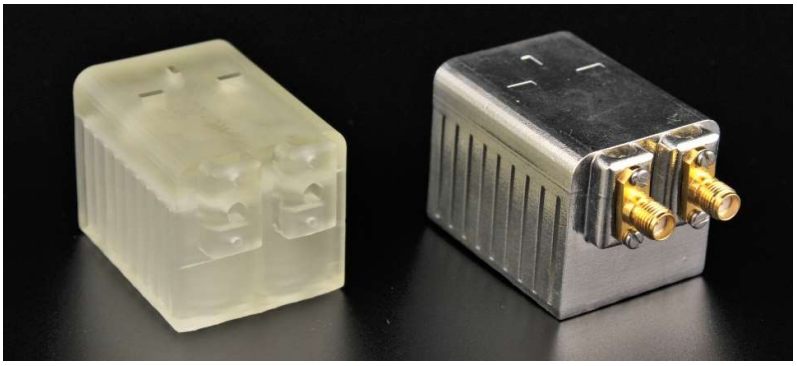
Miniature coaxial Filter made by 3D Printing SLA

elliptika®



DESCRIPTION

A compact narrow-band 6th order band-pass air-filled coaxial filter of 34 × 34 × 44 mm3 external dimensions, operating in the L-band is presented. The filter is based on a coaxial resonator. The central frequency of the filter is set at 1.3 GHz with a relative bandwidth of 8 %. The insertions losses are lower than 1.17 dB in simulation. Moreover, the rejection level is very high and over 80 dB at about 500 MHz from the filter center frequency.

SPECIFICATIONS

	Unit	Value
Impedance	Ω	50
Center Frequency F0	GHz	1.3
Insertion Loss @ F0	dB	1.17
3dB Bandwidth	MHz	110
Return Loss max in Bandwidth	dB	>15
Attenuation from DC to 0.82 GHz	dB	>80
Attenuation from 1.82 to 3 GHz	dB	>90
Termination	X	SMA
Weight	g	40

KEY BENEFITS

The filter was Fabricated by Additive Manufacturing (AM). One of the main advantages of this technologies is the possibility to print complex shapes in a monolithic part in order to decrease its weight and its volume. During the last decade AM has greatly matured and several technologies are available on the market nowadays. We used the StereoLithography Apparatus (SLA) technology that allows to find a trade-off between complex parts and manufacturing costs.

Miniature coaxial Filter made by 3D Printing SLA

elliptika®

EM SIMULATIONS

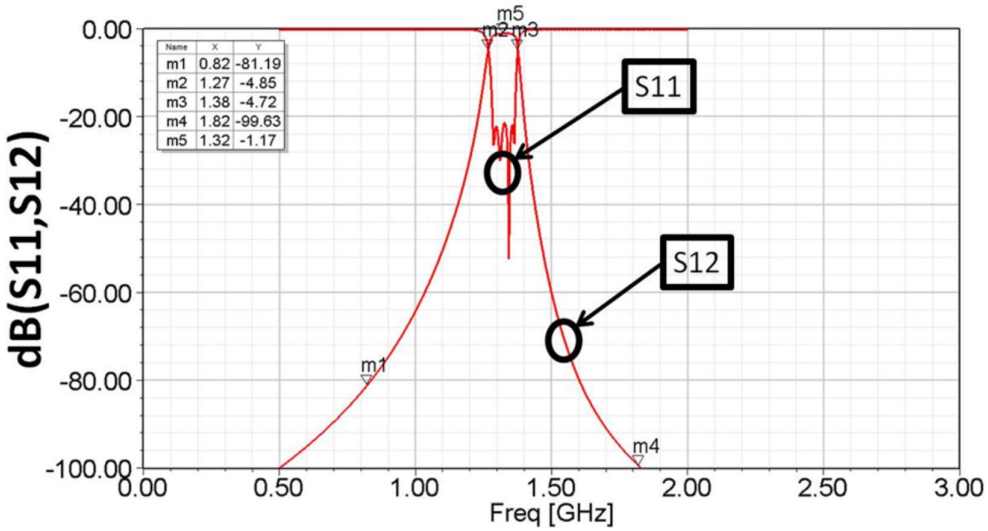


Fig. 1. EM Simulation of the 6th order filter

MEASUREMENTS

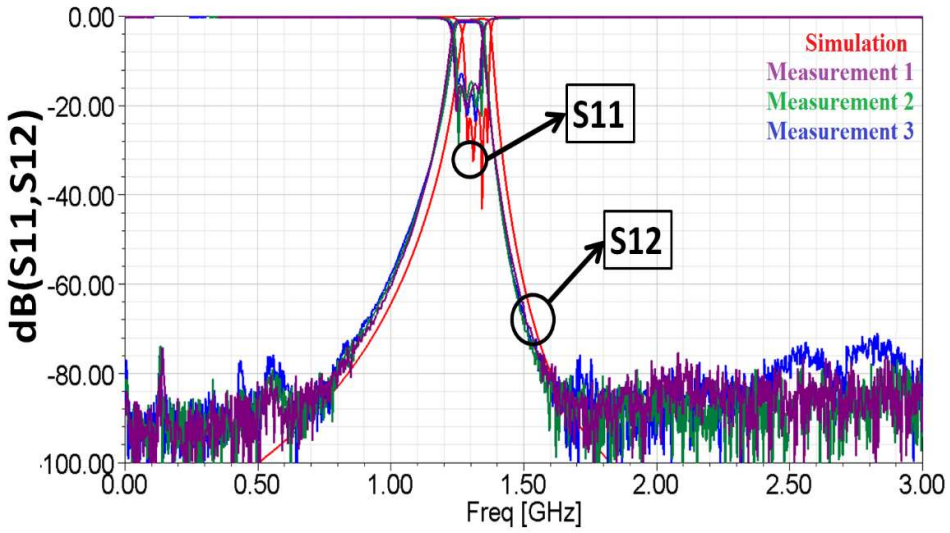


Fig. 2. EM simulation and measurement of three filters

Tables 1: Performances comparison between measurements and simulation

	F0	Shift	BP (-3dB)	IL (F0)	Return Loss
EM Simulation	1.322 GHz	-	109 MHz	1.17 dB	< -20 dB
Measurement 1	1.287 GHz	-2.65 %	115 MHz	0.98 dB	< -13 dB
Measurement 2	1.294 GHz	-2.12 %	113 MHz	1.31 dB	< -15 dB
Measurement 3	1.295 GHz	-2.04 %	113 MHz	0.99 dB	< -15 dB