Ironwood Electronics

XBT 04 contact

DC Measurement Results

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Objective

The objective of these measurements is to determine the DC performance of a Ironwood Electronics XBT 04 contact. Measurements are to determine current carrying ability.

Methodology

A four terminal (Kelvin) measurement setup is used that includes a computer controlled voltage source capable of delivering 10 A. The voltage developed across the contact is measured with a HP 3456A DMM and yields a V-I record. A 4 terminal setup (Kelvin measurement) setup is used and the DMM is operated in compensated mode to remove the effects of thermo-electric voltages due to dissimilar metals.

For the current handling tests the temperature rise in the center of the pin is measured with a thermocouple as drive current levels are gradually increased.

Test procedures

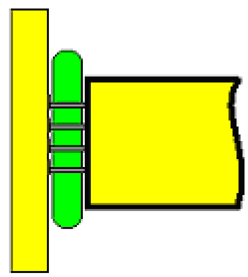

Figure 1 Test setup

During I-V testing, the z value is adjusted to nominal operating position and drive current is increased in steps of 0.05 A up to the maximum tolerable level. The dwell time for each current step is 1 s for V/I curves. Once the data are available, they are processed to reveal the resistance, power dissipation and temperature as a function of drive current.

Setup

The XBT 04 contact is installed in its housing which is attached to an Au covered brass base plate (see Fig.2). Testing is performed in a setup similar to the one shown in Fig. 3:

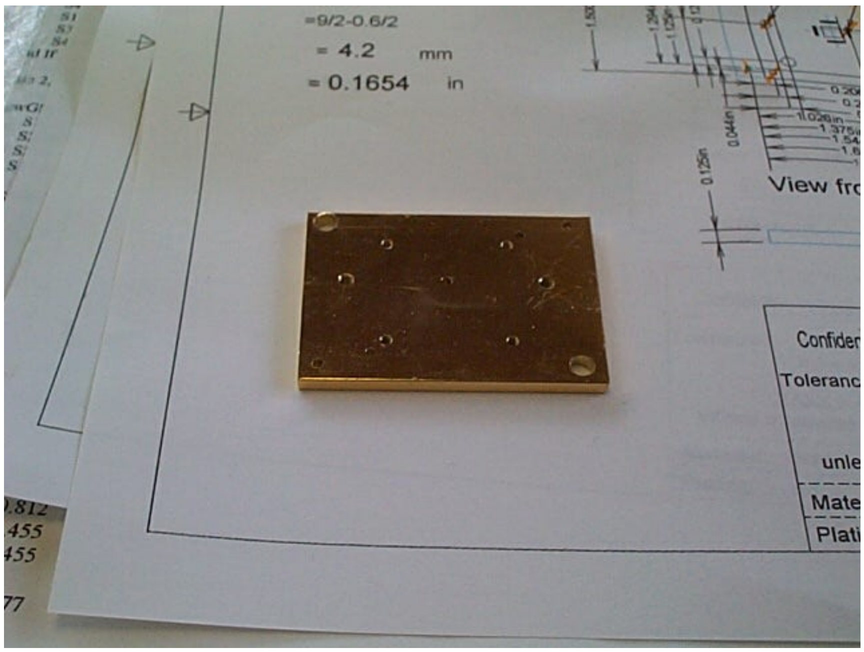

Figure 2 XBT 04 contact mounting plate example

Au over Ni plating was applied to the surfaces of the brass plate. Material type and thickness specifications were identical to those used for PCBs.

The current/voltage probe consists of a copper post with suitably shaped surface. This surface is Ni and Au plated. The post has two connections, thus allowing for a four terminal measurement with very low residual resistance (about 1 milliOhm).

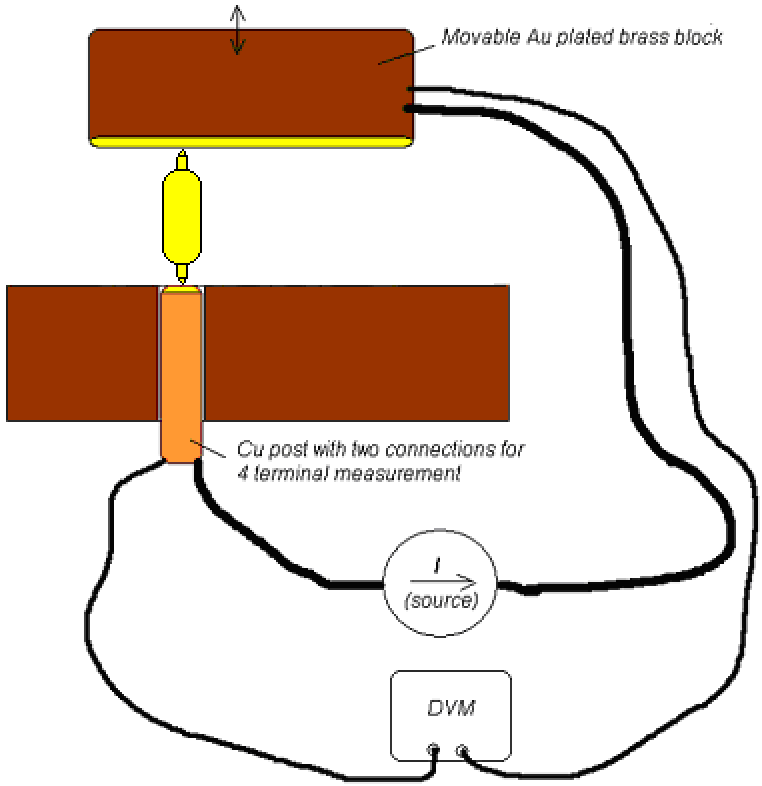

Figure 3 Test setup for 4 terminal (Kelvin) measurements

It should be kept in mind that in this setup the spring probe presses against two surfaces that are very well heat sunk. In reality the finite thermal resistance of a PC board can cause a higher than reported temperature rise. Since there is no a priori knowledge of the actual thermal resistance of that board such cases must be modeled on an individual basis.

The DUT with its plate is mounted in a test stand with XYZ adjustment capability:

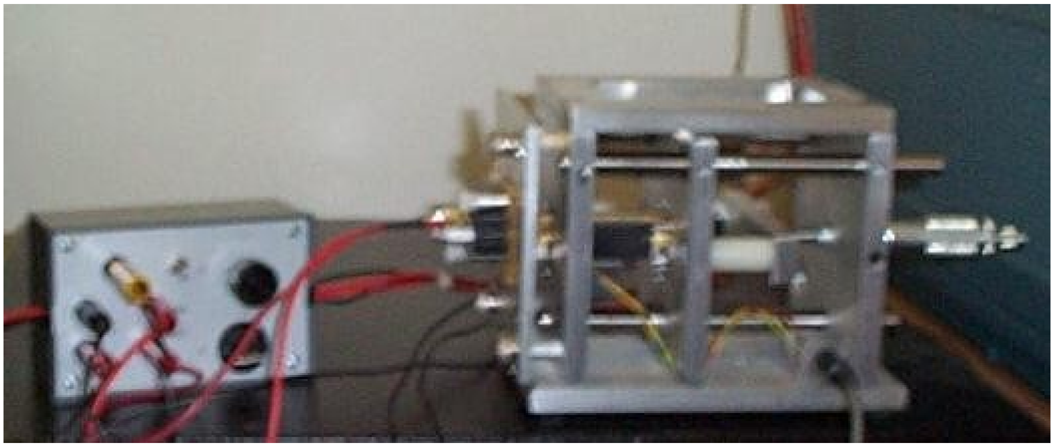

Figure 4 Test stand

This setup has a micrometer screw that allows repeatable adjustments in the Z direction. Also included is a transducer that converts Z position to an electrical signal for the data acquisition.

Measurements

Current carrying capability

The measured current – voltage relationship for two Ironwood Electronics XBT 04 contacts is recorded for a gradually increasing drive current:

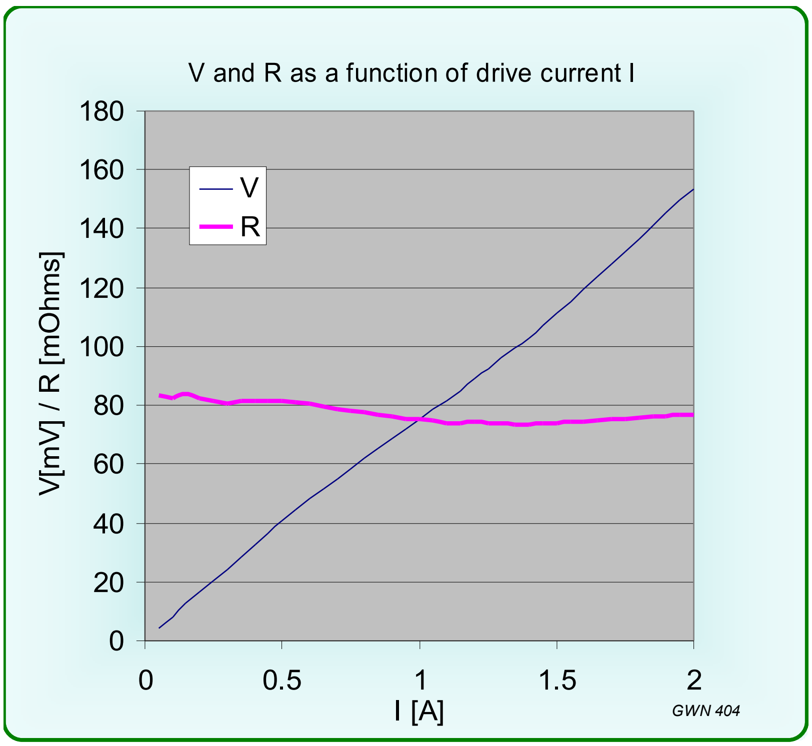

Figure 5 Voltage and resistance as a function of drive current

Above 1.9 A voltage deviates from linear. This will become more evident in a derivative plot (see below).

Of interest is also the power dissipation in the contact:

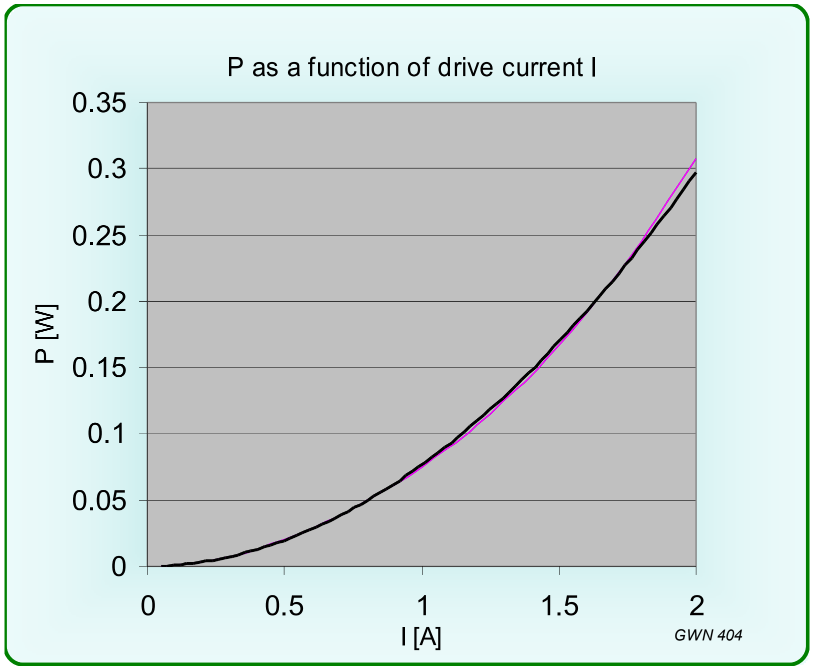

Figure 6 Power dissipation as a function of drive current

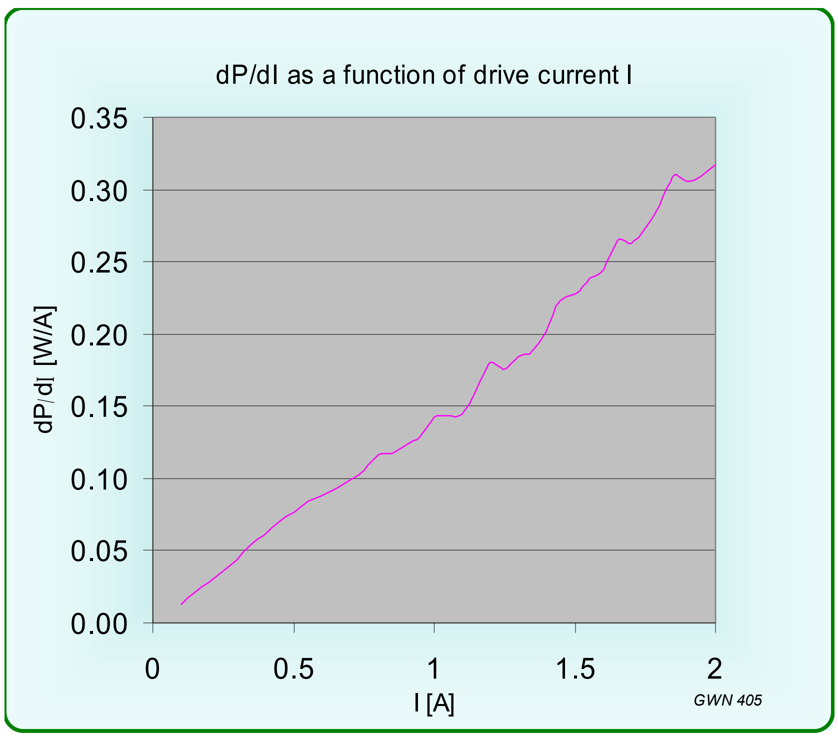

Figure 7 Derivative power dissipation as a function of drive current

Power dissipation basically follows a square law up to 1.8 A (Fig. 6 black vs. red).

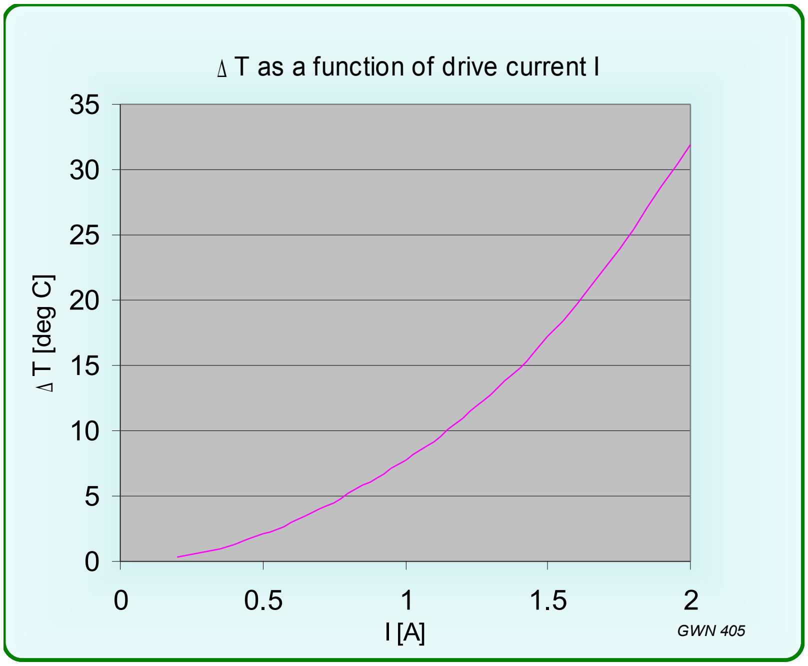

Figure 8 Temperature rise as a function of drive current

The temperature rise above ambient temperature increases as drive currents increase. A temperature rise of 30 degrees C is reached at a current of 1.9 A. The derivative plot of Figure 9 shows no significant fluctuations:

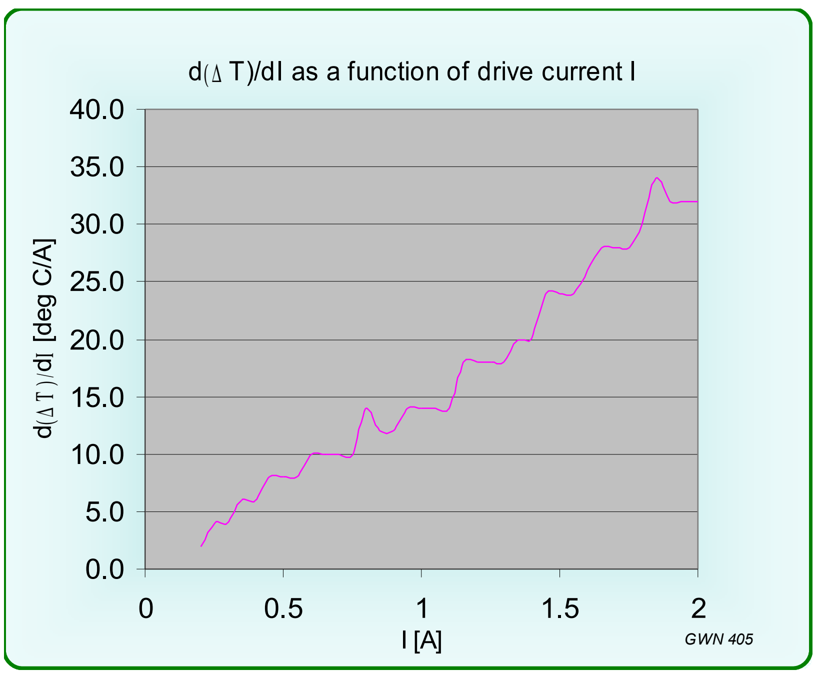

Figure 9 Derivative temperature rise as a function of drive current