How is a Rosenberger Female Load made

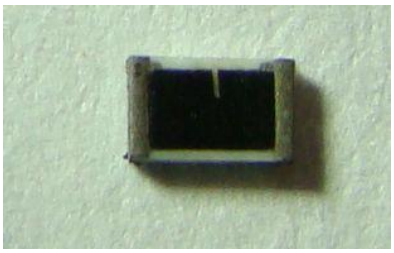
and

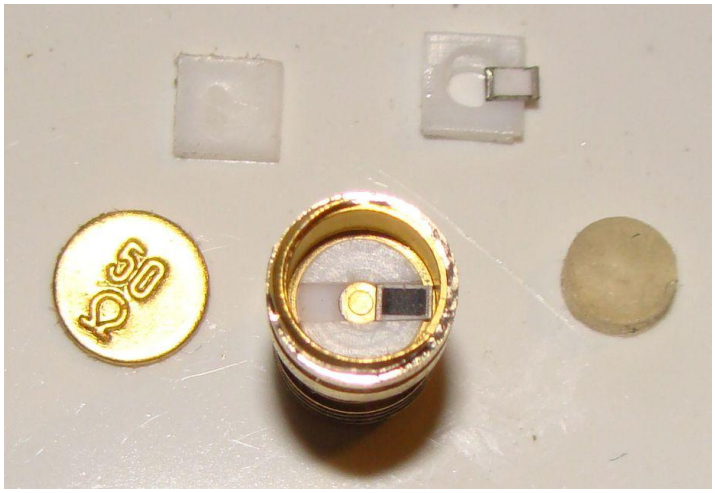
How to repair a defective Rosenberger Female Load

My ”beloved” Female Rosenberger Load which has server me trustfully for more than 2 years and been used extensively (more that 1000 calibration I think) and then defacto should be replaced by a new one, started to be unstable, as switching between 50 ohm and 100 ohm even, some time inbetween.

I simply had to find out what was wrong and tool it apart milling down 1 mm a little less than 180 degree, so the top disk could be removed.

From the top i removed a silicon rubber disk Ø 4.2mm and 1.4mm thick, a square 0,5mm thick teflon pad of dimension 3.8x4.0 mm, two 0.5mm square teflon pads of dimension 3.8x3.9mm with a Ø2mm hole in center (almost). Below was exposed two SMD Resistors each 100 ohm of dimensions 2.05x1.25x0.4mm (**SMD 0805**) with visible laser trimming. As seen on the picture below. One of the resistors adhered to the squaredisk as seen on below picture of the components included, and the two lower pads with hole also adhered to each other.

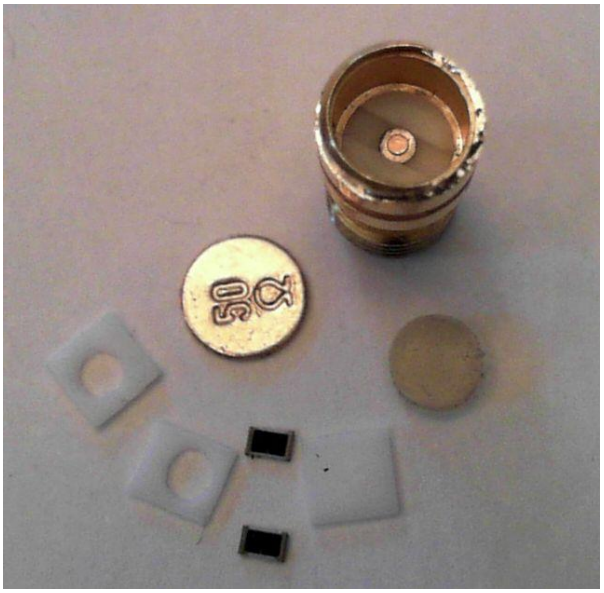




The resistors are not soldered to the center pin ort the grounding edge (made like the SMA mechanical reference plane in the other end of the load) but kept in place by the 3 stacked teflon pad kept under pressure by the silicon rubber disc seen to the right of the Load. The Ø2mm center hole in the two lower teflon pads is to reduce the fringe capacitance from the center in and the square shape is also to minimize the capacitance throught the teflon pads to ”ground”. The two SMD resistors are resting in a milled slot of depth about the thickness of the SMD resistors and the vertical position of the ground ring, the bottum of the slot and the resting part of the centerpin are on same level, and in the center of the centerpin a small extruding part of height abaout 0.4mm or (maybe a little less) thus holding the resistors in place. The resistance has during the two year of service beed controlled quite often and never been drifting so the assembly method without solder is surprisingly stable. Avoiding the solder is a vital element to ensure repeatablity in production as solder has a very negative effect on fringe capacitance causing much larger tolerances for the fringe capacitance. This is the sole reason for it popularity as a acceptable Load even i the Ghz range and it popularity in universities (saving the use of extremely expensive reference SOL’s)

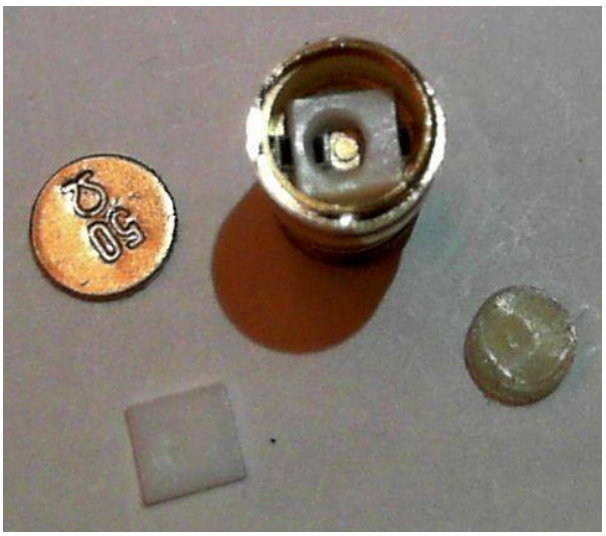
How to assemble it again ?

Step 1: Arrange the parts



Step 2: Place the resistors

Step3: Mount the two Pads with holes



Step4: Place the third PAD without hole

Step 5: Place the Silicon Rubber on top

Step 6: Place to top lid and solder the milled away part

Test of the Load after repair:

Before the Load went unstable it resistance was 49.26ohm, measured with my Load test equipment with 4 point measurement method to 50.088 ohm, But when the load tightened it went open cicuit.

Bottum line and lesson learned **. Waste of time but fun to try. ☺ Two new resistor needed at least as they looked pretty oxidized when looking in a magnifying glass, but I better purchase a new one as the quality of the SOL kit is very essential**

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