

A design and analysis approach that enables extracting the full filtering potential of triple-mode filters while greatly simplifying the construction and hence reducing the filter cost is presented. The presented way views multimode resonators of cavity filters as resonators coupled in parallel, with every mode within the structure completely orthogonal; hence, there are no interresonator couplings. Each resonator then independently sees the interfacing input and output while the strength and phase of the coupling, along with the resonator frequencies, dictate the transmission zero placement. Thus, a completely general frequency response can be attained with as many arbitrarily placed zeros as there are multimode resonators. The absence of intracavity couplings allows using a simple rectangular cuboid while the input-to-output coupling via a single printed circuit board interface manages three controllable transmission zeros per cuboid. To verify the proposed approach, multiple designs operating at the DCS-1800 Band-3 are presented.