

Technical & Applications Information [Relays]

Contact Resistance and Dynamics

Reed relays offer several advantages over electromechanical relays, one of which is switching speed. The fastest switching reed relay is the 9800 series, with a typical actuate time of 100 microseconds as shown in Figure 3 below. Release time is approximately 50 microseconds. Actuate time is defined as the period from coil energization until the contact is closed and has stopped bouncing.

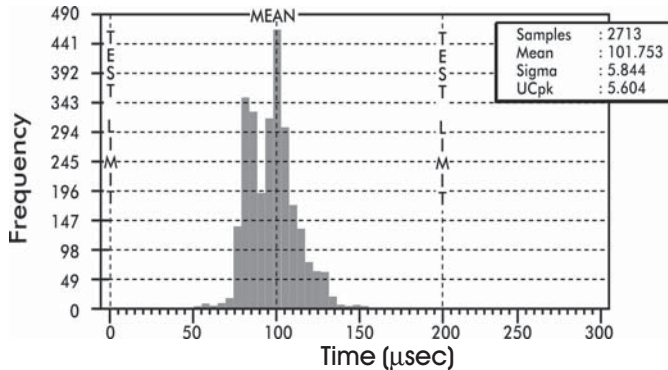


Figure 3: 9800 Actuate Time

After the contacts have stopped bouncing, they continue to vibrate while in contact with one another for a period of about 1 millisecond. This vibration creates a wiping action and variable contact pressure. Close examination of the contact resistance during this period has proven to provide extremely valuable data on the overall quality of the reed relay. Coto has developed the Dynamic Contact Resistance (DCR) test to evaluate finished relays and discern the cleanliness of the contacts, the integrity of the hermetic seals on the switch, the presence of internal stresses, and the soundness of internal connections. The maximum dynamic contact resistance value and the peak-to-peak variation are measured and compared against specified normal limits. Empirical and actual DCR traces are shown in Figures 4 and 5:

Static Contact Resistance (SCR) is the resistance across the contact terminals of the relay after it has been closed for a sufficient period of time to allow for complete settling. For most reed relays, a few milliseconds is more than adequate, but the relay industry uses 50 milliseconds to define the measurement.

Another contact resistance measurement that has provided great insight into the overall quality of the relay is Contact Resistance Stability (CRS). CRS measures the repeatability of successive static contact resistance measurements. Coto typically uses 20 closures and subtracts the lowest contact resistance

reading from the highest. This is compared against engineering specifications.

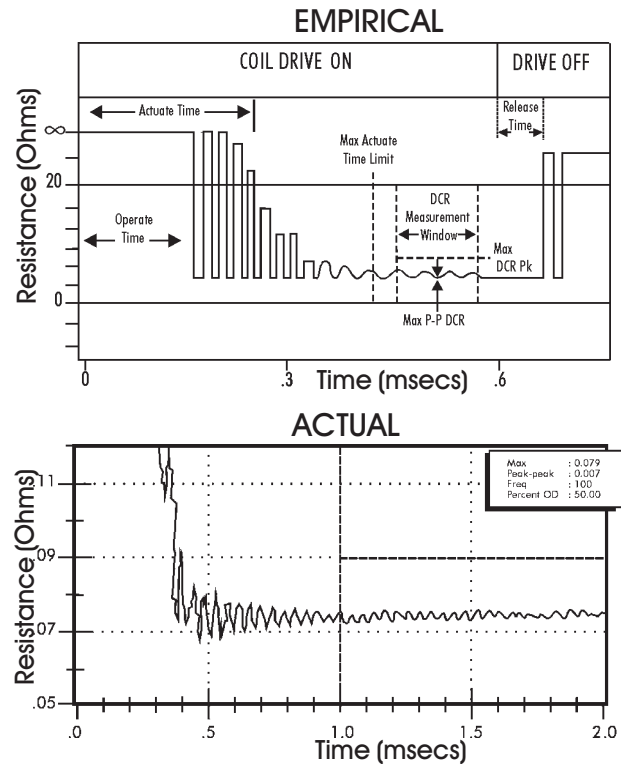


Figure 4: Dynamic Contact Resistance

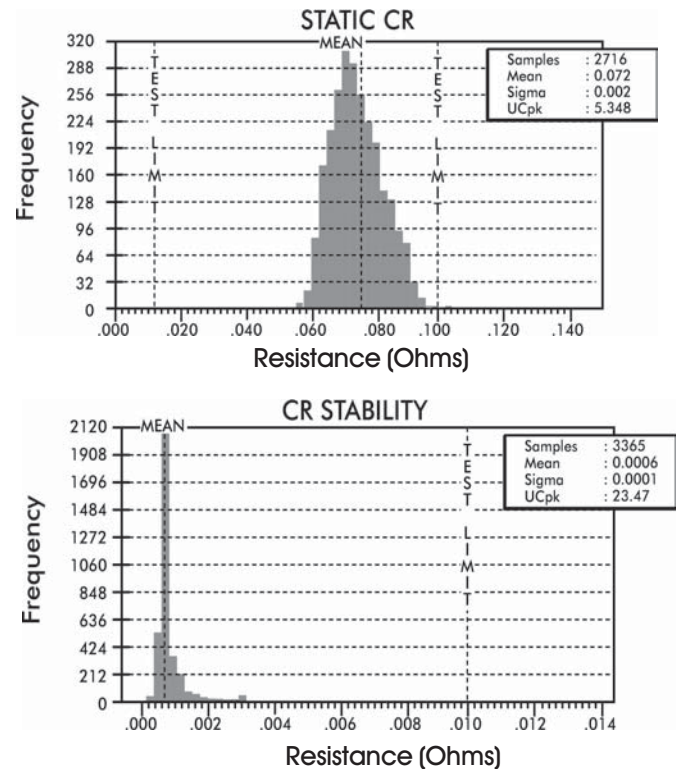


Figure 5: Static Contact Resistance and Stability