Improved Impedance Measurement Precision Utilizing Innovative Test Fixture Design

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Abstract

Precise impedance measurements are difficult to achieve when the value of the capacitor is very low or very high, for example, capacitance values near 1 pF and 1 nF. The accuracy of the measurement is largely dependent on the calibration of the capacitance meter, which can have an accuracy specification of +/- 0.5%. Test precision, however, is largely dependent on the test fixture. Modern capacitance meters utilize an open and short compensation function to measure the stray impedance of the test fixture and subsequently report the measured values after the stray impedances are removed. Repeatable open and short compensations are therefore a necessity for precise impedance testing. This requirement is especially critical in a MLCC factory where there are multiple operators involved. Tweezers fixtures are commonly used in the production of MLCC's because they are very efficient. While tweezers fixtures are valued for their efficiency, they are often not used for certain types of high precision tests, such as, lot qualification, selecting golden chips used for automatic tester correlation, and testing very low capacitance values. In this study, we introduce a new tweezers fixture design and measure the precision achieved for MLCC's in the 0.5 PF to 1 nF capacitance range. We explain the method of shielding the test contacts to reduce stray impedances and we introduce a new method of controlling the open compensation function to greatly improve testing precision. The data generated in this study indicate a level of test precision that enables the use of a tweezers type test fixture for the most demanding of applications, including lot qualification, gold chips for automatic tester correlation, and testing very low value MLCC's.

Presentation Outline