

Supplementary Information

“Cryogenic RF-to-Microwave Transducer based on a DC-Biased Electromechanical System”

1 Cryostat Wiring

The electromechanical and transduction experiments performed in this article have been carried out in a suspended dilution cryostat LD250 from Bluefors at 10 mK temperature. Fig. 1 shows the cryostat wiring.

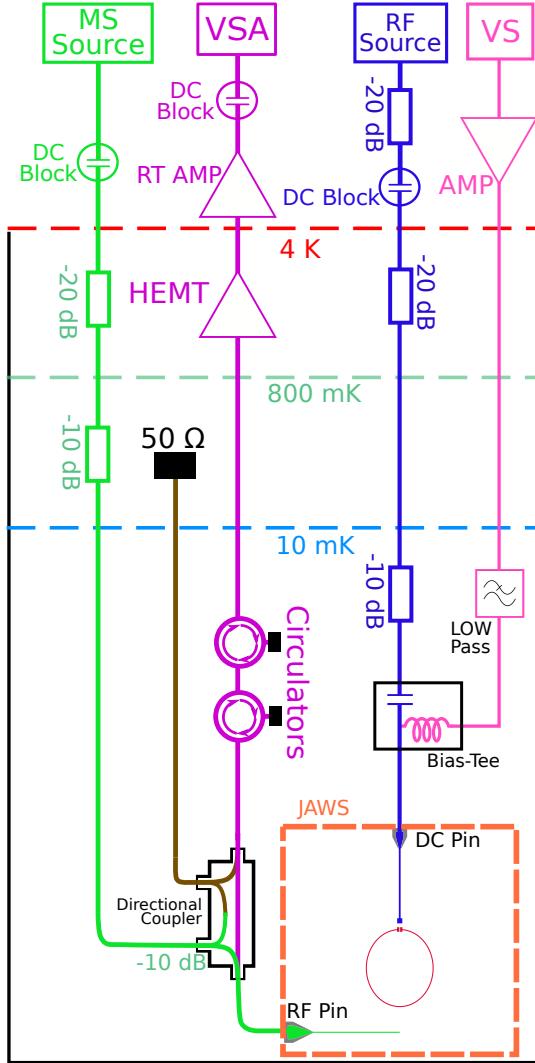


Figure 1: The sample holder (microwave-shielding box) is shown in the 10 mK stage (orange dashed line). The read-out line input (green line) is connected to a microwave source at room temperature. The signal is attenuated by 20 dB at 4 K and 10 dB at 800 mK. A directional coupler (adding 10 dB attenuation, with power dissipated in a 50Ω load at 800 mK), is then inserted before entering the microwave-shielding box. The reflected signal (purple line) is directed to a double circulator (one port of the circulators is blocked by 50Ω loads), and then amplified at 4 K with a HEMT (37 dB gain) and then to a room-temperature amplifier (40 dB gain), before entering a VSA. The rf input signal (blue line) is attenuated by 20 dB at 4 K, and then 10 dB at 10 mK, before entering the dc port of a bias-tee. The voltage source (VS) provides the bias voltage via a high voltage amplifier, which is filtered by a QDevil Qfilter double stage low pass filter (with internal resistance of 1700Ω) before being connected to the dc port of the bias tee.