

UNIVERSITI TEKNOLOGI MARA

**PSEUDO ELLIPTIC DUAL-BAND
FILTERS BASED ON RING
STRUCTURES**

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ABSTRACT

In recent years, wireless transmission via high frequency electromagnetic wave has been given a lot of attention from various industries due to the emergence of new applications and new technologies. One of the most recent and interesting evolution in the wireless communications area is the trend toward the integration of multiple functions into a wireless device that can be used anywhere. One of the main components in the communication system is the microwave filter. The performance of the device is defined in terms of its transmission loss, circuit size and response selectivity. Dual-band filters are seen as the solution for circuit size reduction in a dual-channel communication system. This thesis presents the development of new dual-band filter topologies that offer *simplicity of design with single circuitry structure and improving the response selectivity with general synthesis*. The topologies for dual-band filters whose response can be controlled via their parameters would help in simplifying the early stage of its design. Combinations of resonators were used in designing the filters that constitute towards the selectivity of the frequency response. As the ring resonator is advantageous in terms of compactness and high selectivity, this work will concentrate on ring formation involving parallel coupled-lines in the objective of obtaining novel topologies for dual-band filters. Four topologies are presented whereby extensive optimization on each topology was done in order to obtain the dualband response. Three of this topology was then synthesized by using the synthesis of parallel coupled-lines ring resonators and simple circuit model of parallel coupled-lines that are already available. The complete synthesis of the three design topologies were developed showing the controlling of the transmission zero locations for high selectivity frequency response. The simulation and measurement results for each of the topology were done to verify the concept of the design.

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