UNIVERSITI TEKNOLOGI MARA

PZT MMIC VIA HOLE FABRICATION TECHNIQUE

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

Faculty of Electrical Engineering

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Candidate's Declaration

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result 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 other degree or qualification.

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ABSTRACT

This study is carried out in order to investigate the effects of via hole grounding in newly proposed high dielectric constant material, lead zirconate titanate (PZT) thin films for MMIC applications. To predict the performance of via hole in PZT thin films, 50 × 50 μm^2 square and cylindrical vias of various diameters were simulated using *CST Microwave Studio* over 0.1 to 20 GHz frequency range. The via test structures were patterned using a combination of electron beam lithography and wet etching technique for on-wafer characterization and were metallized with sputtered gold. The on-wafer characterization was performed using a *Wiltron 37269A* vector network analyzer and *Cascade Microtech* probe station with *Cascade Infinity* probes. The values of the resistance and inductance extracted from the simulation and measurement data were compared. The measured results exhibit inductive behaviour which is similar to those obtained from the simulation, indicating successful via realization using a new wet etching technique with 0.5HF : 5HCl : $10NH_4Cl$: $50H_2O$ composition. However, the inductance (18.839 pH) and resistance (1.212 Ω) are found to be higher than the simulated values.

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