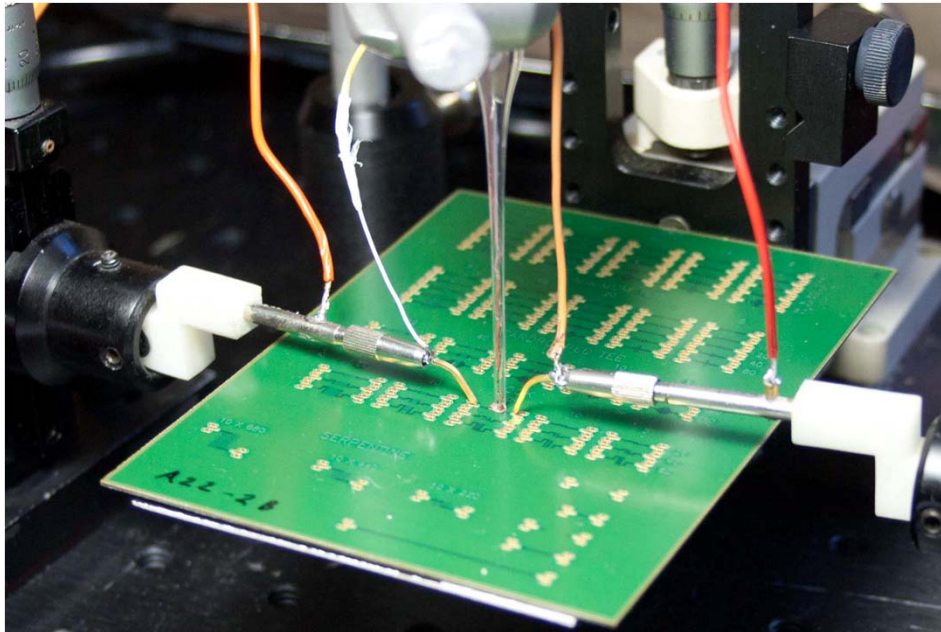


PDR Measurements of Embedded Resistors (example data for two resistors from two TVs)



Probe station, DC 4-Wire configuration
with a thermocouple for surface temperature
measurement above the embedded resistor

Power stimulus: Voltage
Measure:

current (I)
voltage (V)
power (mW)

Voltage step: 0.2V

Power step ON : 60 s

Cooling to ambient

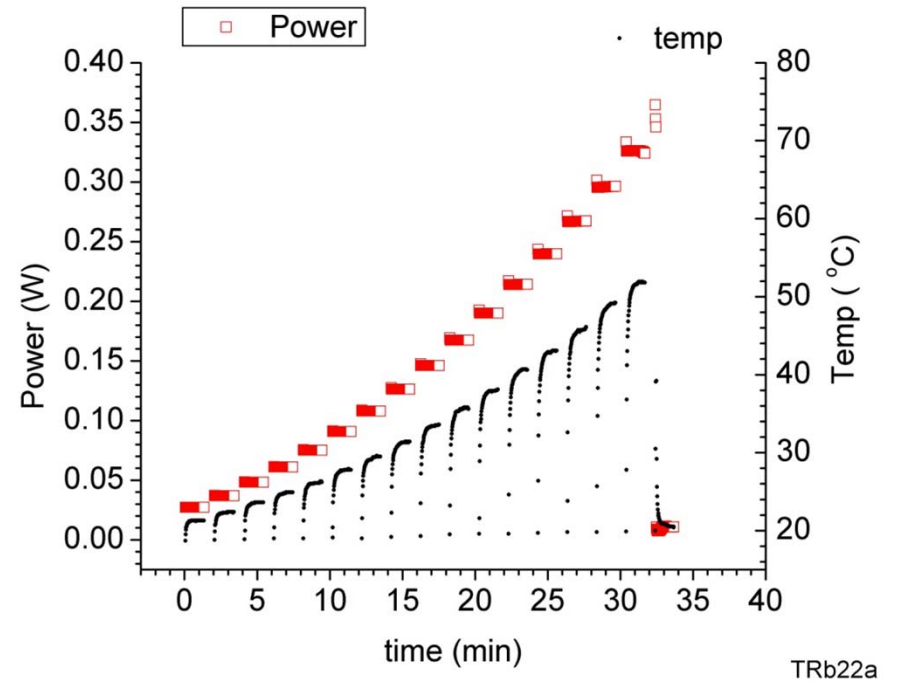
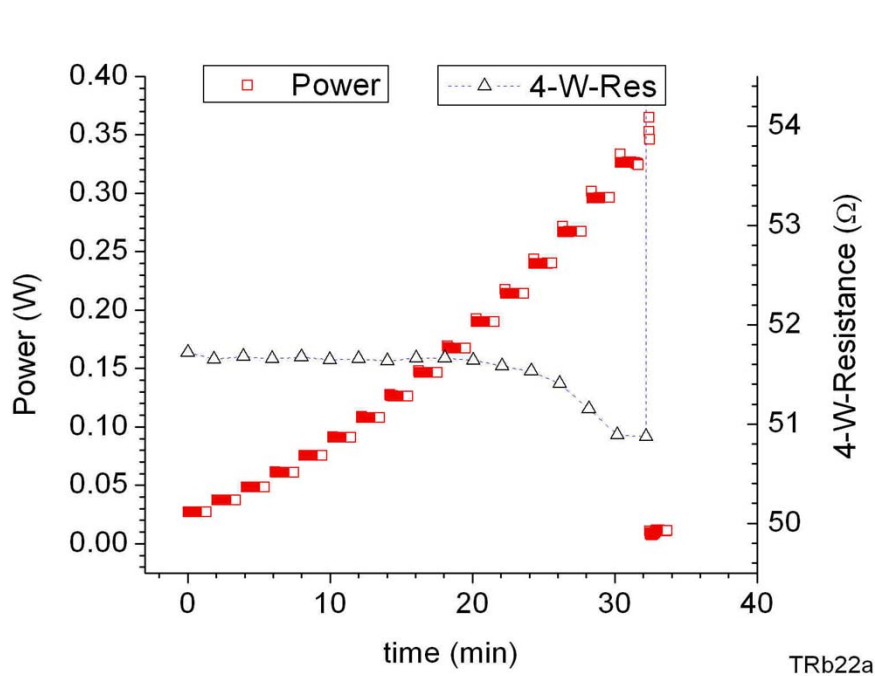
Power OFF: 20 s (typical)

Measure 4-W resistance

Measure temperature
(optional)

PDR test results [50 Ω TearDropper Tee]

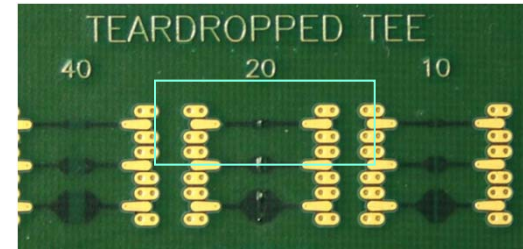
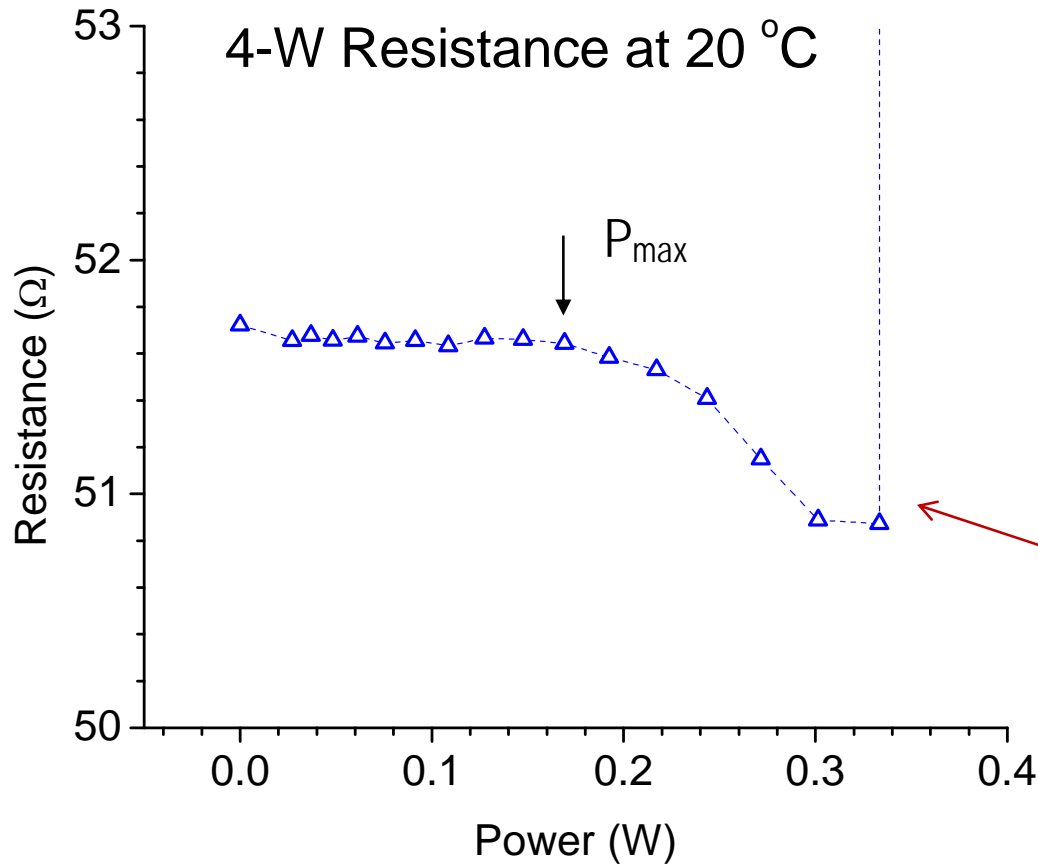
Example 1 metal:



Test timing:

The resistor fails 'OPEN' at P_{failure} of 360 mW
The surface temp at failure is 52 C

PDR test results [50 Ω TearDropper Tee (metal)]



$P_{\text{failure}} = 360 \text{ mW}$

$t_{\text{failure}} = 52 \text{ C}$

TRb22a

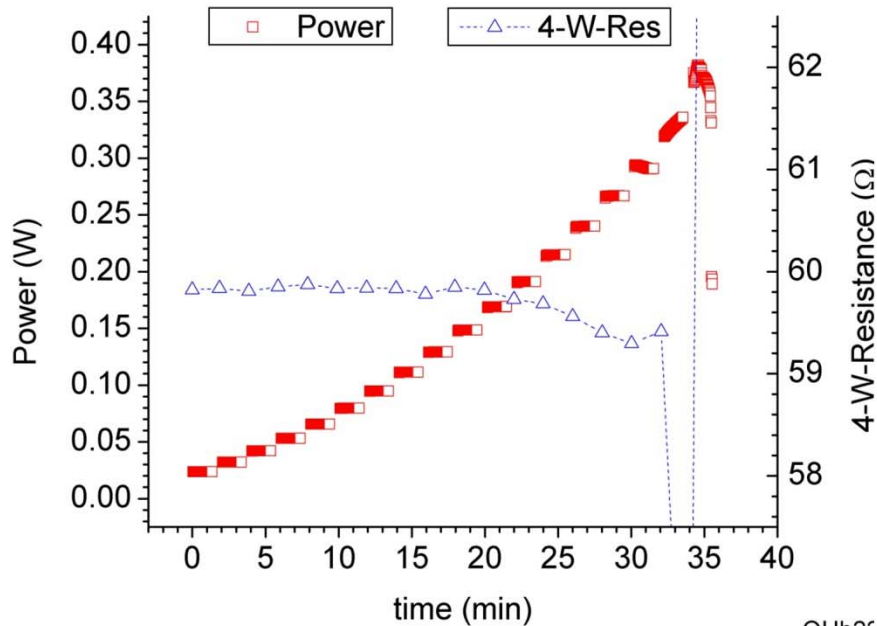
PDR:

$R_o = 51.7 \text{ } \Omega$, P_{max} is about 160 mW

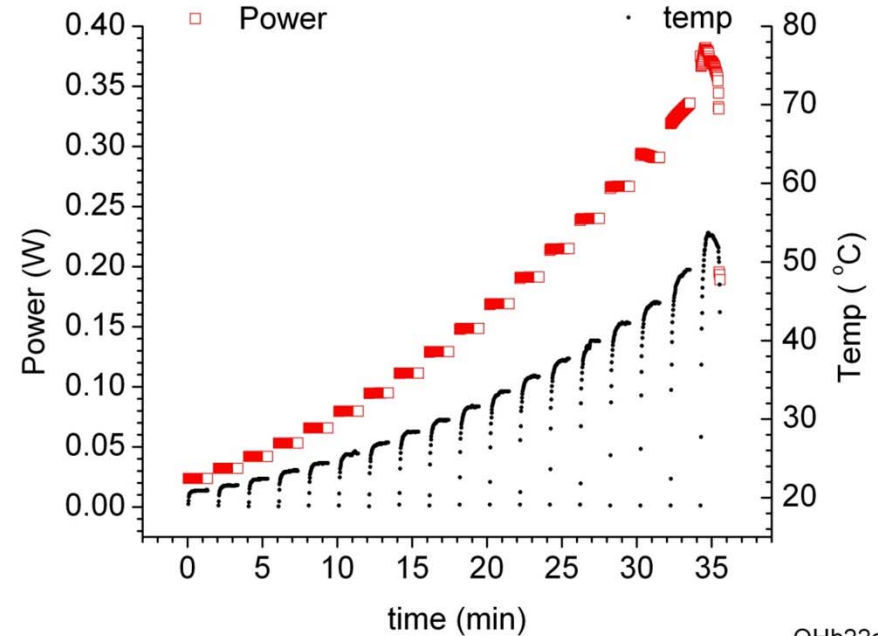
The corresponding surface temp, $t_{\text{max}} \cong 42 \text{ C}$

PDR test results [50 Ω TearDropperd Tee]

Example 2 poly:



OHb22



OHb22a

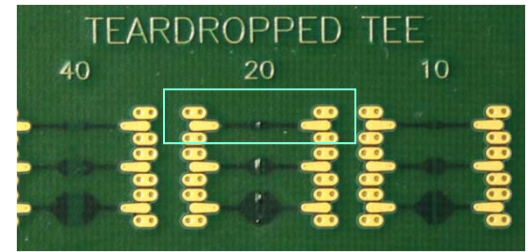
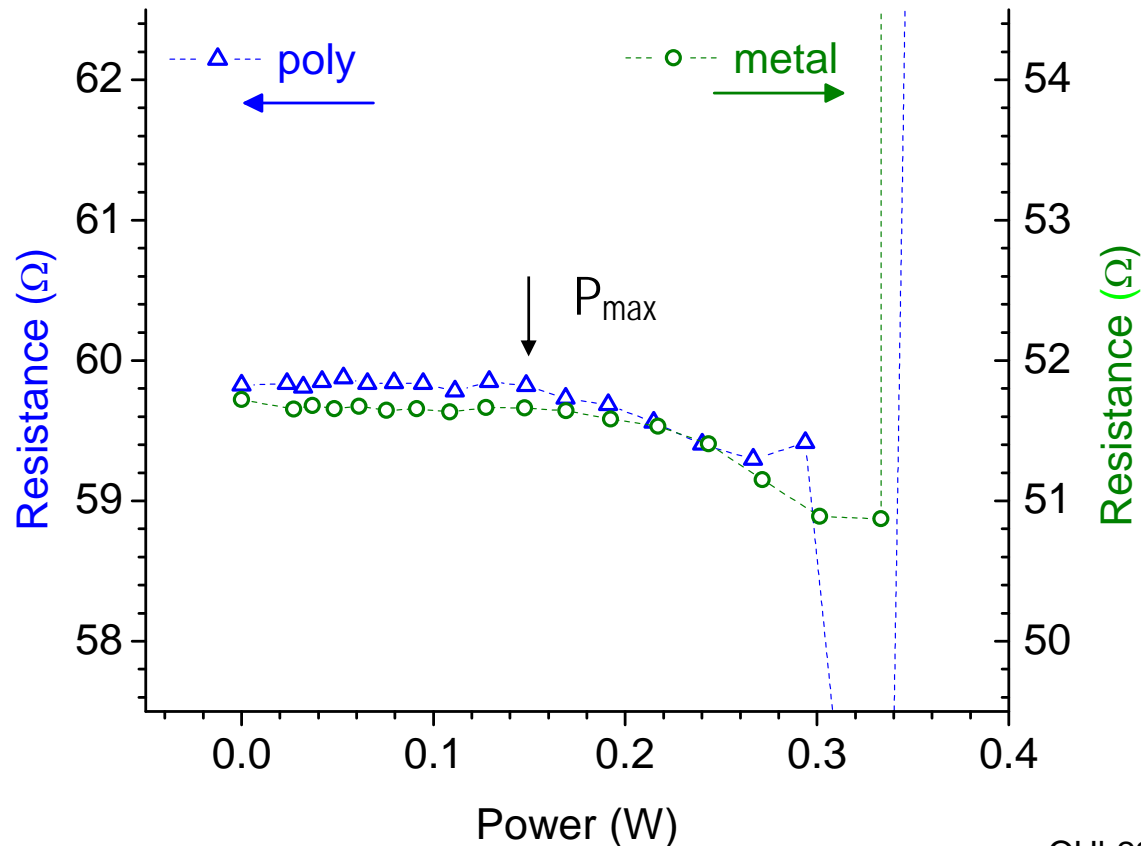
Test timing:

The resistor fails 'OPEN' at P_{failure} of 380 mW

The surface temp at failure is 54 $^{\circ}\text{C}$

PDR test results [50 Ω TearDropper Tee]

4-W Resistance at 20 °C



Resistance failure causes Blistering

PDR:

For 'poly; P_{max} is about 150 mW, $P_{failure}$ is 380 mW

The corresponding surface temp, $t_{max} \cong 32$ C, $t_{failure} = 54$ C

OHb22a

CONCLUSION

- In the failure range the resistance measurements should be accurate to within 0.1Ω
- The final failed resistance is an OPEN
- The power rating appears similar for the two tested TVs and seems to be independent of the resistive material
- For continuous operation at constant R_o , P_{\max} may need to be adjusted by a certain safety factor that can be deduced, for example, from aging/reliability study.