FREE-SPACE MICROWAVE MEASUREMENT OF DOPING CONCENTRATION FOR SILICON WAFER

ALYAA SYAZA BINTI AZIRI

FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
MALAYSIA

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UNIVERSITI TEKNOLOGI MARA

ALYAA SYAZA BINTI AZINI
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM,
SELANGOR, MALAYSIA
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ABSTRACT

Microwave non-destructive testing (MNDT) using free space microwave measurement (FSMM) system is used to characterize silicon semiconductor wafers from reflection and transmission coefficients. The FSMM system consists of transmit and receive spot-focusing horn lens antenna, mode transitions, coaxial cables and a vector network analyzer (VNA). The resistivity and conductivity of silicon wafers can be obtained from the complex permittivity. In this project, results for p-type high resistivity silicon wafer before and after doping was measured.

The FSMM setup was modeled using CST Microwave Studio simulation and the simulation results were then compared with the measurement. Simulation results of doping concentration using tsuprem conducted by Mr. Mohd Rosydi Zakaria from Universiti Malaysia Perlis, (uniMAP) were used in this project to make comparison with FSMM technique.

In this project, it was found that the dielectric constant, loss factor and conductivity of doped wafer were higher than the undoped wafer. In addition, it was observed that the resistivity decreased with increased frequencies

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