

# Modeling of High Roll-off SIW Coax Filter with Novel Coupling Structures and Stopband Transmission Reduction Methods

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## Abstract

Proposed dual-mode substrate integrated waveguide (SIW) short-circuited coax filter demonstrates a passband that has transmission zeros on both upper and lower stopbands; in addition, such a filter is also inherent with good out-of-band rejection up to three times of the center frequency (fc). There are four signal paths from input port to output port. The signal routings are done by conductor-backed coplanar waveguide (CBCPW) and the slotlines on the top metal. In addition to signal routings, frequency control capacitors (CFreq), and electric coupling capacitors (CE) are on the bottom metal. The center frequency of the passband can be determined by CFreq, and the transmission zero on the lower-end can be tuned by CE respectively. The phase delay of the signal routings are investigated individually as a way to explain the generation of the transmission zero below the passband. Furthermore, capacitors' touchstone files from the vendor are implemented in the schematic such that simulation results including all the parasitic components can be emulated to real-world measurements. In the best scenario, presented filter shows a prescribed passband centered at 4.84 GHz, and with insertion loss (IL) of 2.11 dB as well as 3-dB bandwidth of 0.46 GHz.

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