Recalibration of Lowband Receiver 01 25C

Leroy Johnson, Titu Samson, Steven Murray, Nivedita Mahesh

Introduction

- Here we show the calibration results for the Low Band 1 receiver at 25◦C.
- The specific calibrations considered correspond to Low-Band 1 receiver done in 2020_01.
- The calibration coeeficients were estimated for the frequency range:
  - 50-190 MHz.
- As a precaution, in order to avoid periods of instability of the calibrators, we remove ~ 5% of the data at the beginning of each period covered by the listed spectra files.

Files used:

/data5/edges/data/Receiver01_2020_01_09_040_to_200/25C

s11:

/data5/edges/data/Receiver01_2020_01_09_040_to_200/25C/S11/

Note: The s11's used in this report were the first measurement in each set.

Standards used:

Male standard - Maury Kit - 50.16 ohm (25 degC)

Female Standard - EDGES Keysight - 49.98 ohm (25 degC)

Temperature of calibration loads @ 25C

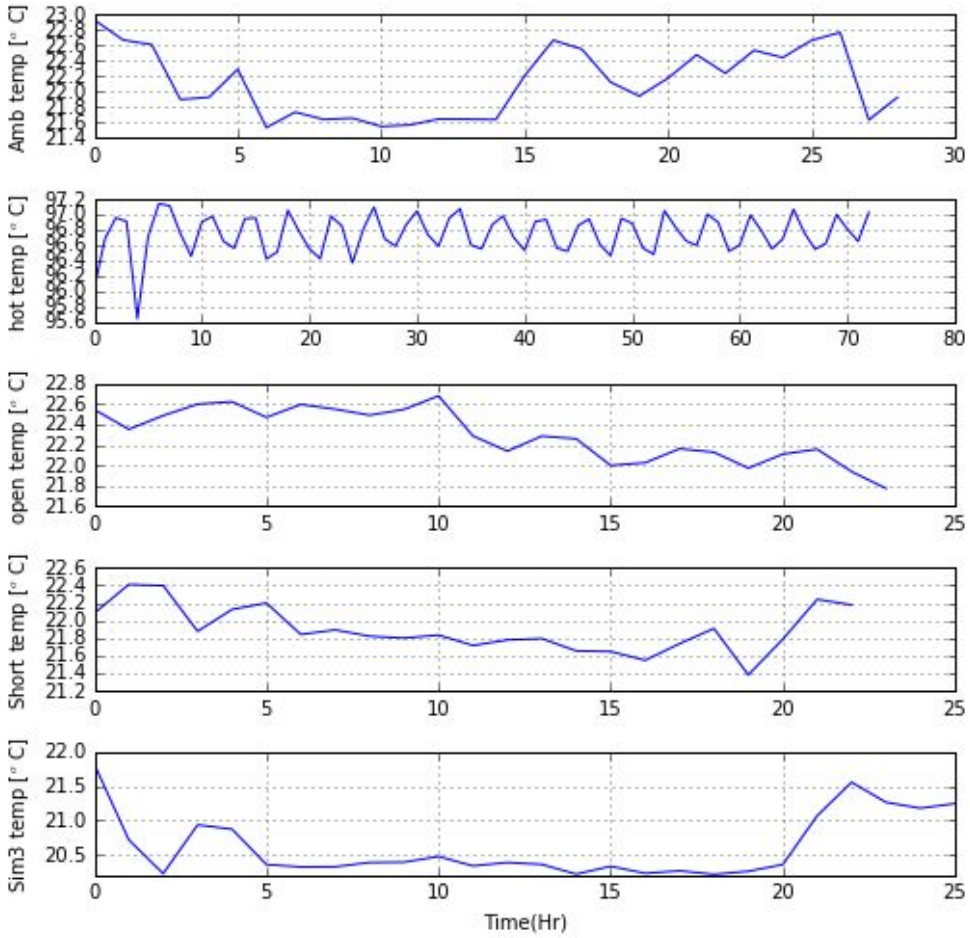


Figure1: Temperature of the calibration loads and antenna simulator 3.

Spectra data @ 25C for the loads

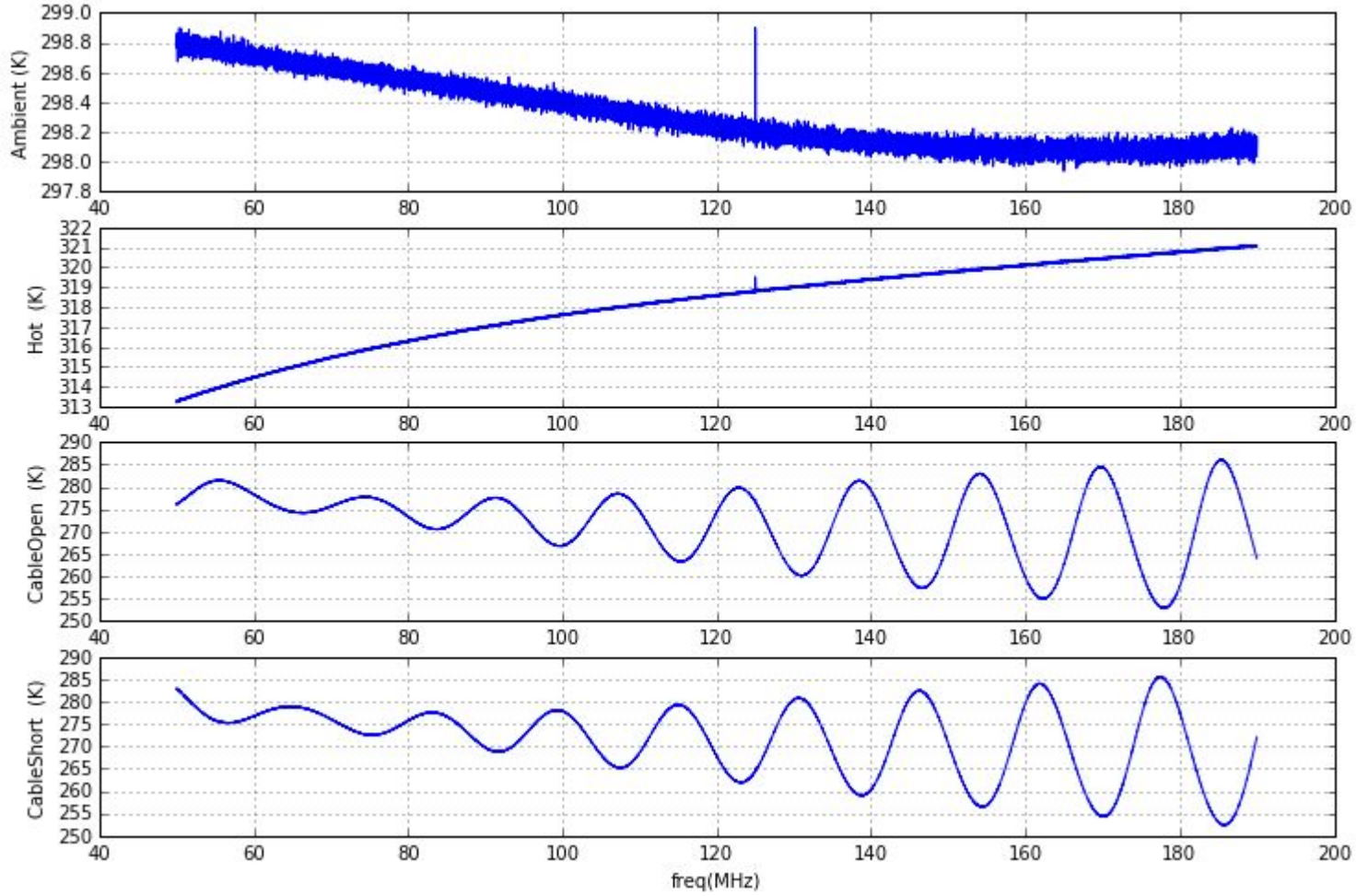


Figure2: Raw spectra of the calibration loads. RFI seen in Ambload

Spectra data @ 25C for the loads

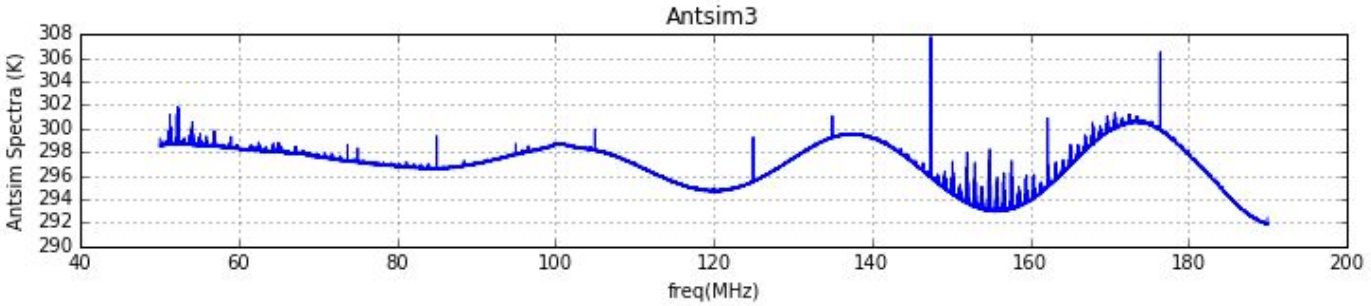
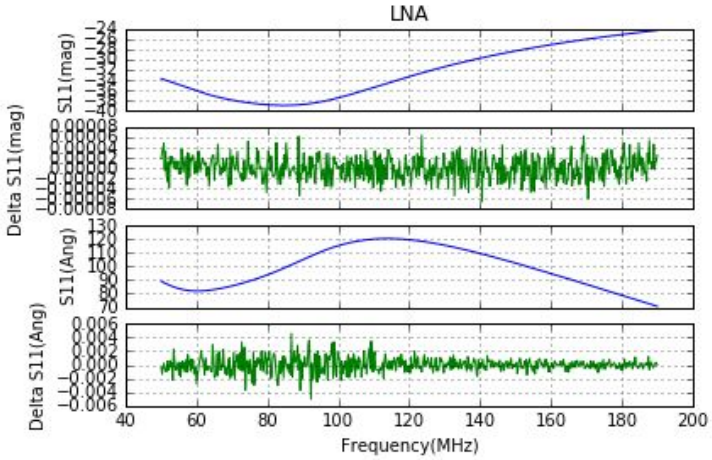


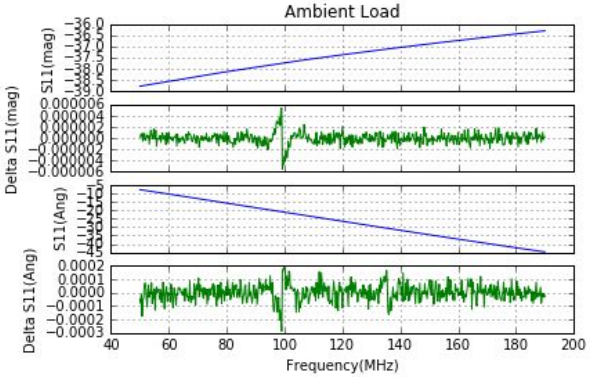
Figure2b: Raw spectra of the calibration loads. A lot of RFI

Reflection coefficients of the loads @25C; Freq: 50-190MHz

47 polynomial terms



37 fourier terms



37 fourier terms

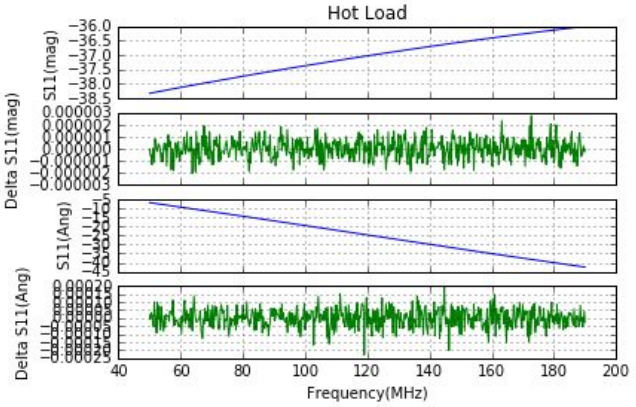
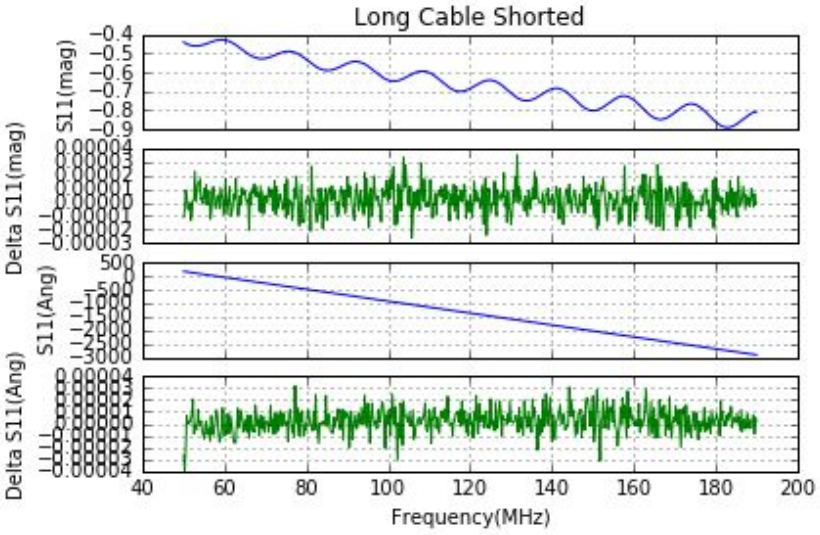


Figure3a: Reflection coefficients of the LNA and the calibration loads. Blue is the fit to the S11s (mag & phase). Green is the difference between the fits and the actual measurements for each respective case.

Reflection coefficients of the loads @25C

187 fourier terms



105 fourier terms

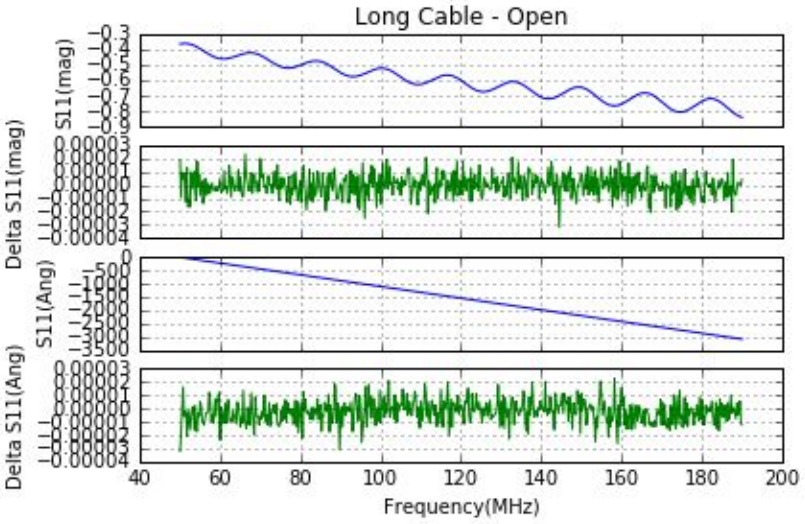


Figure3b: Reflection coefficients of the long cables. Blue is the fit to the S11s (mag & phase). Green is the difference between the fits and the actual measurements for each respective case.

Reflection coefficients of the loads @25C

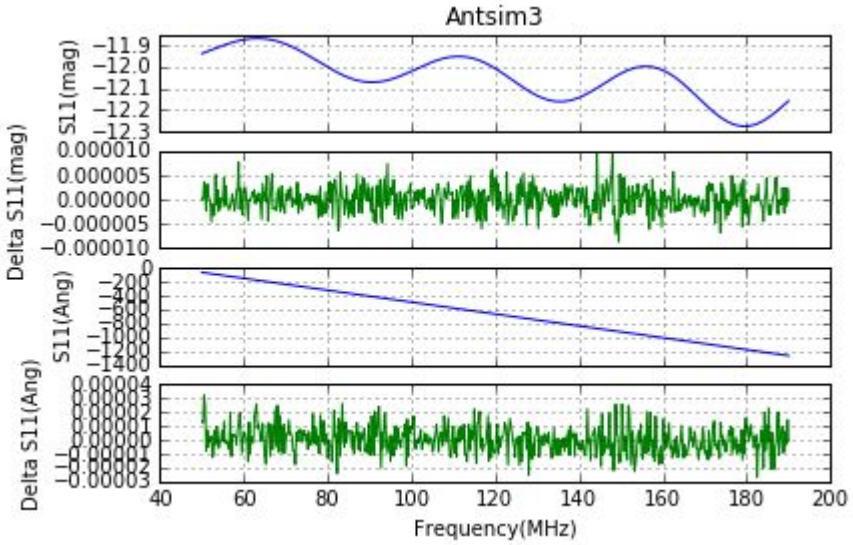
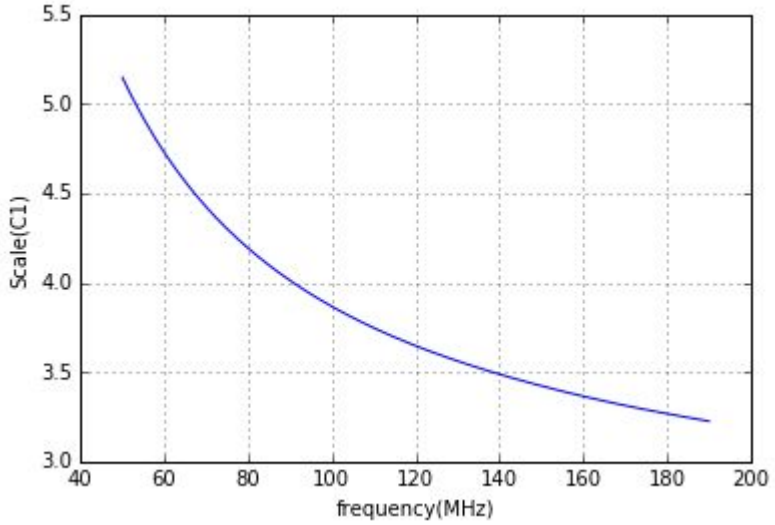
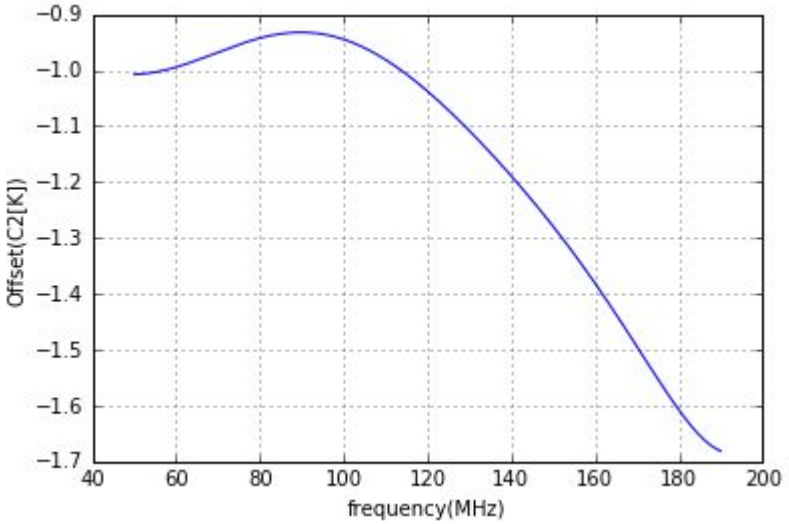
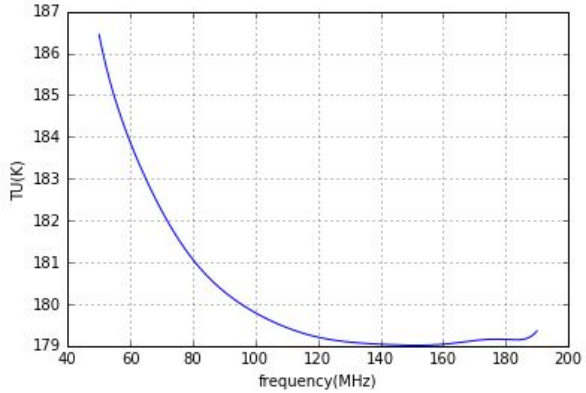


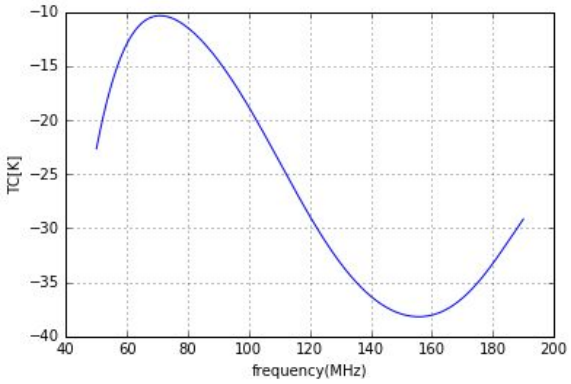
Figure3c: Reflection coefficients of the long cables. Blue is the fit to the S11s (mag & phase). Green is the difference between the fits and the actual measurements for each respective case.

Cal coefficients derived from 25C; Freq: 50-190MHz









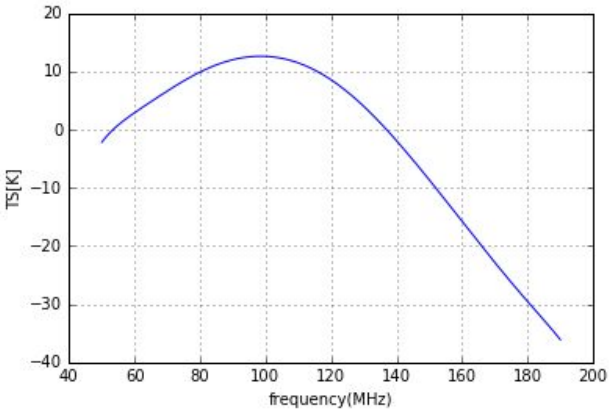
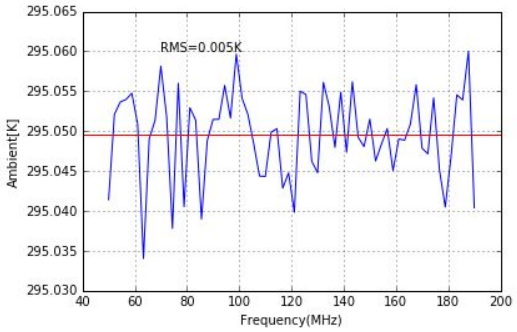
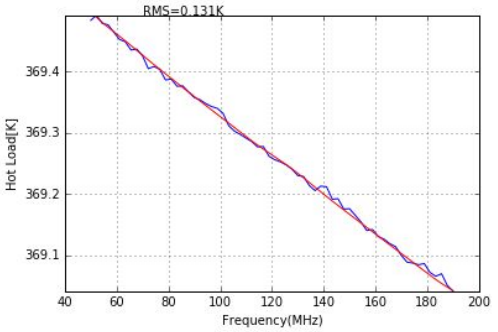
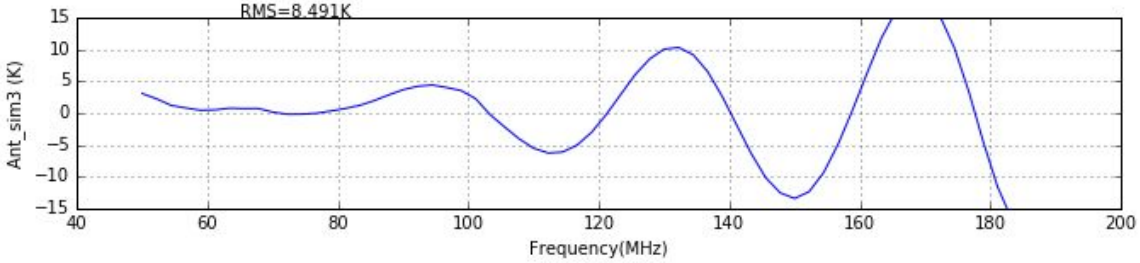


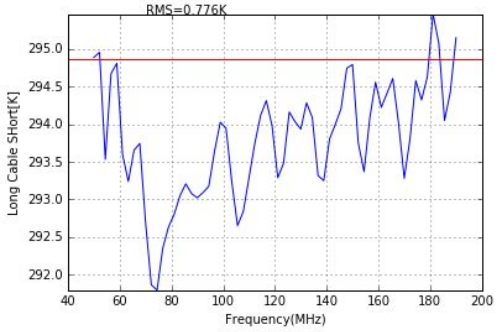
Figure4: Calibration parameters for the Low-Band 1 receiver. Over 50-190 MHz, we use 8 terms to model C1 & C2 and 11 terms to model Tu,Tc,Ts.

Calibration Cross check for 25 C; Freq: 50-190 MHz (w/ Ant_sim3)
Case1 - 8 terms for constants and 11 terms for noise wave parameters









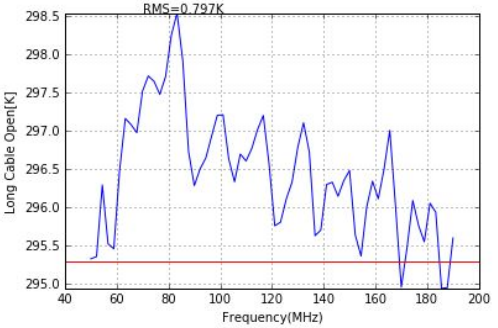


Figure5a: Cross checks for calibration of Low-Band 1, 2020-01.