Recalibration of Lowband Receiver 01 25C

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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 2018_01.
- The calibration coeeficients were estimated for two frequency ranges:
  - 50 -100 MHz (This was done so that one to one comparison could be made with the results from August 2015)
  - 50-190 MHz.
- The calibration coeffecients obtained were compared with the ones obtained in August 2015
- The Calibration coeffecients over the 50-190MHz were calculated for different cases
  - One such case is using a different set for resistances for the calibration standards(Male & Female).
- 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_2018_01_08_040_to_200/25C

Corrected s11:
/data5/edges/data/Receiver01_2018_01_08_040_to_200/25C/S11/corrected

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

Standards used:

Male standard - Phil's Kit - 50.027 ohm (25 degC)

Female Standard - EDGES Keysight - 50.009 ohm (25 degC)

Temperature of calibration loads @ 25C

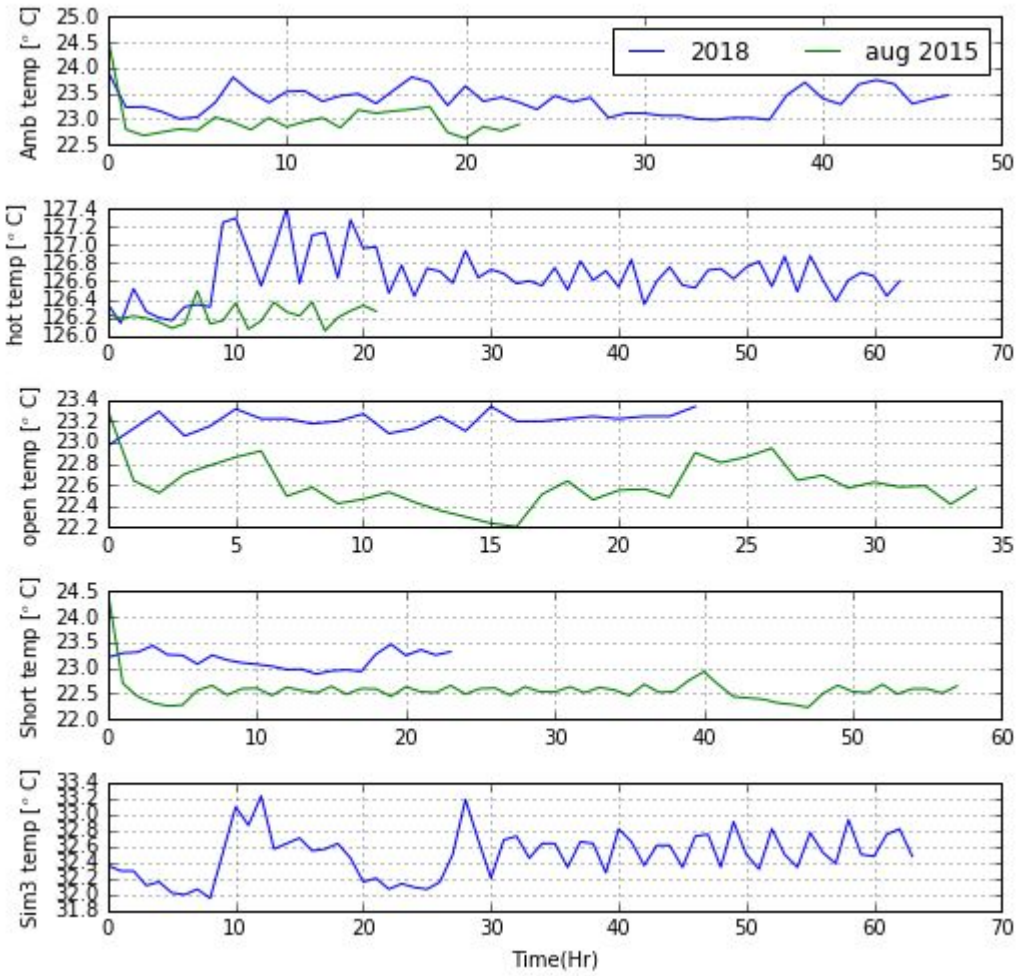


Figure2: Temperature of the calibration loads and antenna simulator 3. Also shown for comparison is the temperature of the calibration loads obtained during the calibration of Lowband1 in august 2015

Spectra data @ 25C for the loads

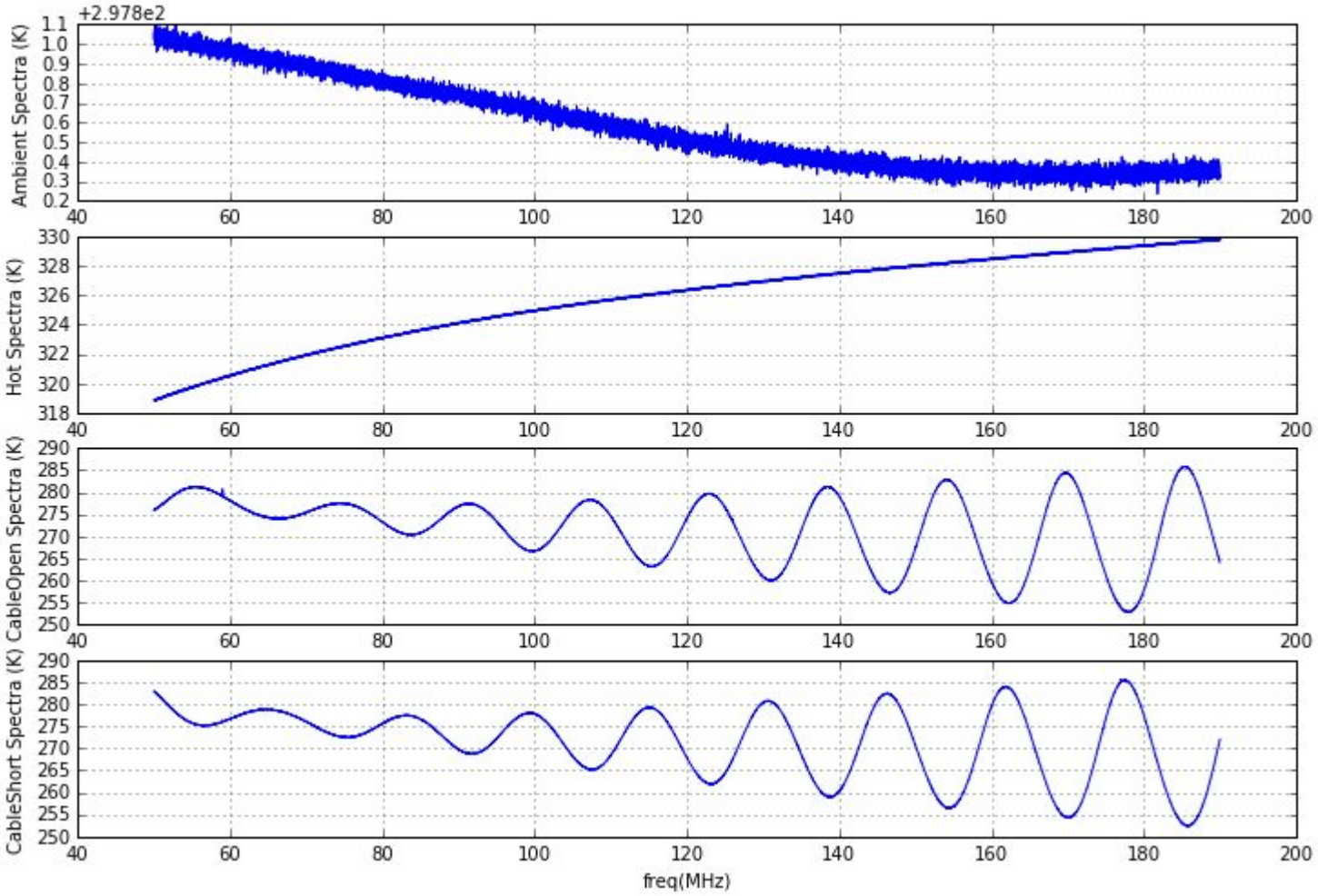
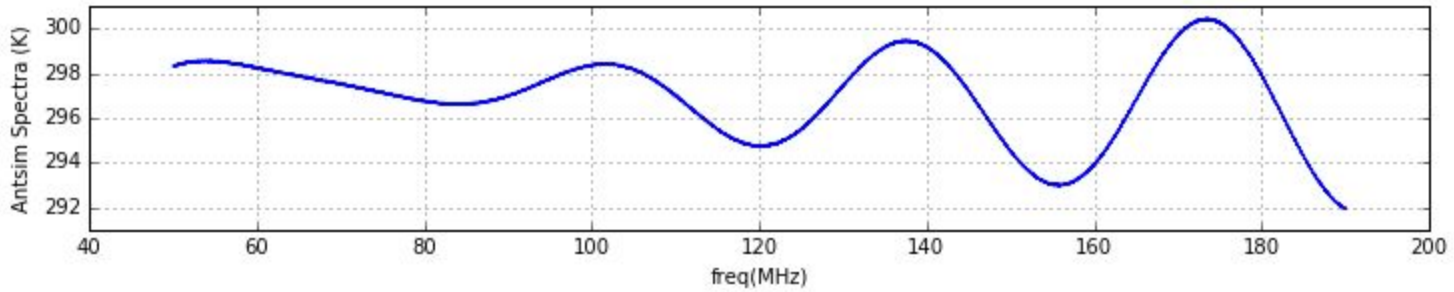
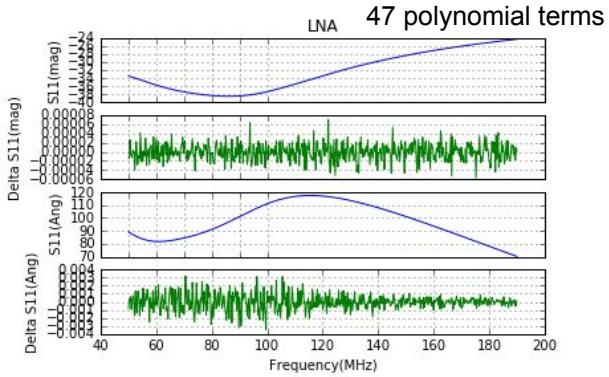


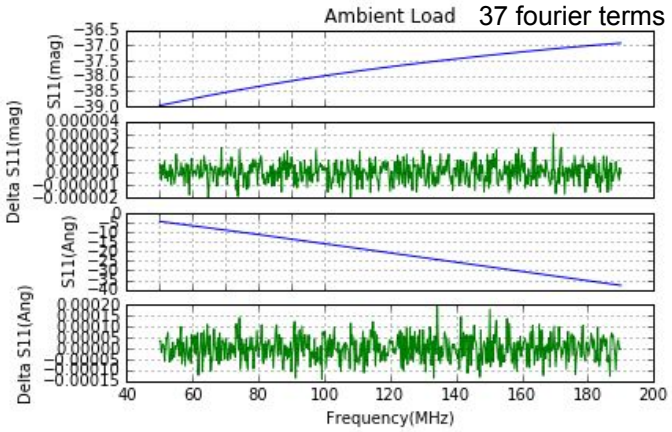
Figure1: Raw spectra of the calibration loads. Spectra looks clean without any RFI

Spectra data @ 25C for the loads



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





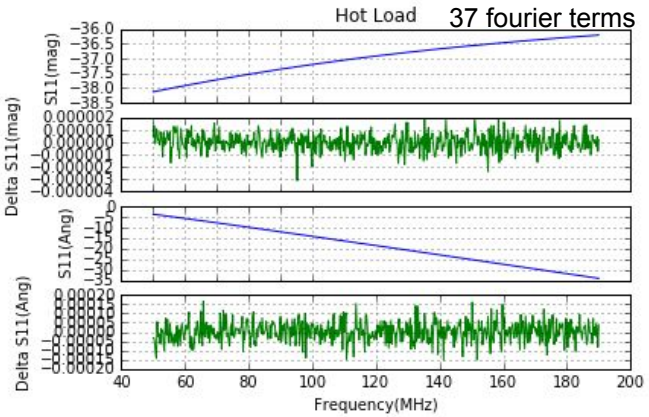
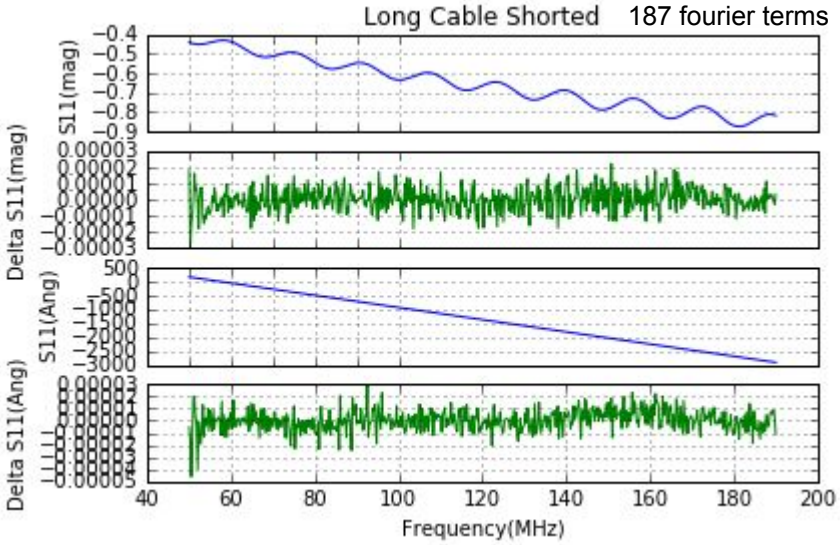


Figure2a: Reflection coefficients of the LNA and the calibration loads. Blue is the fit to the S11s (mag & phase). Green is the difference between the fits and the actual measurements for each respective case.

Reflection coefficients of the loads @25C



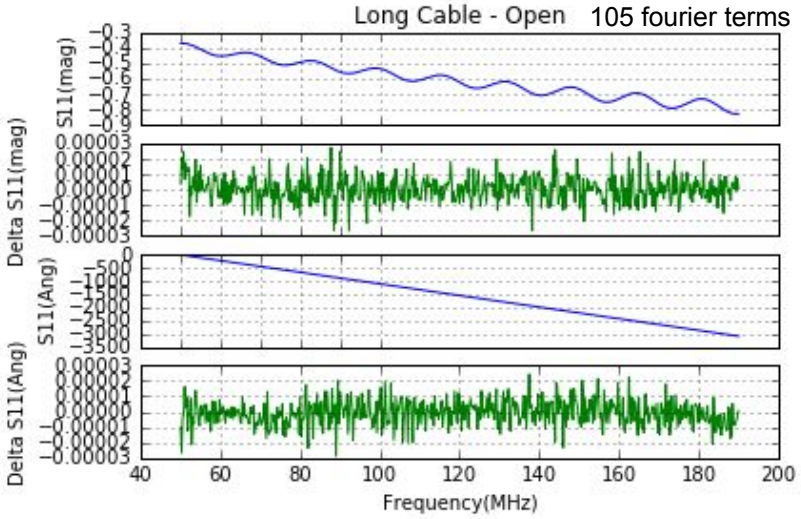
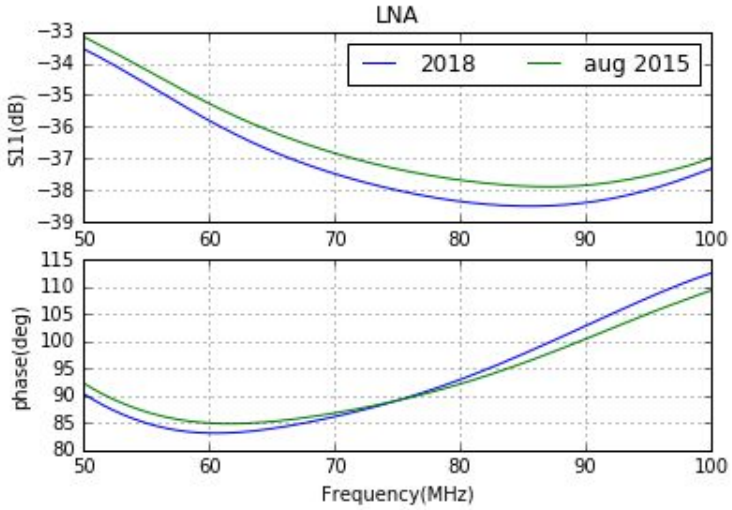
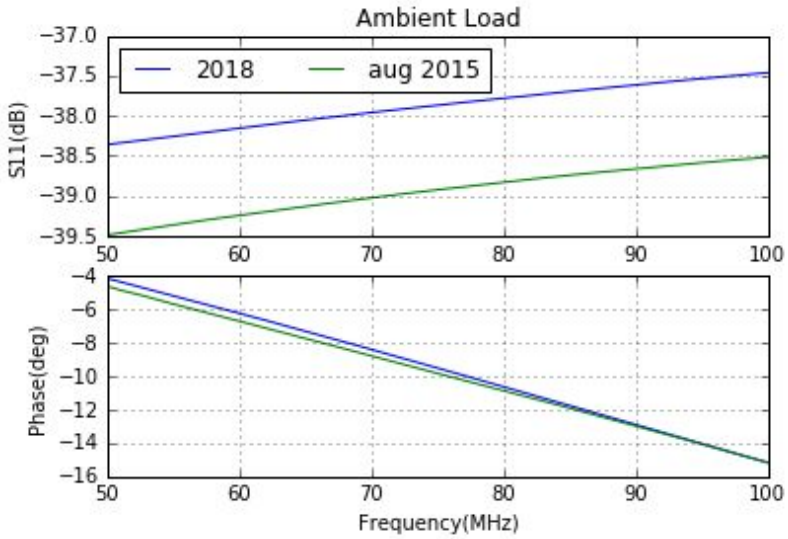


Figure2b: Reflection coefficients of the long cables. Blue is the fit to the S11s (mag & phase). Green is the difference between the fits and the actual measurements for each respective case.

Reflection coefficients of the loads @25C





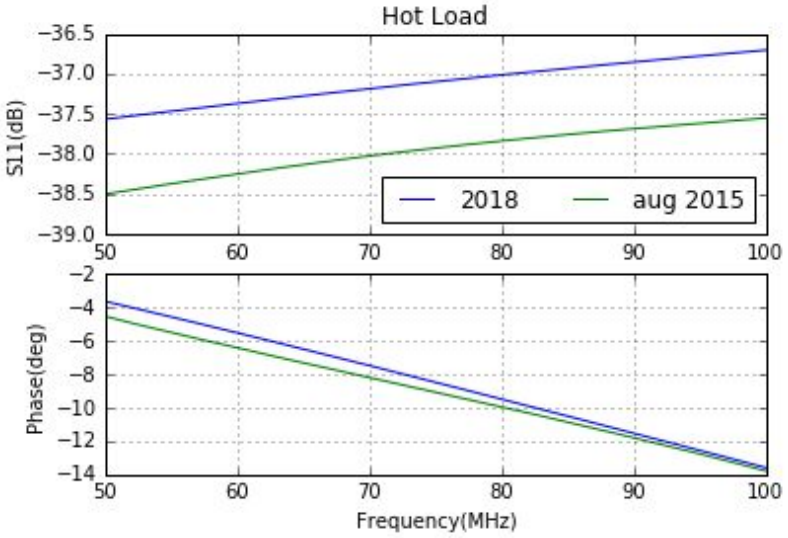
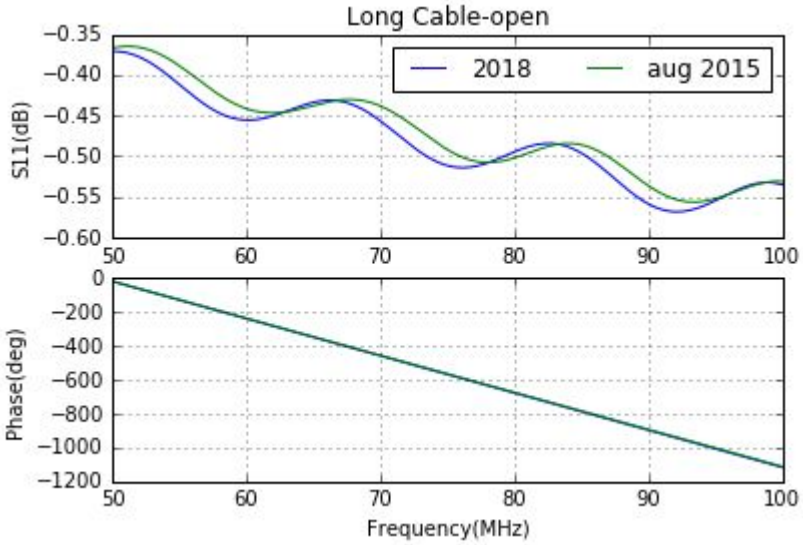
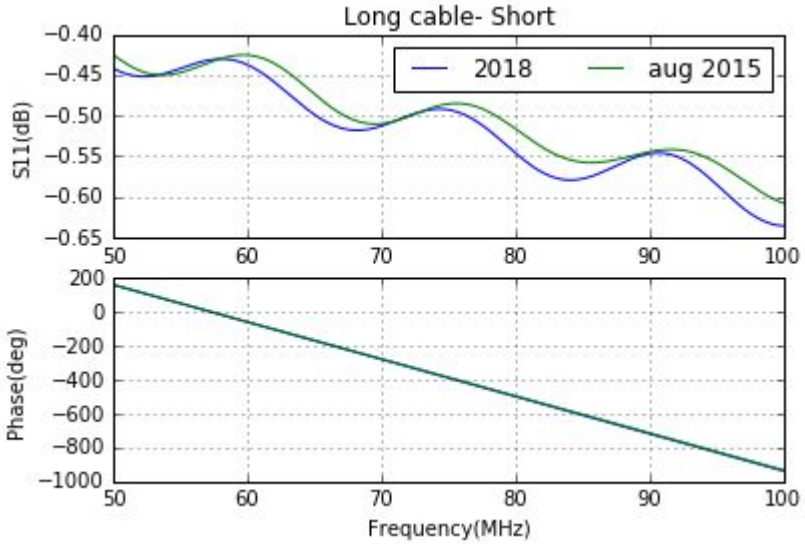


Figure3a: Reflection coefficients (Mag -top panel & phase- bottom panel) of the LNA and the calibration loads. Show for comparison are the reflection coefficients from the 2015 calibration run.

Reflection coefficients of the loads @25C





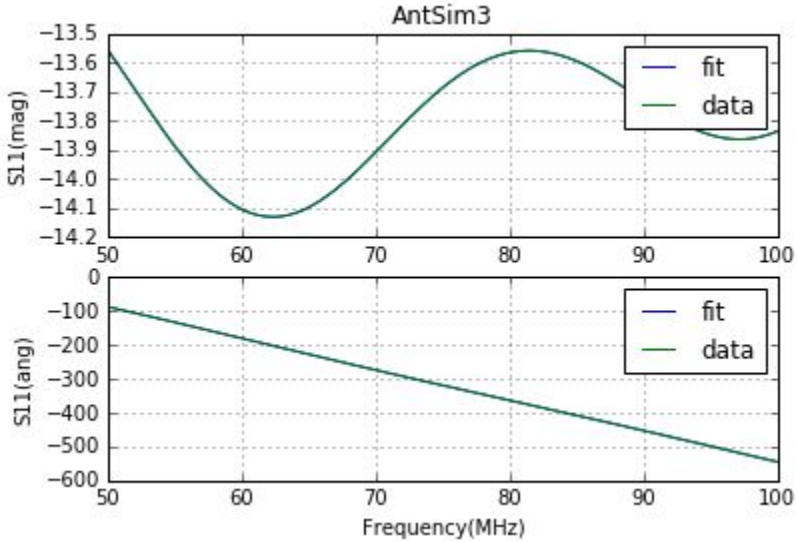
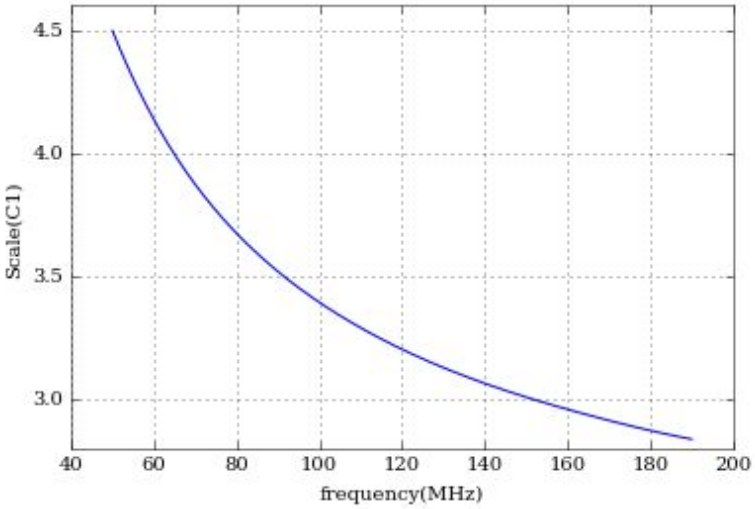
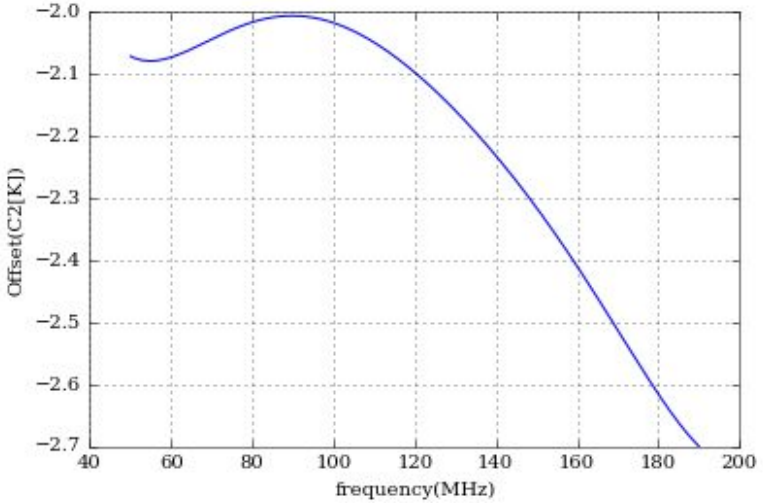
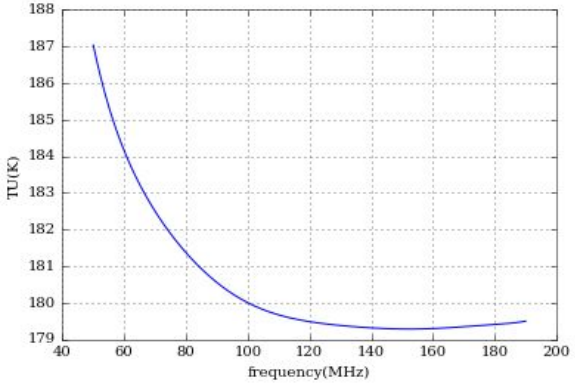


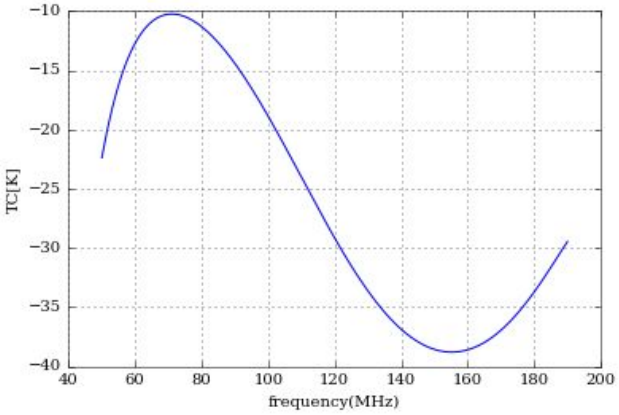
Figure3b: Reflection coefficients (Mag -top panel & phase- bottom panel) of the LNA and the calibration loads. Show for comparison are the reflection coefficients from the 2015 calibration run.

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









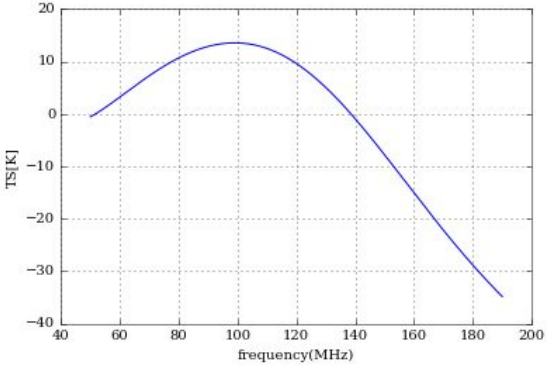
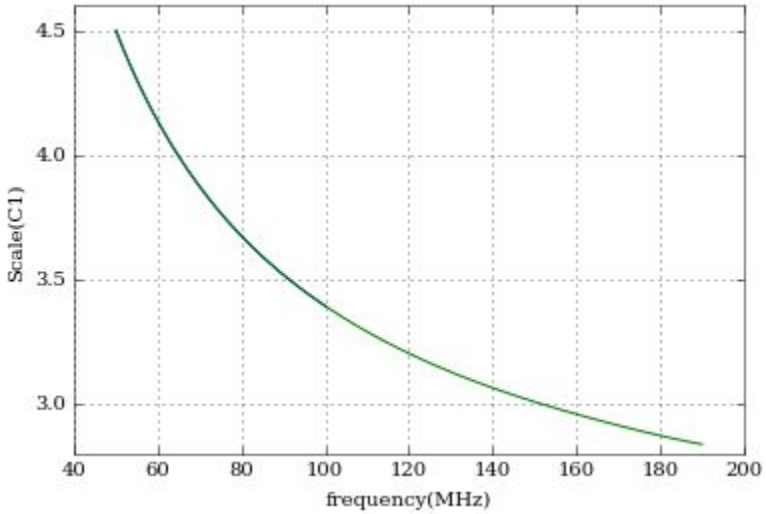
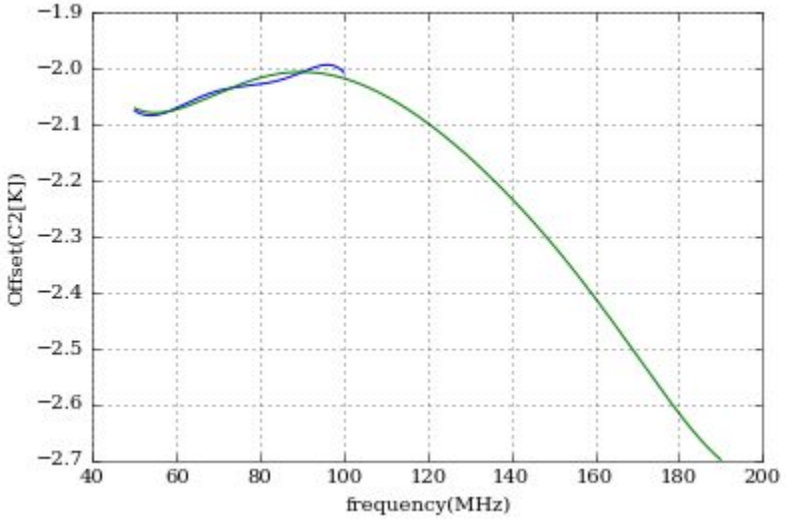
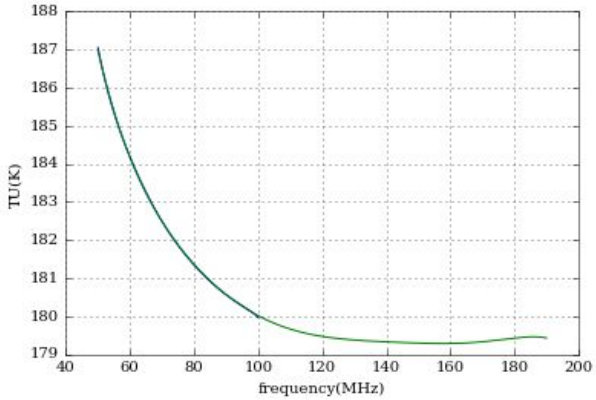


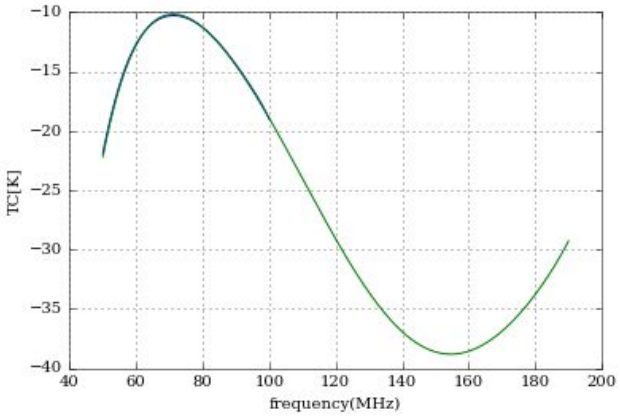
Figure4: Calibration parameters for the Low-Band 1 receiver. Over 50-190 MHz, we use 7 terms to model C1 & C2 and 9 terms to model Tu,Tc,Ts.

Cal coefficients derived from 25C; Comparing freq ranges









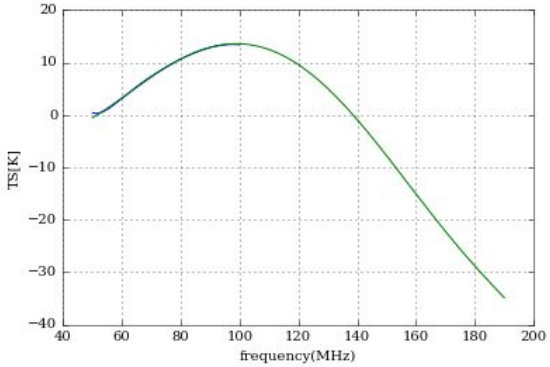
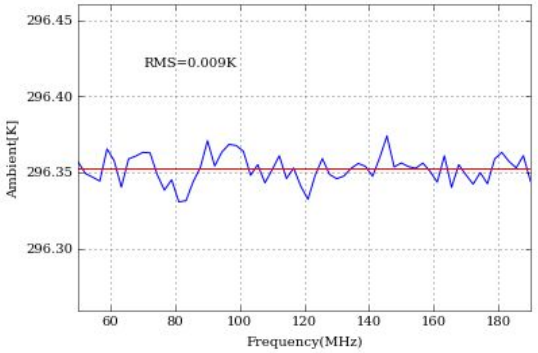
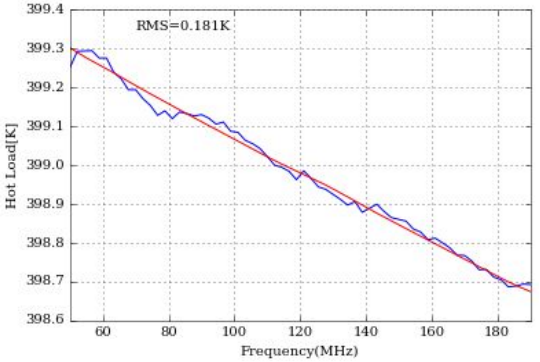
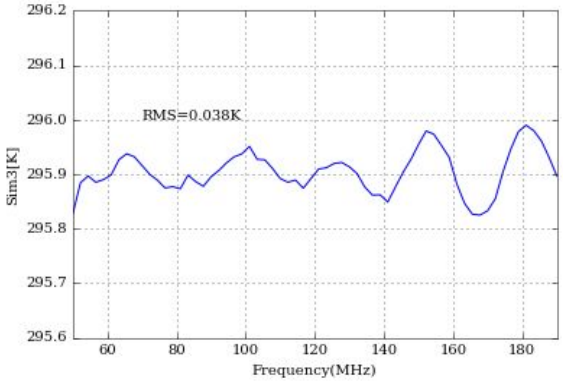


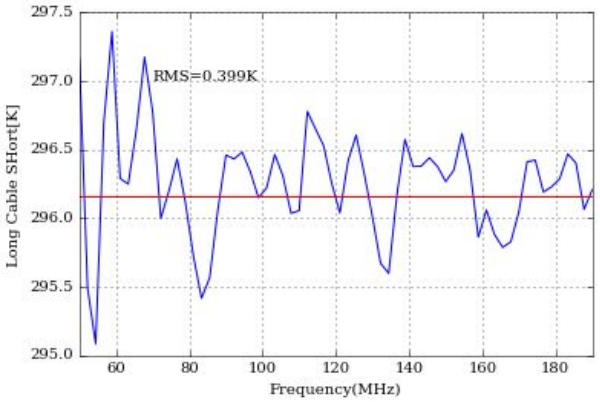
Figure4: Calibration parameters for the Low-Band 1 receiver. Over 50-190 MHz, we use 7 terms to model C1 & C2 and 9 terms to model Tu,Tc,Ts.

Calibration Cross check for 25 C; Freq: 50-190 MHz
Case1 - 7 terms for constants and 9 terms for noise wave parameters









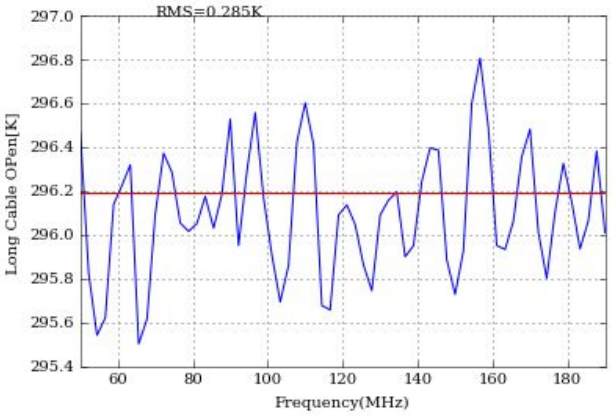
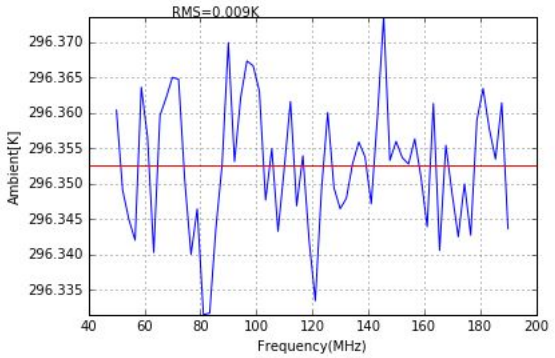
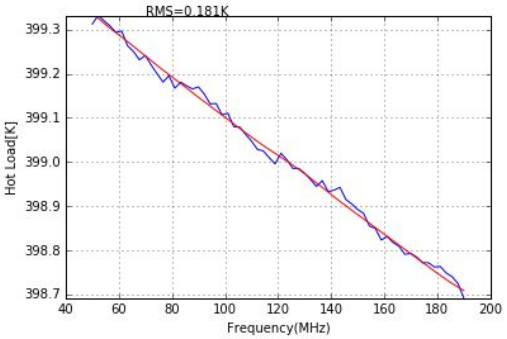
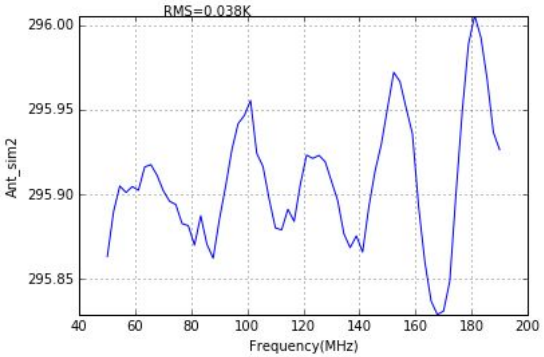


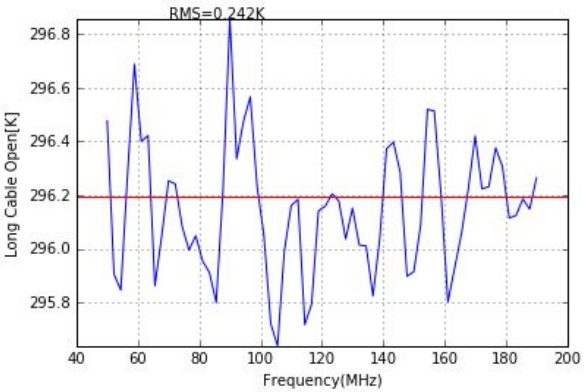
Figure6: Cross checks for calibration of Low-Band 1, 2018-02

Calibration Cross check for 25 C; Freq: 50-190 MHz
Case2 - 8 terms for constants and 10 terms for noise wave parameters









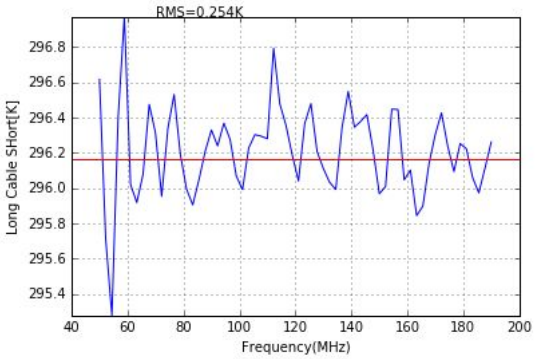
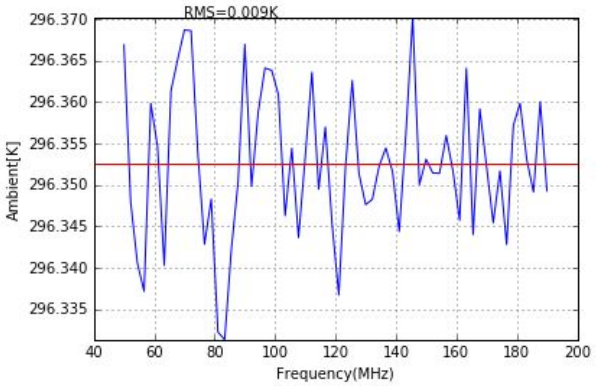
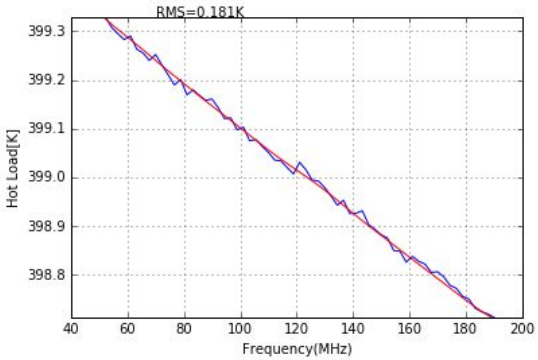
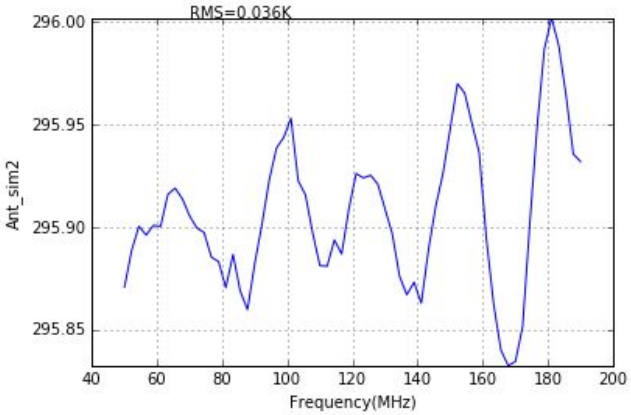


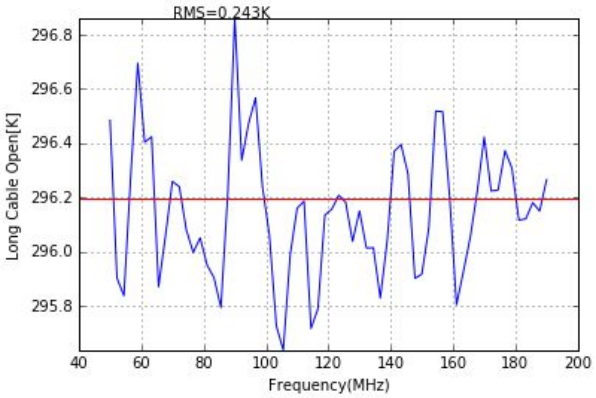
Figure6: Cross checks for calibration of Low-Band 1, 2018-02

Calibration Cross check for 25 C; Freq: 50-190 MHz
Case3 - 9 terms for constants and 10 terms for noise wave parameters









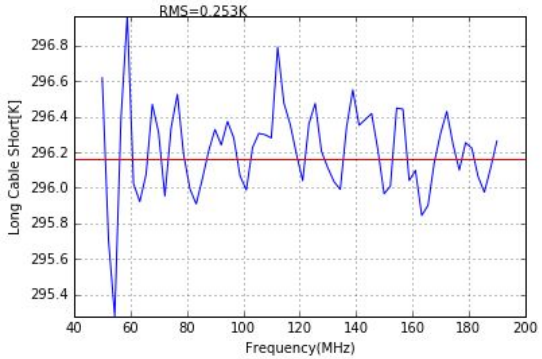
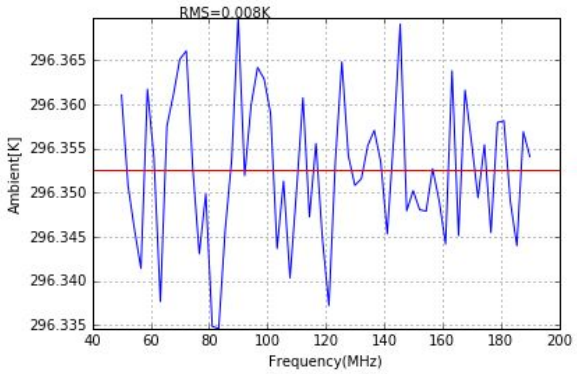
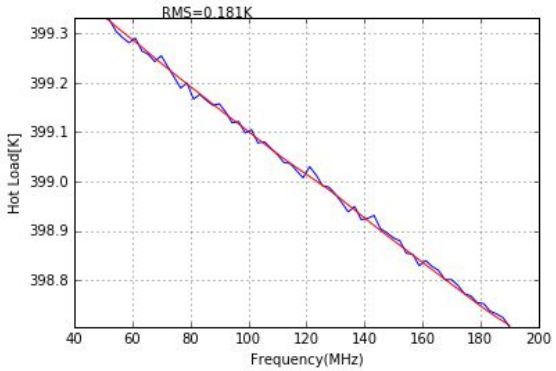
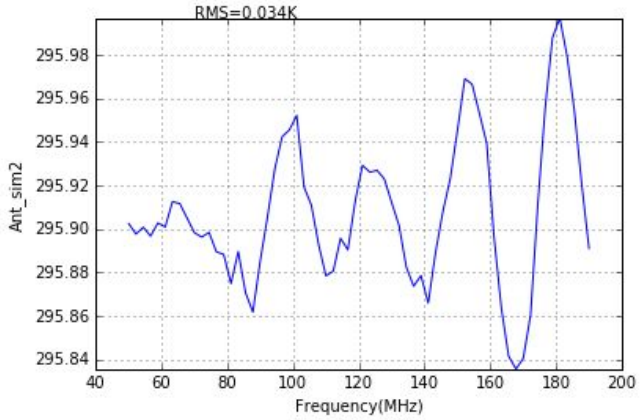


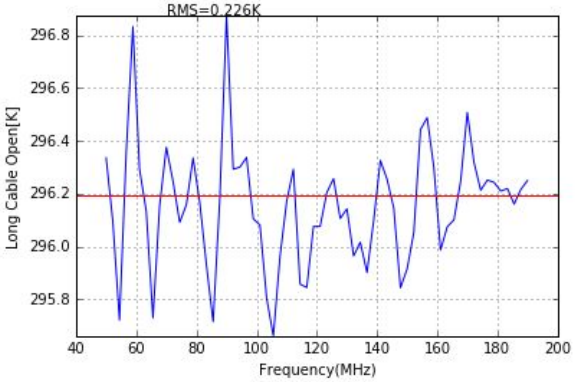
Figure6: Cross checks for calibration of Low-Band 1, 2018-02

Calibration Cross check for 25 C; Freq: 50-190 MHz
Case4 - 10 terms for constants and 11 terms for noise wave parameters









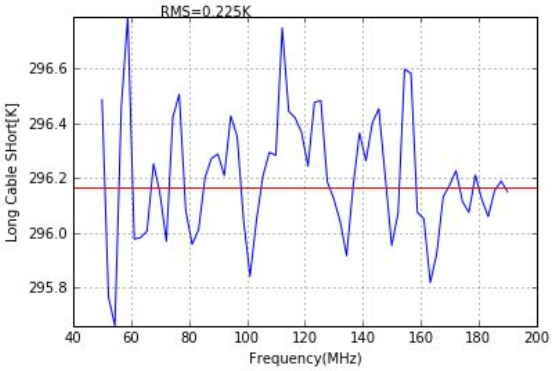
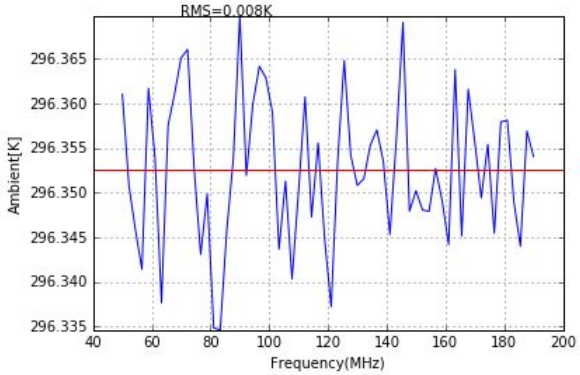
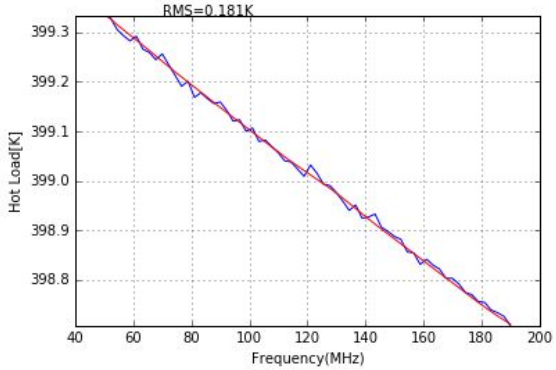


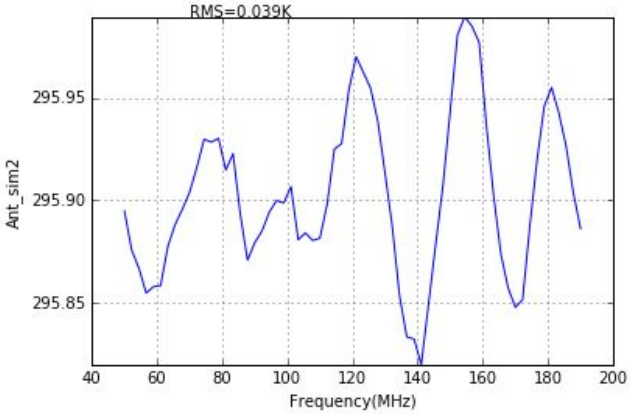
Figure6: Cross checks for calibration of Low-Band 1, 2018-02

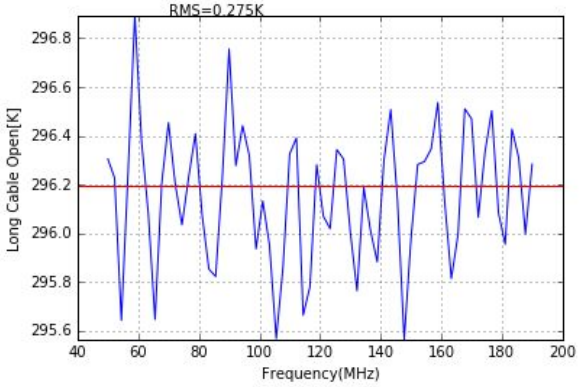
Calibration Cross check for 25 C; Freq: 50-190 MHz

Case5 - 10 terms for constants and 11 terms for noise wave parameters & ***Changing the resistances (50.12 & 49.99)***









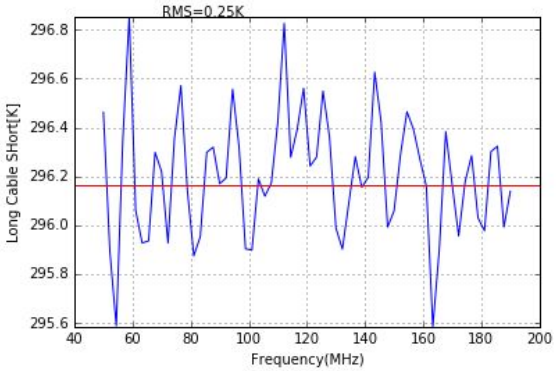


Figure6: Cross checks for calibration of Low-Band 1, 2018-02

Calibration Cross check for 25 C; Freq: 60-160 MHz
Case1 - 8 terms for constants and 9 terms for noise wave parameters