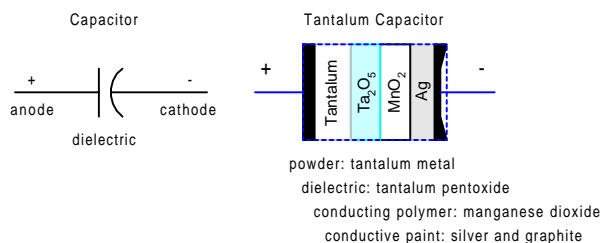


Monitoring the Production Process of Tantalum Powder

Customer Inquiry

One of QuadTech's customers is a manufacturer of tantalum powder for the tantalum capacitor industry. Capacitor manufacturers use tantalum for a number of factors including its ESR (equivalent series resistance) characteristics. The powder is manufactured from pure tantalum metal, ground into fine particles, a typical granule size being 10 μ m. The size of the particle affects the capacitance/voltage (CV) value of the powder. The greater the surface area of the particle, the higher the capacitance value of the powder will be. Therefore, tantalum powder manufacturers can change the shape of the particles (say from a sphere to a flake for less surface area and lower voltage capacitance) to manipulate the CV value to tailor it to its end-product application (low voltage capacitors). So monitoring the electrical properties (C, V) of the tantalum powder during the production process is necessary to insure consistent product is delivered to the end user.



QuadTech Solution

The manufacturer has used the QuadTech 1659 Digibridge to measure three parameters of the powder: capacitance, equivalent series resistance (ESR) and dissipation factor (D). Measuring this material at 120Hz and 1000Hz has generally been adequate in the past. However, to meet the demands from capacitor manufacturers for tantalum powder with higher frequency stability, the company recently introduced the 7400 Precision LCR Meter as an R&D tool for studying the material at higher frequencies.

Measurement Procedure

The process of monitoring the tantalum powder begins by producing a test capacitor from sample powder taken from production. Both wet cell and solid capacitors are made and tested at 120Hz and 1kHz for capacitance value C, ESR and DF. Test results are then compared for consistency with previously accepted values and production batches are altered accordingly. The problem they face today is that their customers continue to place higher demands on the tantalum being used. If the quality of the capacitors is very frequency dependent, the capacitance value can decrease quite sharply at frequencies approaching 10kHz.

The QuadTech 1659 Digibridge continues to be used for the QC monitoring of production powder. Figure 1 illustrates the automated use of the 7400 instrument for R&D purposes. It was chosen primarily for its multi-frequency capability and wide frequency range. The 7400 instrument is interfaced via IEEE-488 to a PC controlling measurements to as high as 100kHz. The PC also controls the scanning of 20 plug-in capacitors installed in a custom designed Kelvin fixture.

What's that look like?

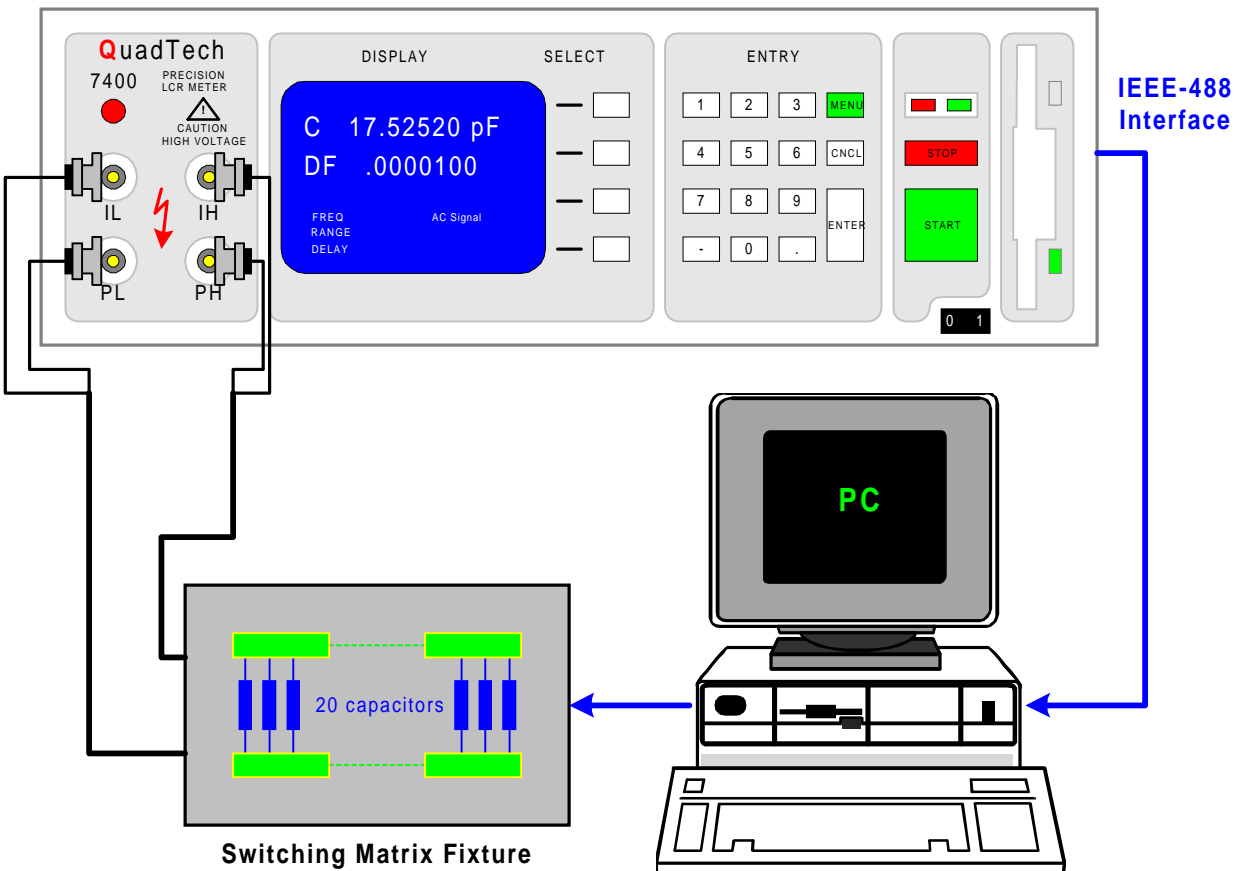


Figure 1: 7400 Precision LCR Meter automated connection to DUT

Summary

This manufacturer chose the 7400 Instrument for the frequency selection capability and wide range. The high-resolution display and averaging capability provide this materials manufacturer the ability to monitor very minute changes in product characteristics. The ability to monitor the variation of a reading is much more beneficial in determining the tantalum powder characteristics than the absolute accuracy of the measurements.

For complete product specifications on the 7000 Series Precision LCR meters or any of QuadTech's products, visit us at <http://www.quadtech.com/products>. Call us at 1-800-253-1230 or email your questions to info@quadtech.com.

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