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Research on Calibration Method for Single High Pulse Voltage for Semiconductor Devices Test Instruments

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Power IGBT module is widely used in high power conversion applications in various fields because of the advantages of high voltage and high current applications. In order to avoid the influence of temperature rise to the device measurement, pulse test method is widely used to test its static and dynamic parameters, So there are single high pulse voltage source and single pulse high current source in power IGBT modules test instruments. For now in the metrology field, how to calibrate its Single High Pulse Voltage source is a difficult problem. Now the amplitude of single high pulse voltage source is above 7kV with the pulse width as 50 microseconds. Based on detailed research on the test principles of the power IGBT modules test instruments, the pulse high voltage divider and the data acquisition unit are used to setup a calibration device for Single High Pulse Voltage source to calibrate the amplitude of Single High Pulse Voltage source. We use the resistors to develop the pulse high voltage divider, and did carefully research on the pulse response time, voltage dispersion, voltage regulation of the pulse high voltage divider. Also the data acquisition unit with 20MHz bandwidth and 100MS/s acquisition rate is evaluated through tests including vertical accuracy test, bandwidth test, rise time test, comparison test and etc.. Through above relevant test results, with the comprehensive consideration of the influence of each measurement uncertainty component, we have finished the evaluation of the uncertainties of the amplitude measurement for Single High Pulse Voltage source. The uncertainty of measurement is better than 2% with the coverage factor as 2.

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