Ceramic Varistor

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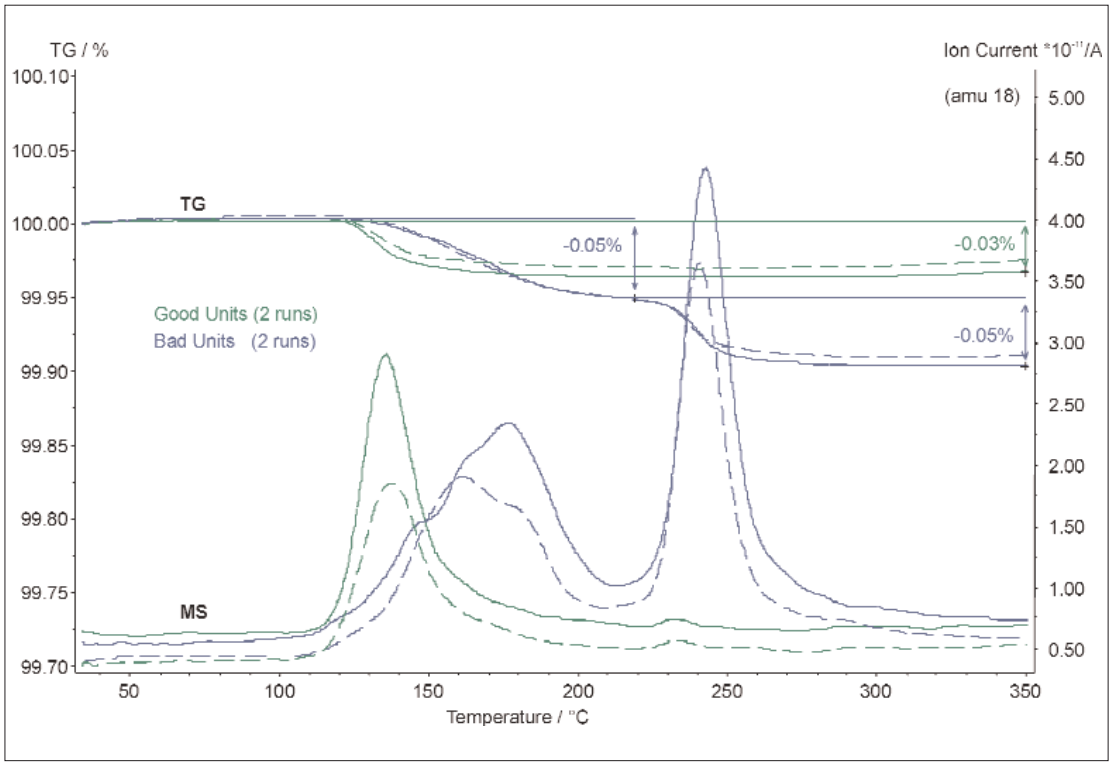
Passive electronic components do not require a source of energy to perform their intended function in an electronic circuit. Examples of passive components include resistors, capacitors, inductors, diodes, varistors, etc. A varistor is equivalent to a combination of back-to-back diode pairs which lead to a voltage dependent resistor (VDR). These electronic components are soldered onto circuit boards using SMD technology (surface mounted devices) or through-hole technology. Thermal analysis - in particular thermogravimetry (TG) – allows for characterization and thus for quality control of such electronic components. Simultaneous mass spectroscopy enables furthermore identification of the evolved gases from the sample – another valuable source of information even for the development and production of electronic parts.

Test Conditions:

Temperature range: RT … 350°C
Heating/cooling rates: 10 K/min
Atmosphere: Helium at 70 ml/min

Sample mass: approx. 900 mg
Crucible: Al_2O_3
Sensor: TG-DSC typ S



Results:

By means of simultaneous thermogravimetry (TG) and mass spectroscopy (MS), good and bad varistor parts could be distinguished. Reproducibility tests were also carried out (dashed lines). The bad parts showed two mass loss steps of 0.05% whereas the good parts showed only one mass loss step of 0.03%. As can be seen from the mass spectrometer curves, the origin of the mass-loss steps is due to the release of water with mass number 18. In the bad varistor parts, a larger amount of humidity is even captured up to ~250°C which is critical for automatical soldering onto the circuit board.

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