# Summary Run F17A

Johannes Staguhn, Dec. 10, 2001

F17A was the second run with **MoAu** devices which were read out with SQUID muxes. The devices in col 0 have bilayer ratios for high $T_C$ and no gold bars, no absorbers. The devices in col1 have bilayer ratios for low $T_C$ , small gold bars, no absorbers. Devices from the same wafer were also tested in the 4-wire resistance check run MoAu2.

The main goal of the run was to determine $T_C$ and noise performance of the devices. *All devices were not punched out, but on a complete membrane*, which has a significant effect on the thermal conductivity.

**Col 0, high $T_C$ devices**: These devices have a transition temperature of 494 +/- 5 mK. The mean normal resistance value for the working devices was ~110 mΩ. Figure 1 shows the DAC readout for a triangle wave with 2.3 μV p/p over the shunt. 2500 counts correspond to 4μA (1$\Phi_0$) current through the detector.

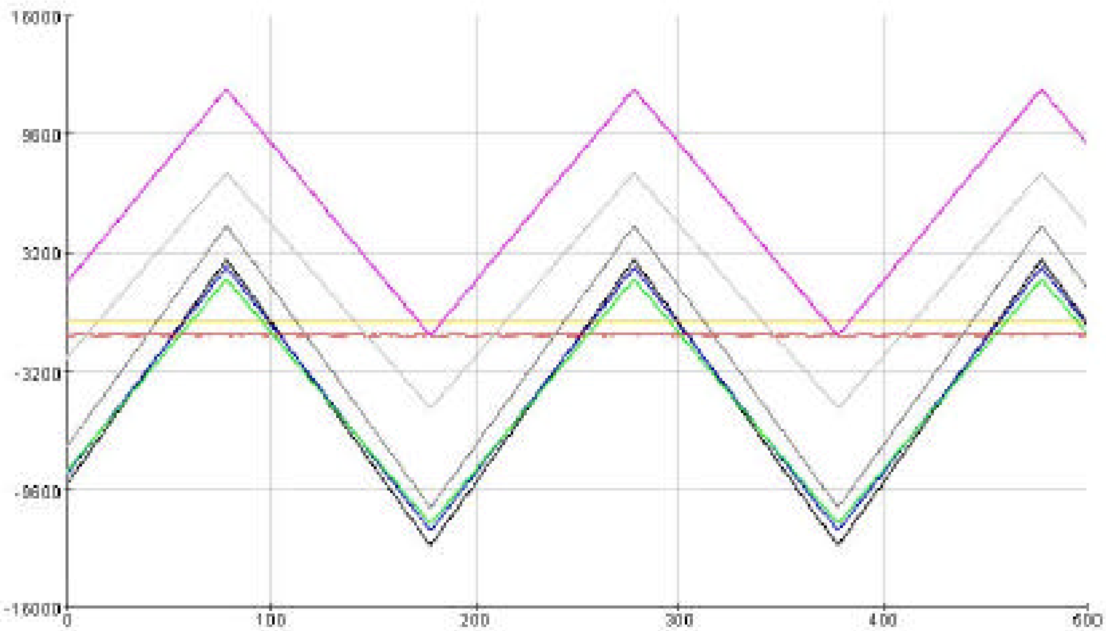


**Figure 1**

It was virtually impossible to keep the devices of col. 0 on the transition. They were extremely flaky. This is likely a consequence of the non-presence of the gold bars.

**Col. 1, low $T_C$ devices:** These devices have a transition temperature of 390 +/- 10 mK.The variations in resistance are significant. Figure 2 shows the DAC readout for a triangle wave with 2.3 μV p/p over the shunt. 2500 counts correspond to 4μA ($1\Phi_0$) current through the detector. The variations in the 4 working devices (Fig. 2) range from roughly 40mΩ to 60 mΩ (compare to Fig. 1 for col. 0)

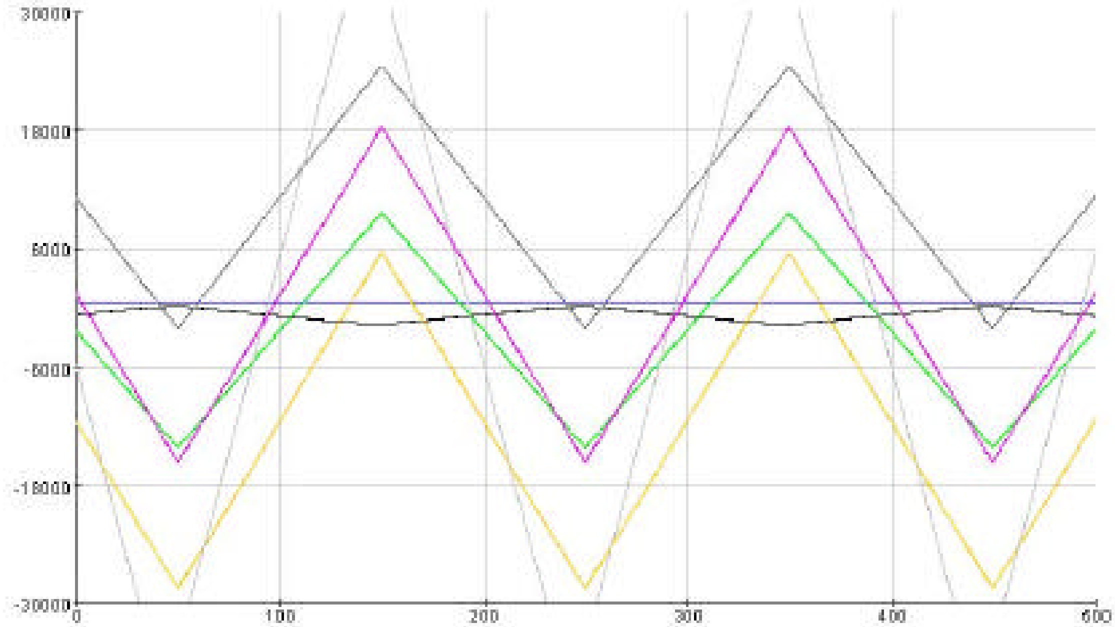

Figure 2: Note: The light grey line shows a shunted "device"

Only two channels were easily biasable.
Channel 4: 54 mΩ (26500 counts p/p) (dark grey line in Fig. 2)
Channel 5: 61 mΩ (23700 counts p/p) (green line in Fig. 2)

The devices showed significant excess noise at the lower bias range of the transition with high frequency bump around 4.5 kHz.
An example noise measurement is shown in Figs. 3 and 4.

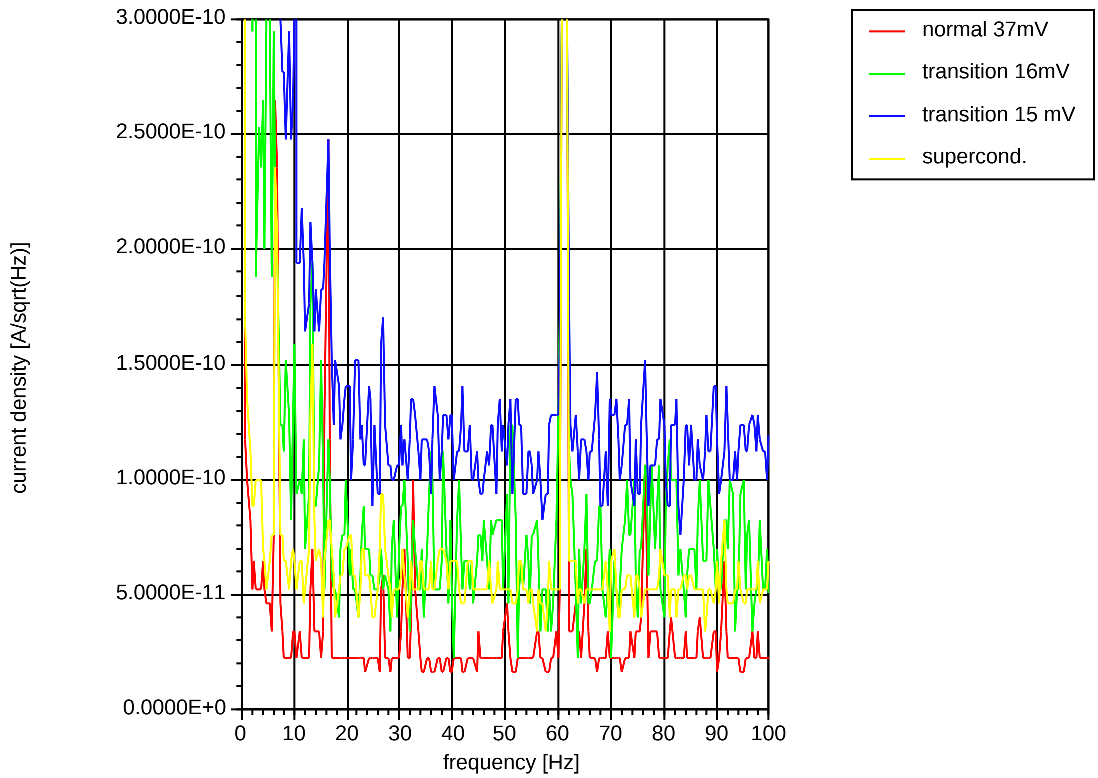


Fig. 3 Current noise vs Frequency for different bias of one low $T_C$ device.

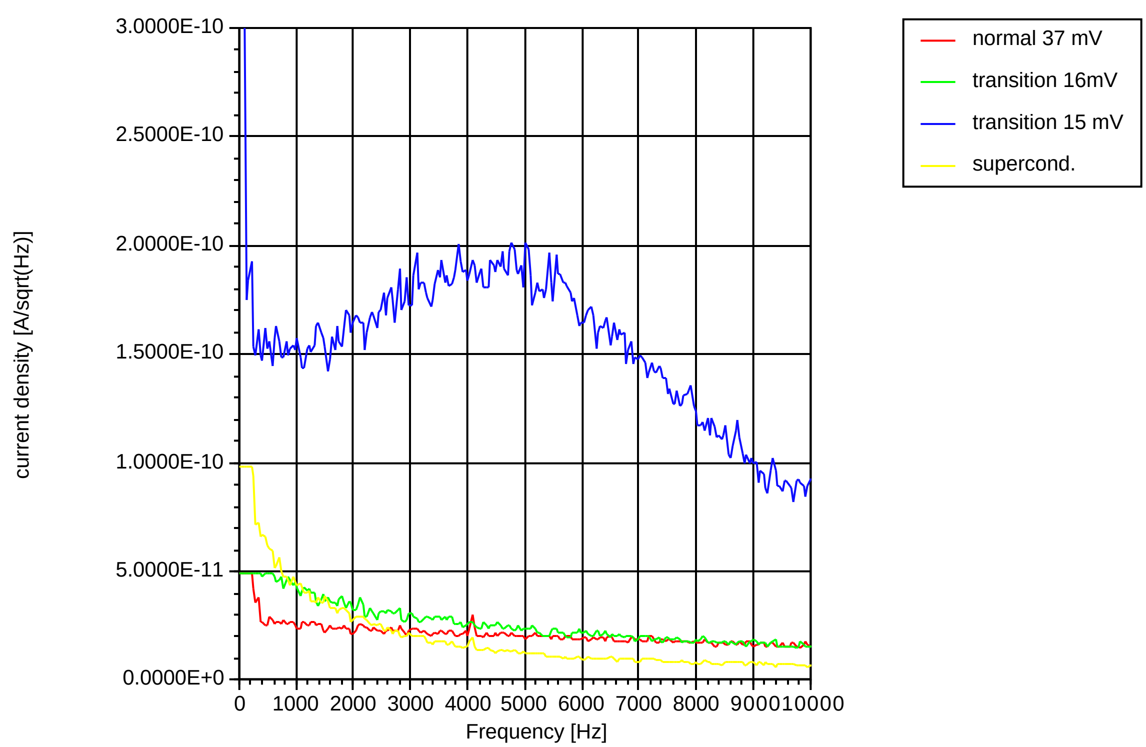


Fig. 4 Current noise vs Frequency for different bias voltages of the same low $T_C$ device as shown in Fig. 3.

### *thermal conductivity*

NOTE: Since the devices are nor punched out, the thermal conductivity is expected to be significantly higher than it would be if the pixels were punched out.

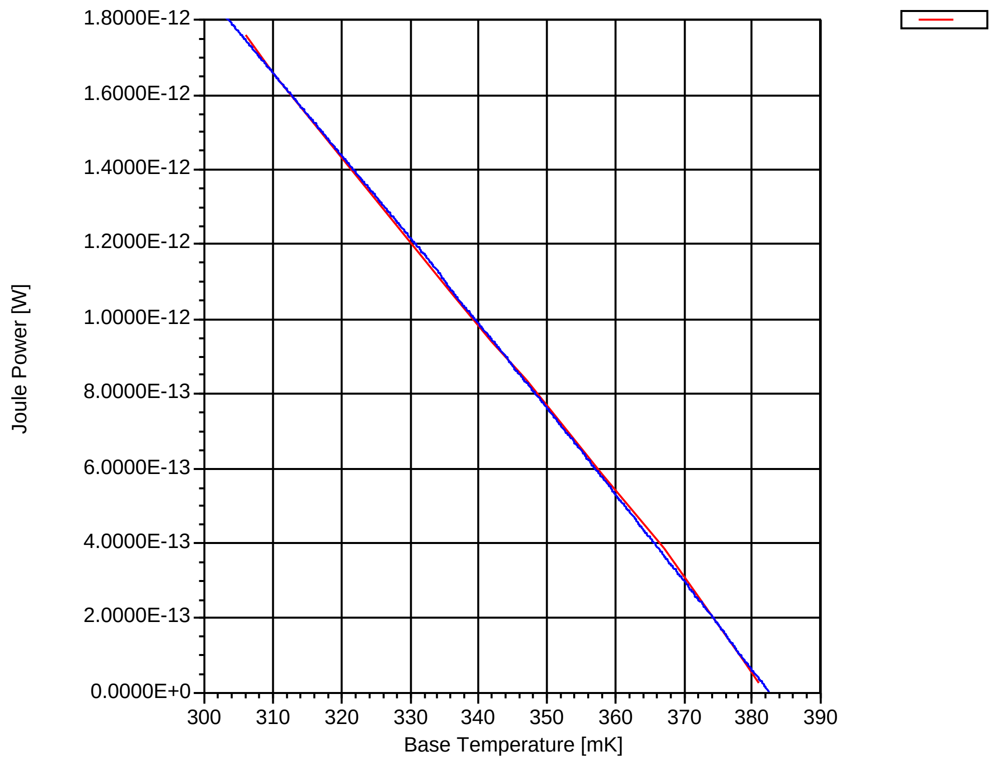


Figure 5 Dissipated Joule power in the devices vs. base temperature.
The red line represents the data, the blue line is the fit.

A fit to the equation $P= G_0 (T_C^{n+1} - T_{base}^{n+1})/(n+1)$
yields:

$G_0 = 3.5\ 10^{-11}\ W/K^{n+1}$
N = 0.4
$T_C = 383$ mK