

UNIVERSITI TEKNOLOGI MARA

**COMPACT MULTIBAND ANTENNAS
ON LOW TEMPERATURE CO-FIRED
CERAMIC (LTCC) TECHNOLOGY**

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Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science

Faculty of Electrical Engineering

April 2015

CONFIRMATION BY PANEL OF EXAMINERS

I certify that a Panel of Examiners has met on 17th March 2015 to conduct the final examination of Hadi Bin Jumaat on his Master of Science thesis entitled “Compact multiband antennas on low temperature co-fired ceramic (LTCC) technology” in accordance with Universiti Teknologi MARA Act 1976 (Akta 173). The Panel of Examiners recommends that the student be awarded the relevant degree. The panel of Examiners was as follows:

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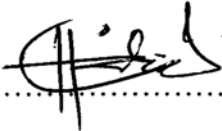
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AUTHOR'S DECLARATION

I declare that the work in this thesis/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

In recent years, the developments of wireless system that can operate over multiband frequency with compact size have enormous growth. In this project, LTCC technology is benefited for miniaturization of multiband antennas for short range medical sensor application. Three antenna designs on LTCC multilayer substrate have been proposed. They are Aperture Coupled antenna (ACA), Dual Patch Microstrip Antenna (DPMA) and Triple Band Off-Center Fed Microstrip Antenna (TBOCFMA). In aperture coupled antenna structure, observation on the controlling parameters of the aperture coupled antenna on LTCC multilayer substrate package is conducted to investigate the effect of aperture slot at various layers with different height. The proposed concept of this idea is simulated on Ferro A6M microstrip ceramic substrate and compared with the simulated of aperture coupled antenna on Flame Retardent 4 (FR-4) substrate at operating frequency of 5.8 GHz. Thus, the best location of the ground plane that contains the aperture slot has been adopted in DPMA design. In DPMA, dual band frequency spectrum operating at 5.8 GHz and 6.3 GHz frequency band has been proposed. This design develops dual radiating patch at the top and bottom of the overall substrate with the aperture slot at the ground between patches. The second radiating patch is designed to place at the feedline that is innovated from the aperture coupled structure. This design then fabricated and a good agreement was achieved between the simulation and measurement results. Meanwhile, the third design TBOCFMA operating at 5.8 GHz, 6.3 GHz and 10 GHz frequency band is presented. This design adopted the dual radiating patch with the aperture slot at the ground between second radiation patch in DPMA. The feedline then was fed with an off-centred feedline technique to create another resonant frequency. Fabrication also has been done for this design for feasibility of study purpose. The complexity of the LTCC technology fabrication process is covered in this thesis.

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