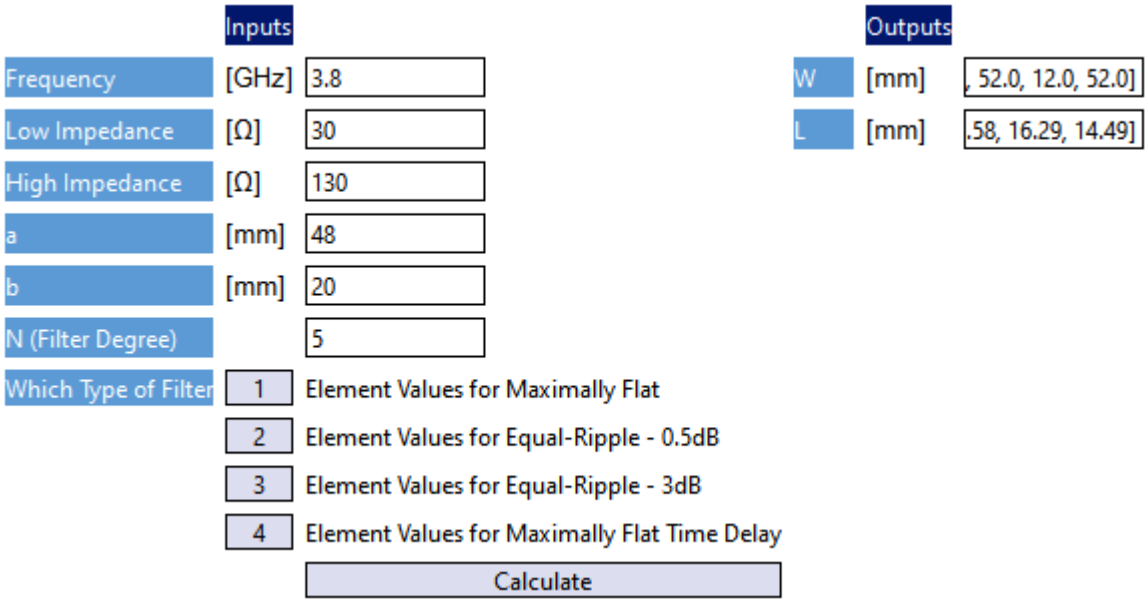
The figure below presents the widths and the lengths of the low pass filter as well as the waveguide dimensions.



And finally, the user must choose which type of filter they want to use. There are 4 different filter types:

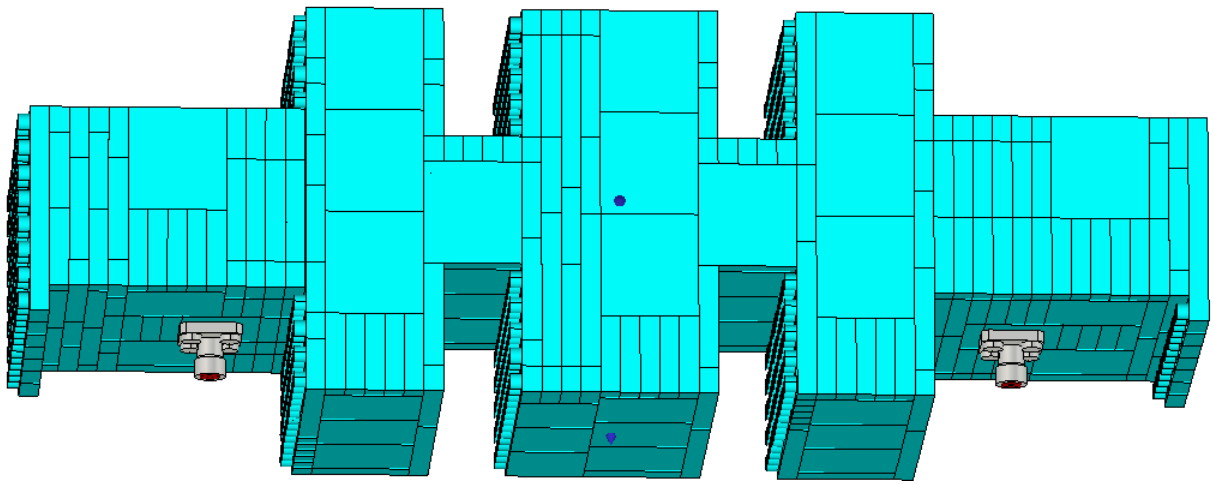
- Element Values for Maximally Flat
- Element Values for Equal-Ripple - 0.5dB
- Element Values for Equal-Ripple - 3dB
- Element Values for Maximally Flat Time Delay

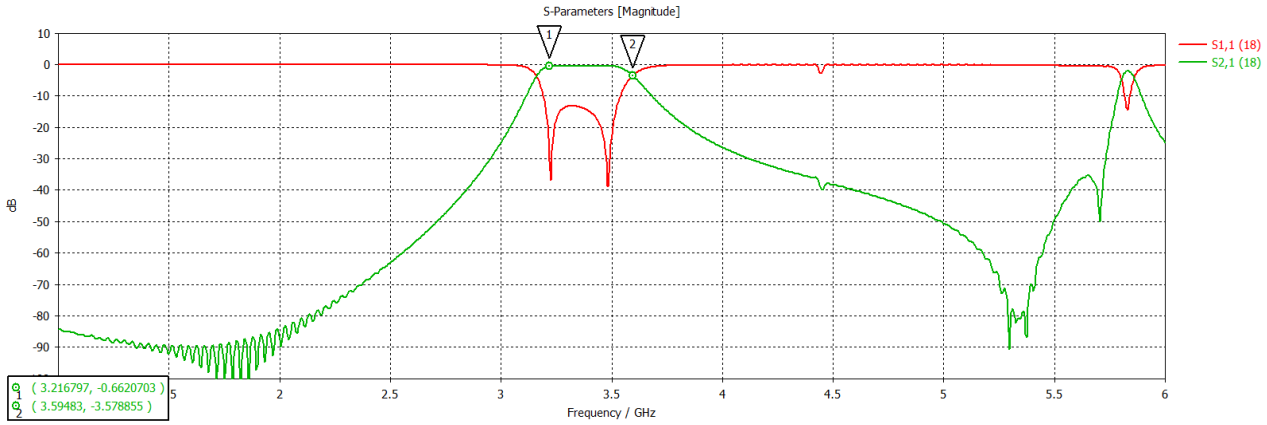
In this example, the frequency was chosen as 3.8 GHz, low impedance 30 Ω, high impedance 130 Ω, waveguide width 48 mm, waveguide height 20 mm, filter degree 5 and filter type element values for equal-ripple - 0.5 dB.



And our calculated results are: W = [52.0, 12.0, 52.0, 52.0, 12.0, 52.0], L = [14.49, 16.29, 21.58, 16.29, 14.49].

Using this data, we created a filter design in the CST Studio program and simulated it. S-parameter results show us that the filter frequency shifted a bit, which can be the result of the difference between the theoretical calculation and the simulation or may also be the result of our brick-type structure instead of a smooth surface structure.





In conclusion, the filter toolbox is very useful for practical work.

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