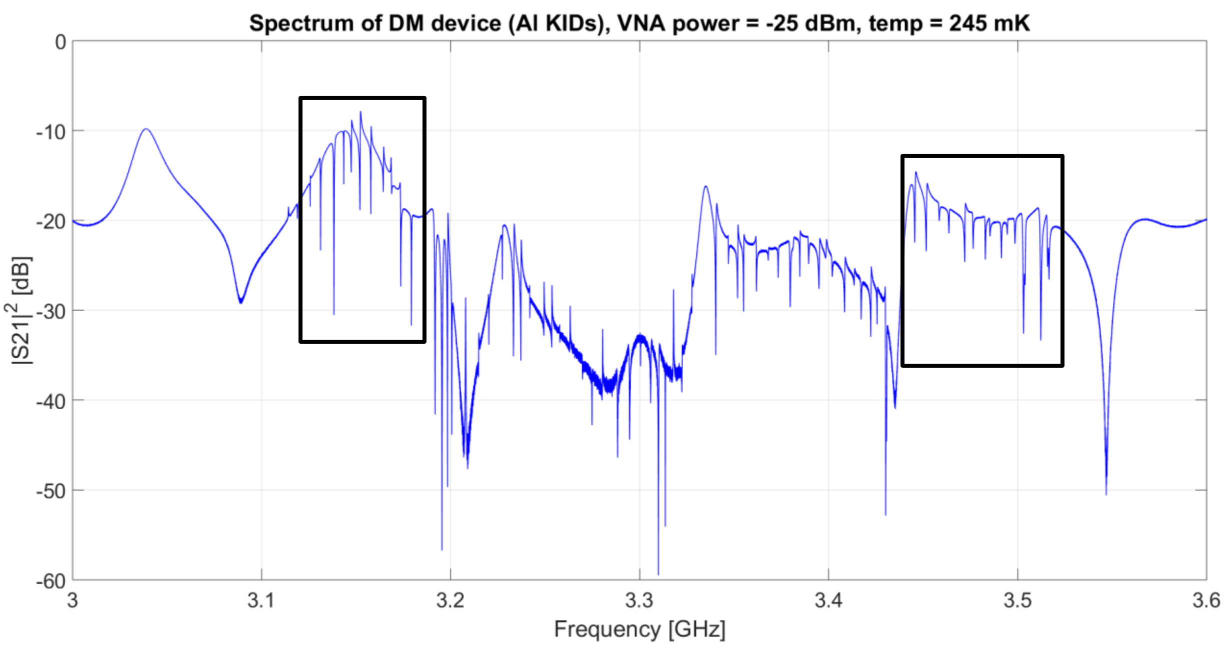
DM Device

The resonances are between 3.1 GHz and 3.6 GHz. The measurements were done with the cryogenic amplifier 4 (CIT LF1 S/N 128) in the yellow cryostat which can go down to 240 mK.

The data was taken with 2 additional warm amplifiers Mini-Circuit ZJL-4HG+ (which have about +15 dB of gain each between 3.1 GHz and 3.6 GHz, and 490 K of noise temperature).

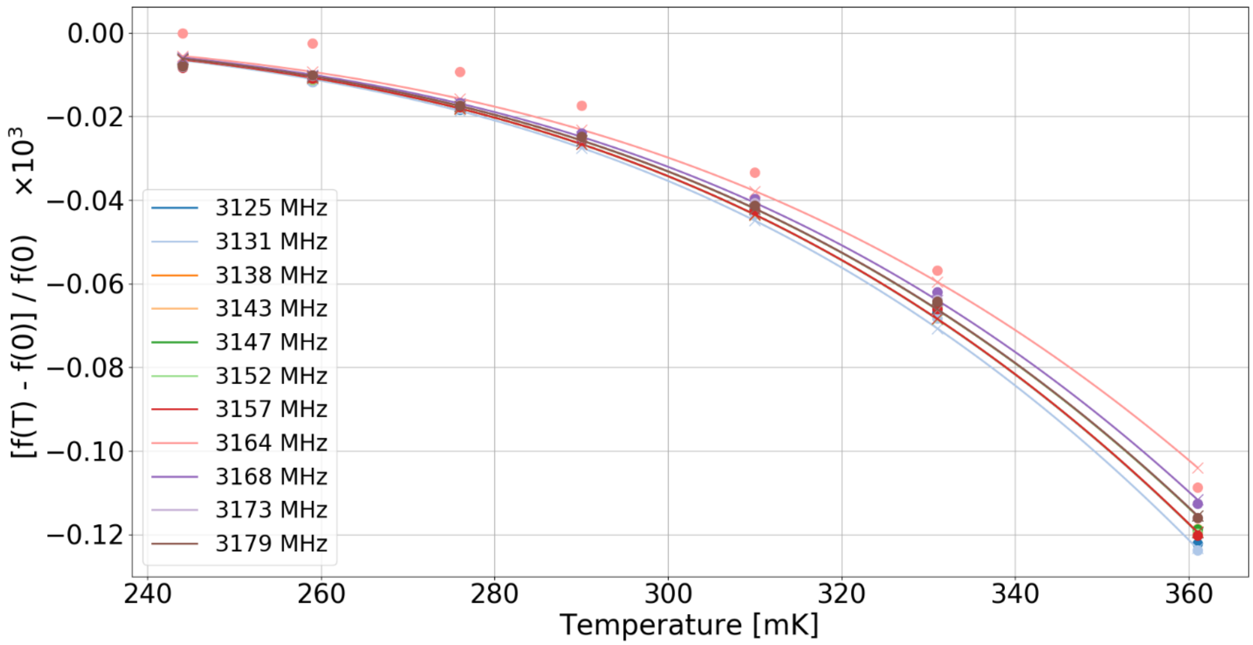
The resonances scanned for the measurements correspond to the 2 regions inside the black squares in the picture below. These resonances were chosen because they were the least noisy. In the rest of this document, only the results of data from square 1 are shown. The results of the second set of data are present in the data folder (but both data sets give similar results).

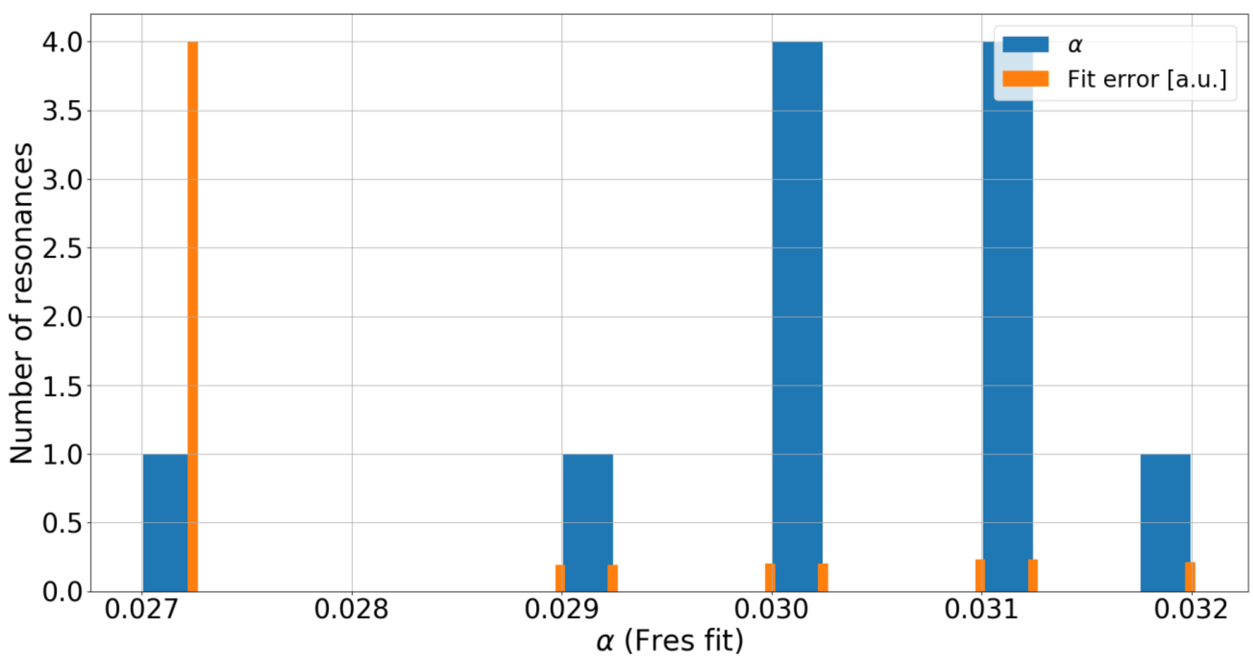


Temperature sweep: Mattis-Bardeen fit:

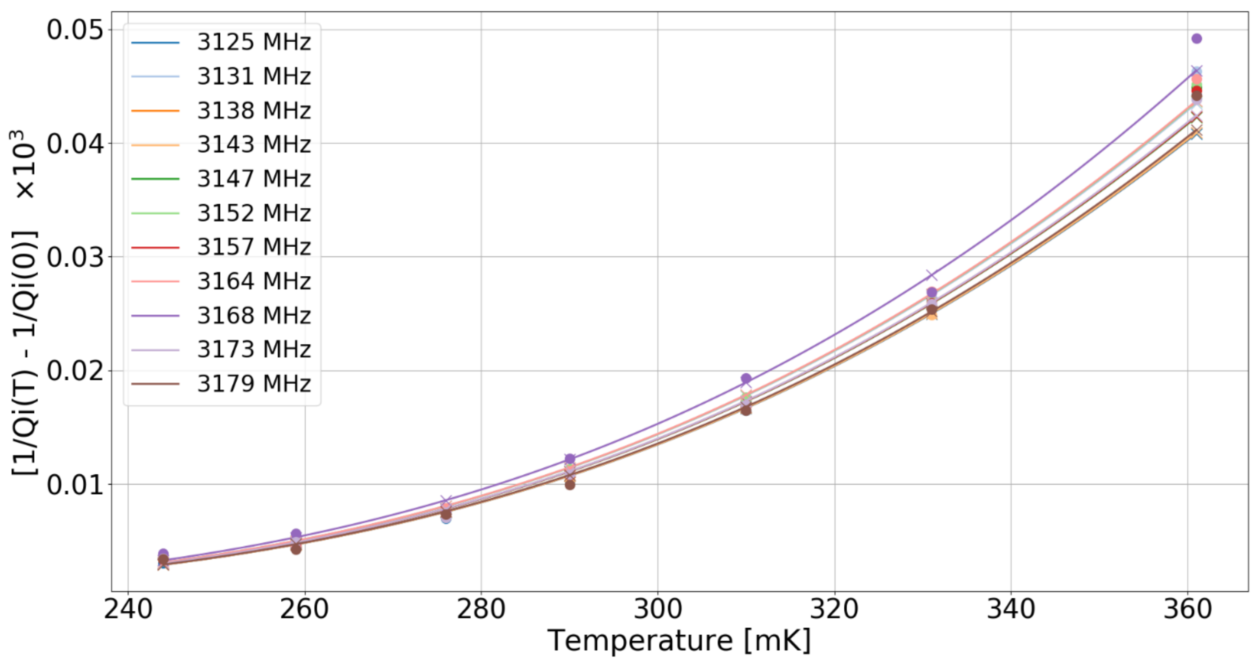
In order to be able to fit the data correctly, the parameter delta (band gap) was determined before. As the critical temperature of aluminum is 1.2 K, the band gap is approximately 3.52*Tc*kb/2 = 0.182 meV.

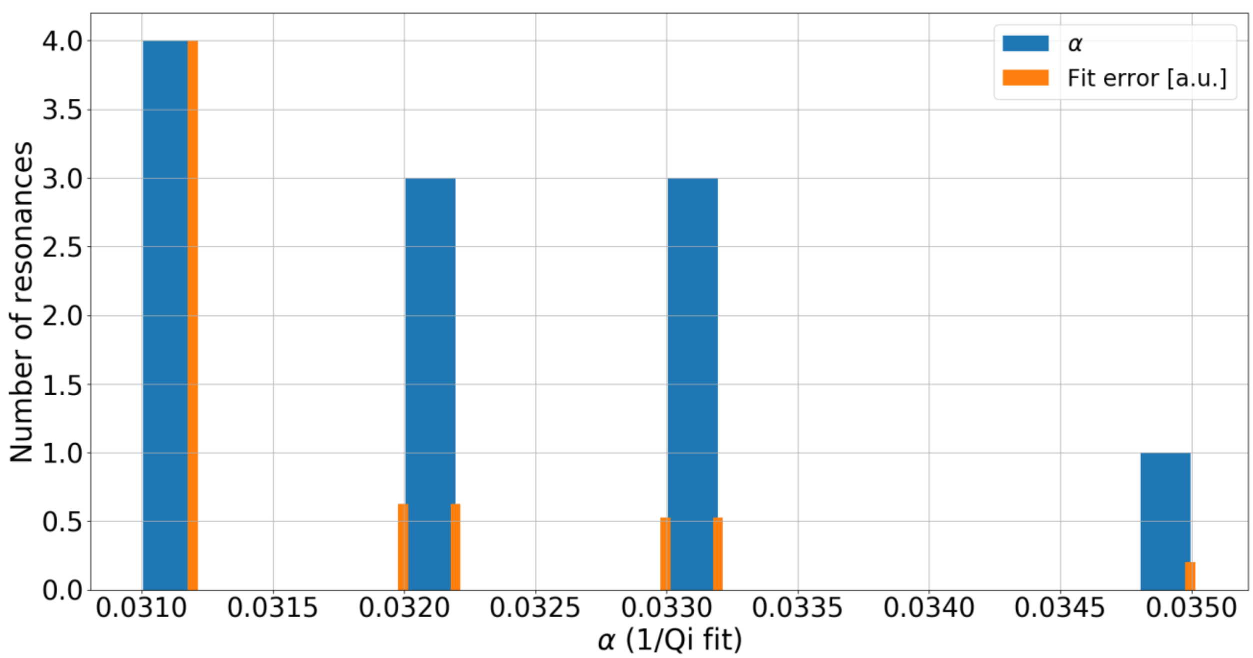
The fit with the variation of fres as a function of temperature give a parameter alpha equal to [0.029, 0.031].





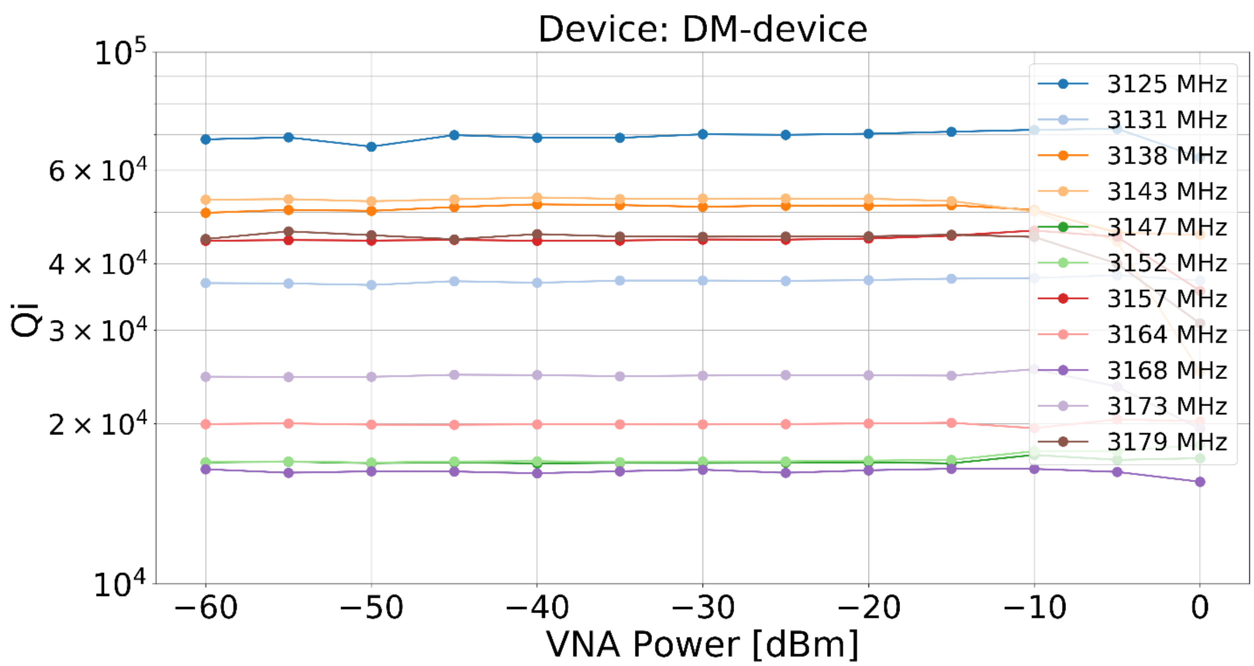
The fit with the variation of 1/Qi as a function of temperature give a parameter alpha equal approximately [0.031 – 0.033].





As a result, both fits (fres and 1/Qi) give similar vaules for alpha (approximately 0.031).

The evolution of Qi as a function of readout power shows a creation of quasiparticles at about -5 dBm (VNA power), so approximately -35 dBm at the device. We can also note that Qi is between 1e4 and 7e4.



The internal quality factor also decreases with temperature.