ALMA Developers' Workshop

Band 1 Status

Ted Huang

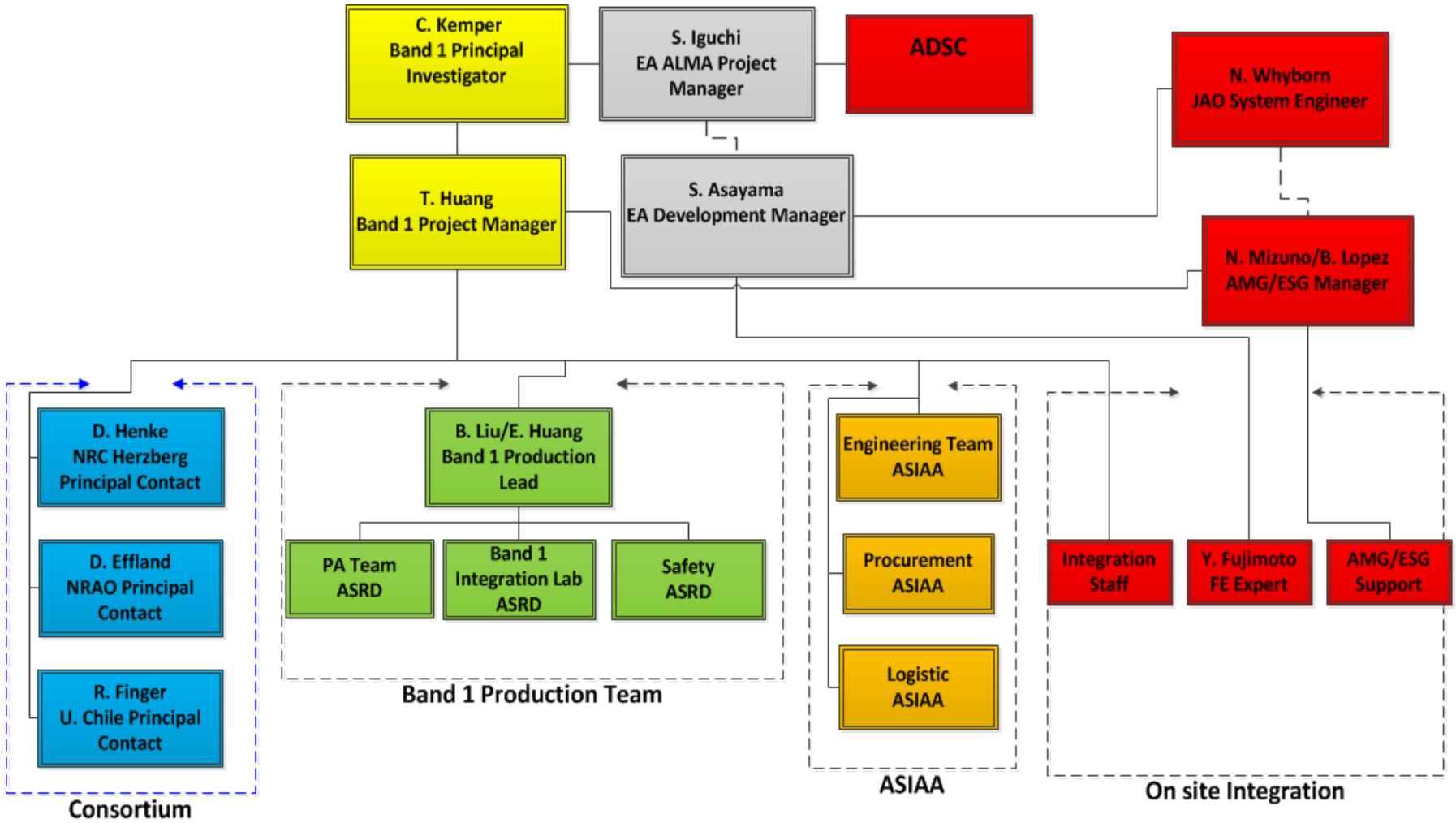
Outline

- Introduction
- Schedule
- Performance

Team

- ALMA Band-1 is ALMA-EA project, with collaboration with **U. Chile, NRAO and HIA**.
- Approved by ALMA Board for proto-typing in 2014.
- Band 1 Production approved in ALMA: May 2016
- ALMA-EA take all responsibilities for the Band 1 work package:
  - CCA+WCA, CPDS, Bias modules and photomxiers.
  - Band 1 Prototype Development
  - Band 1 Cartridge Production
  - Maintenance;
  - Integration and testing at OSF
  - Test Line and its Maintenance

Organizational



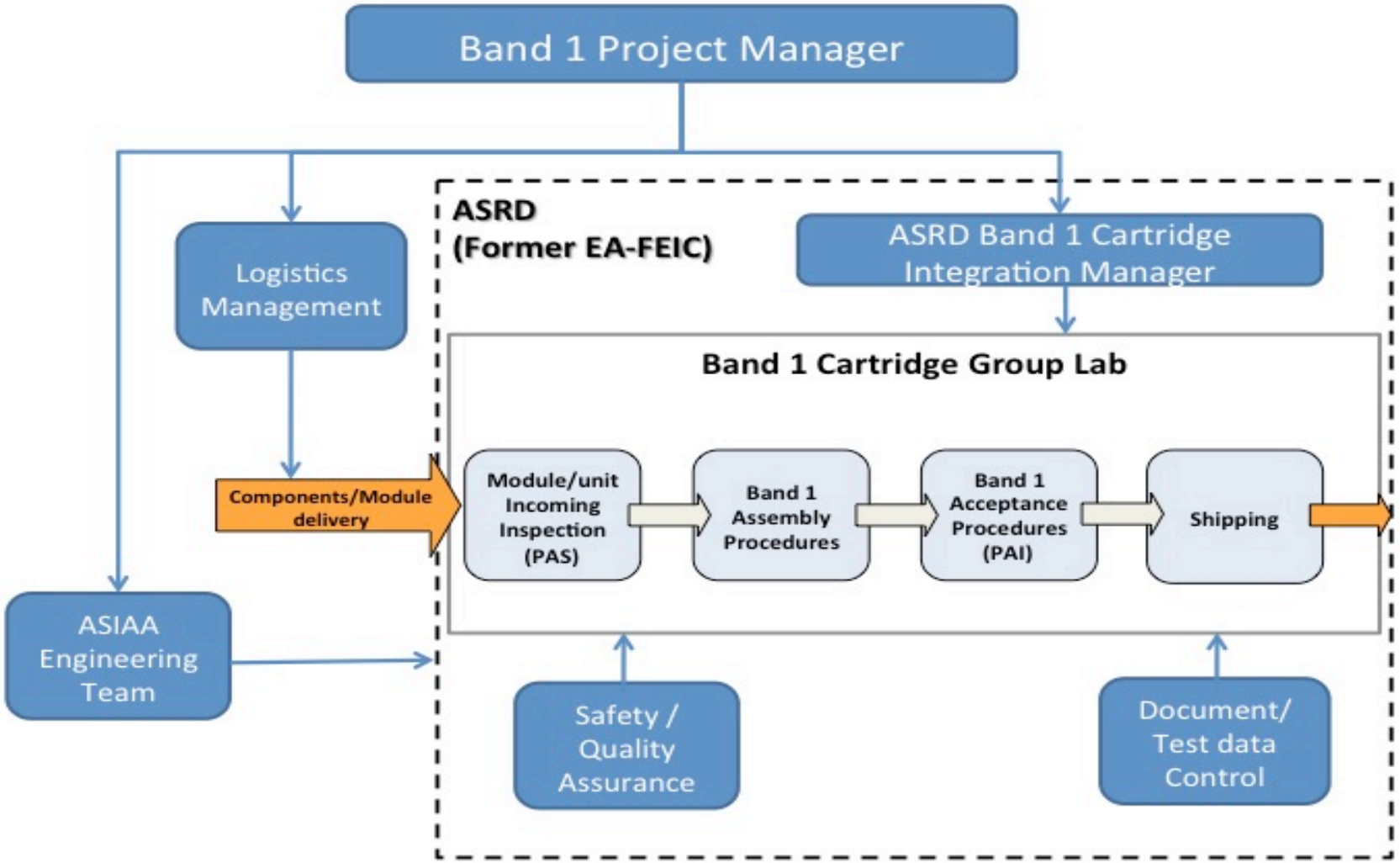
Band 1 Project

- Key component down-selection: **Jan 2013**
- Approval to build prototype from ALMA board and ADSC in 2014 March
- PDR: July 2013
- Post PDR: January 2014
- Band 1 Optical Review (internal review): meeting by J. Lamb, J. Kooi, N. Whyborn, R. Hill, M. Sugimoto in Santiago, Chile in Nov. 2014.
- Critical Design Review on January 19th to 21st 2016

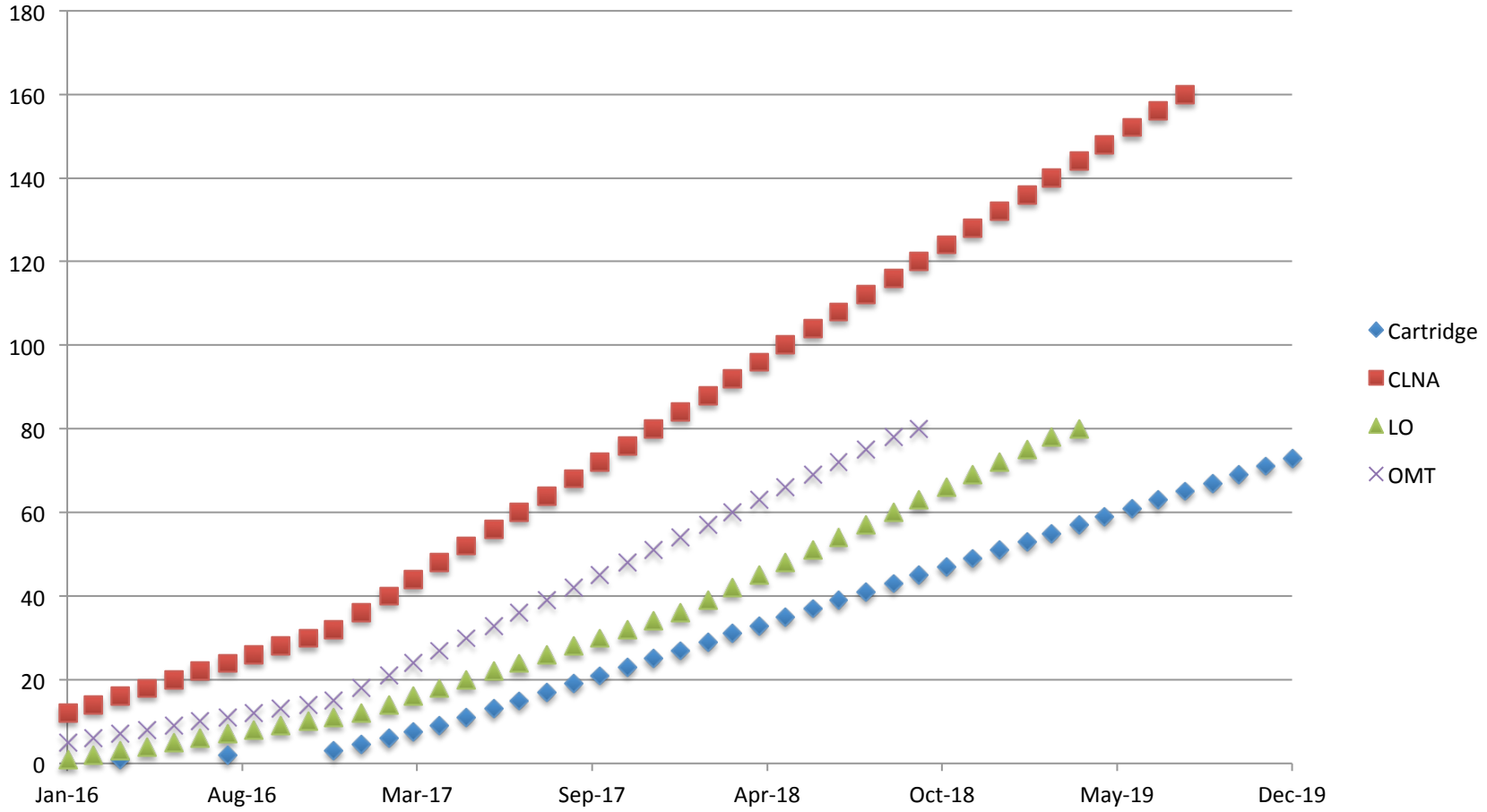
Timeline

- Begin #1 to #3 production cartridge starting from March 2016
- LO CDMR: October 2016
- Band 1 MRR: October 2016
- First cartridge test with actual cryostat :Fall 2016 @NRAO
- Frist cartridge testing at OSF: Spring-Summer 2017
- Integration and testing #4-#9 production cartridge : Before May 2017
- Complete #73 cartridge delivery by : December 2019

Production process



Cartridge and key components production rate



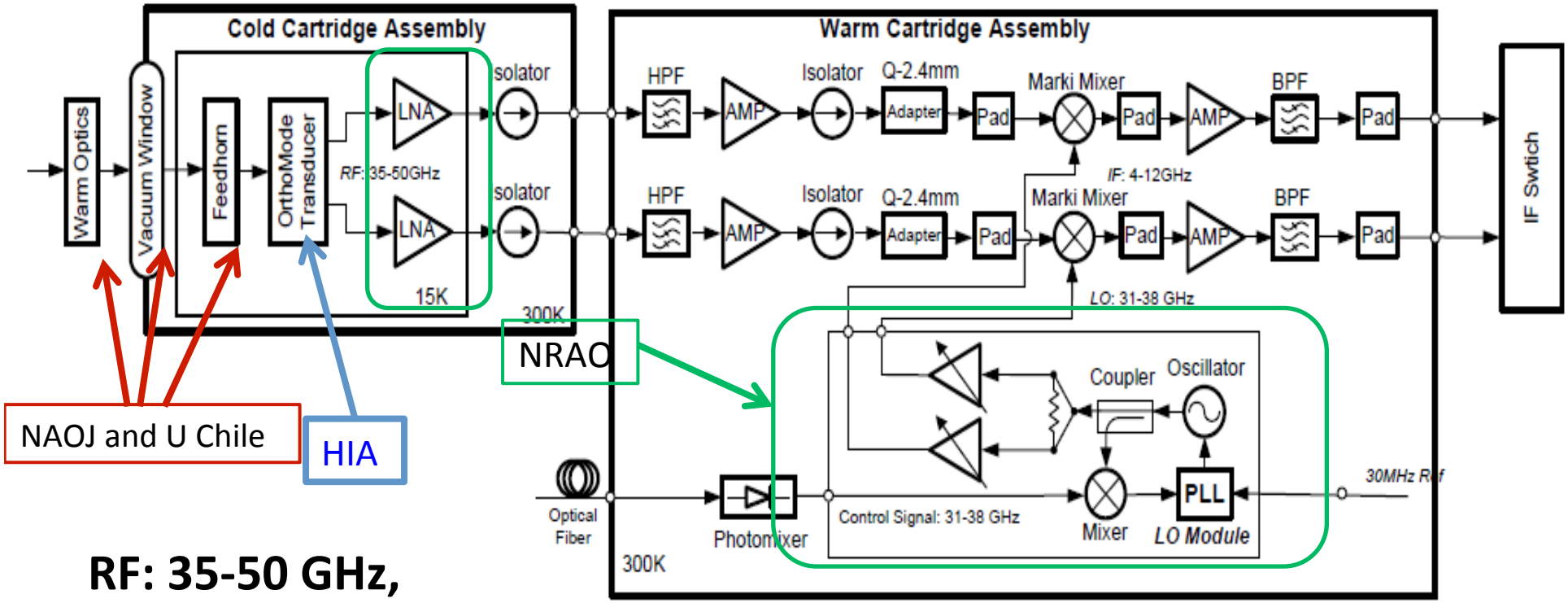
Current Status

- Integrating and testing the Pre-production cartridge SN#01
- Working on the solar observation operation mode.

(Poster, C-C, Chiong)

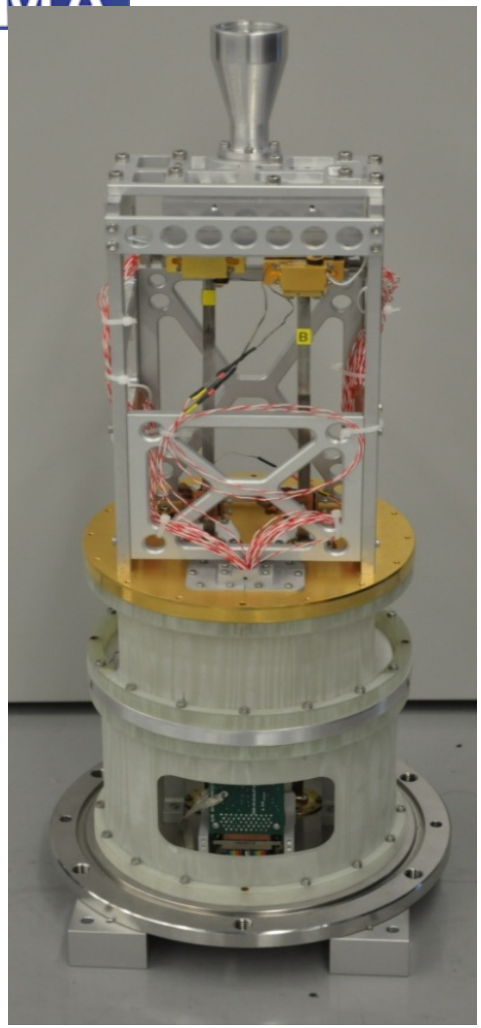
- Settle the baseline design.

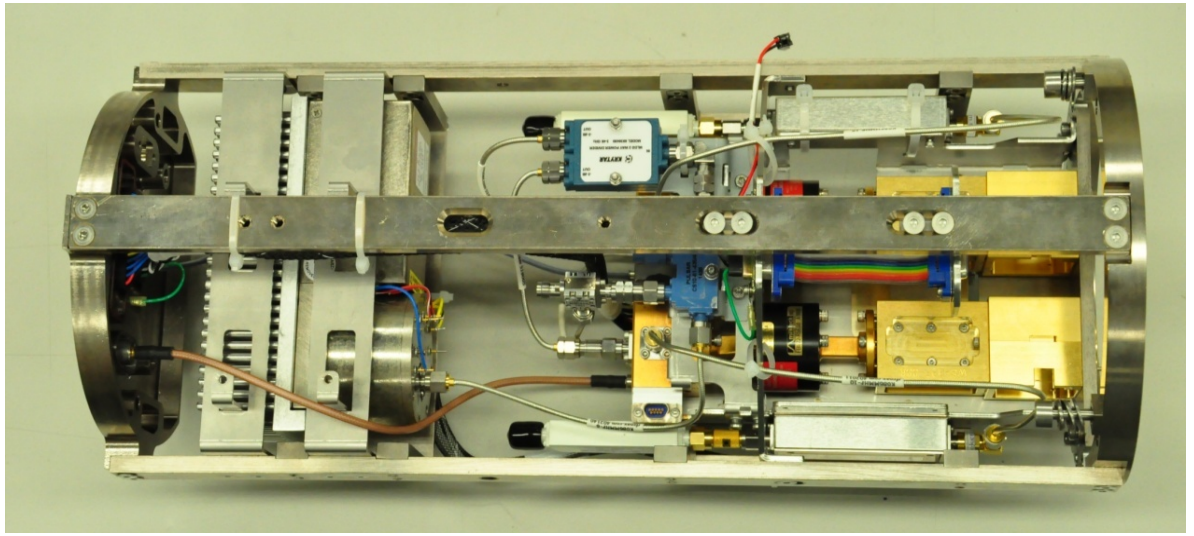
Overview

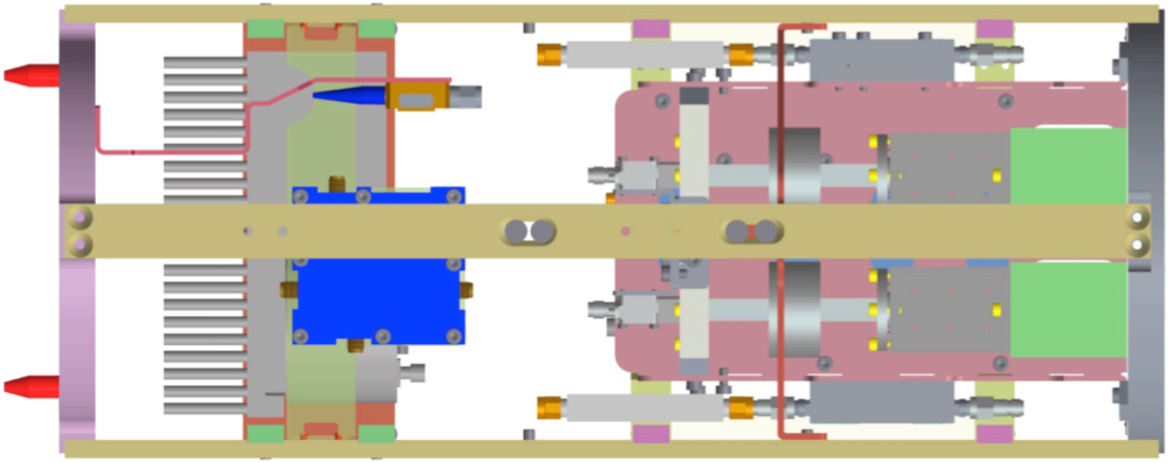


RF: 35-50 GHz,
35-52GHz(Best effort)
LO: 31- 40 GHz,
IF: 4-12 GHz, SSB
Trx: 25-32 K

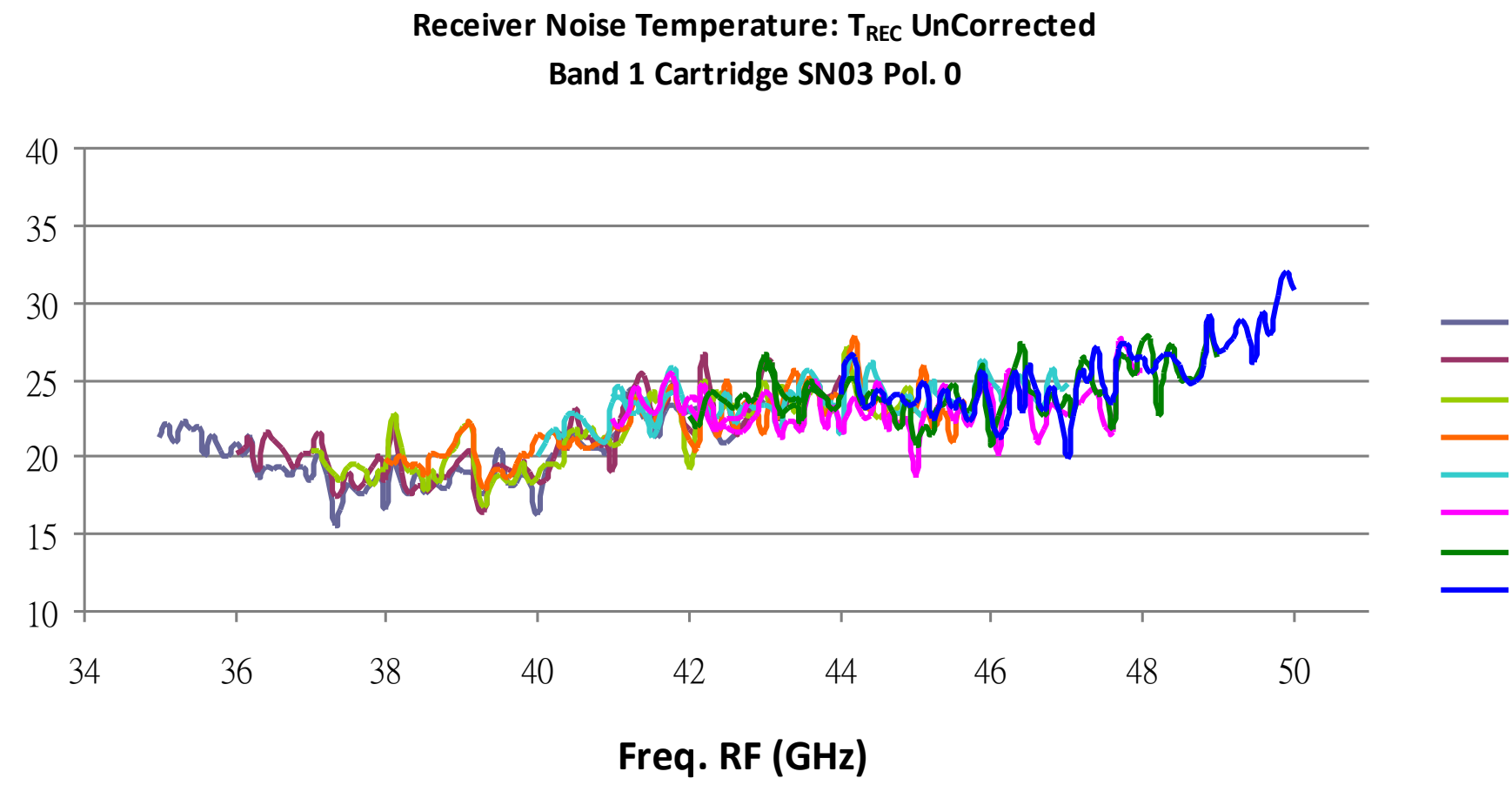
Overview



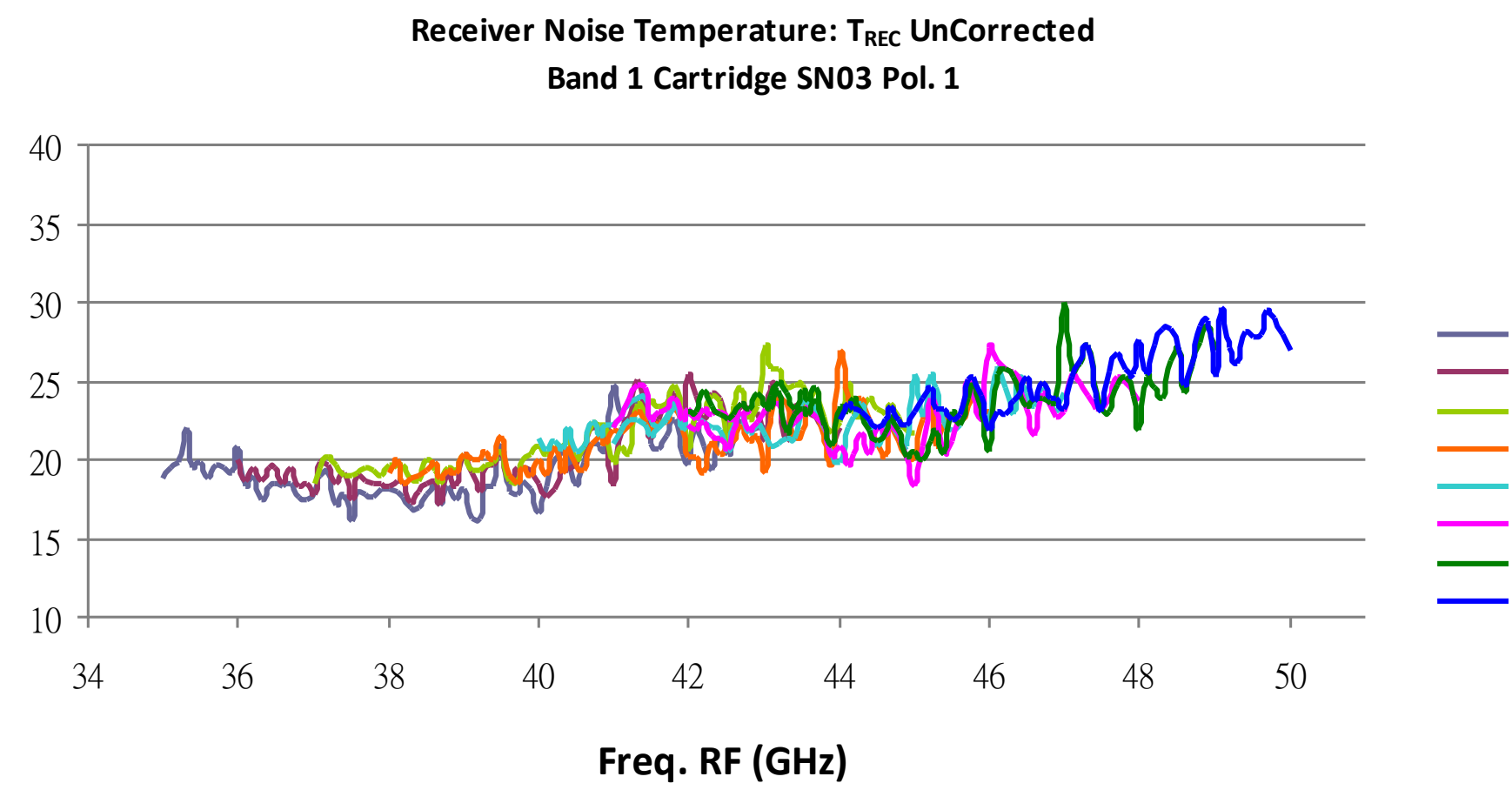




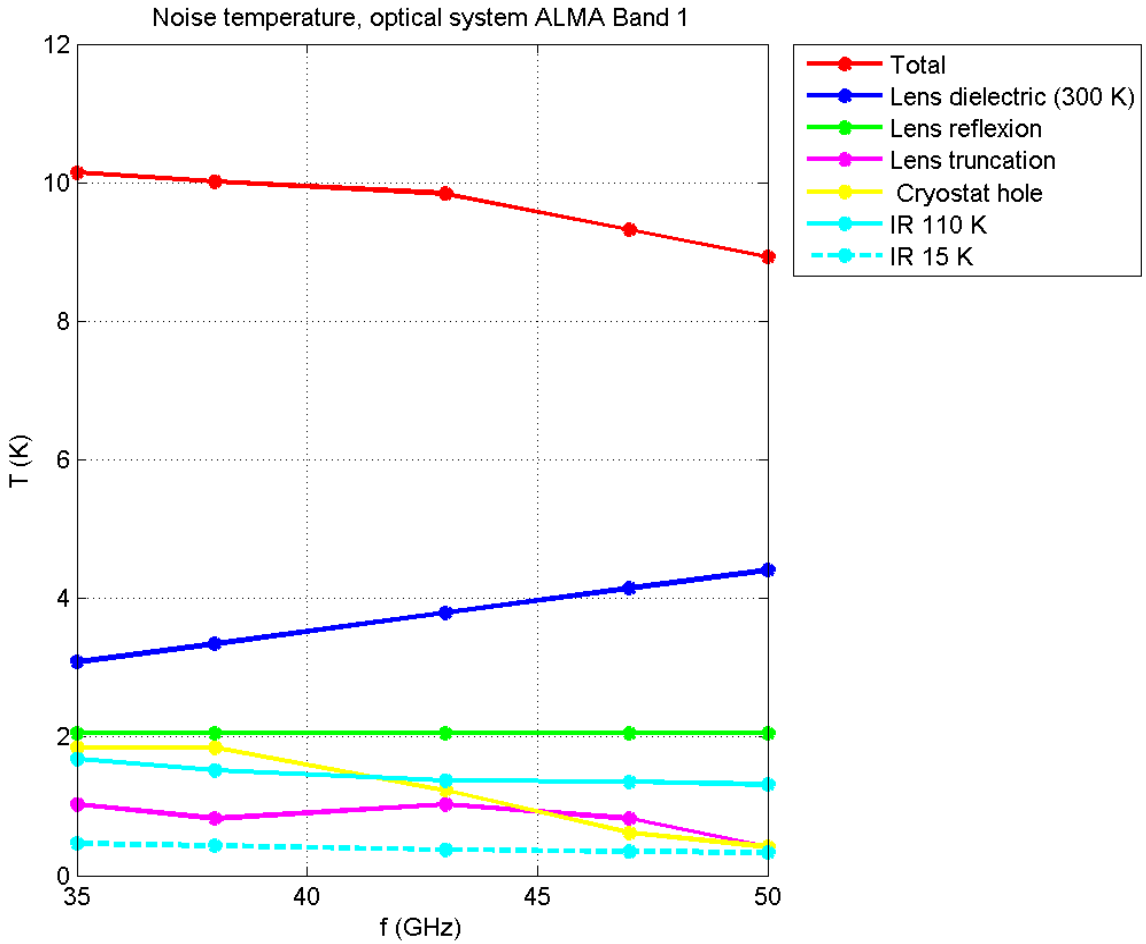
System Noise Temperature: Pol. 0



System Noise Temperature: Pol. 1



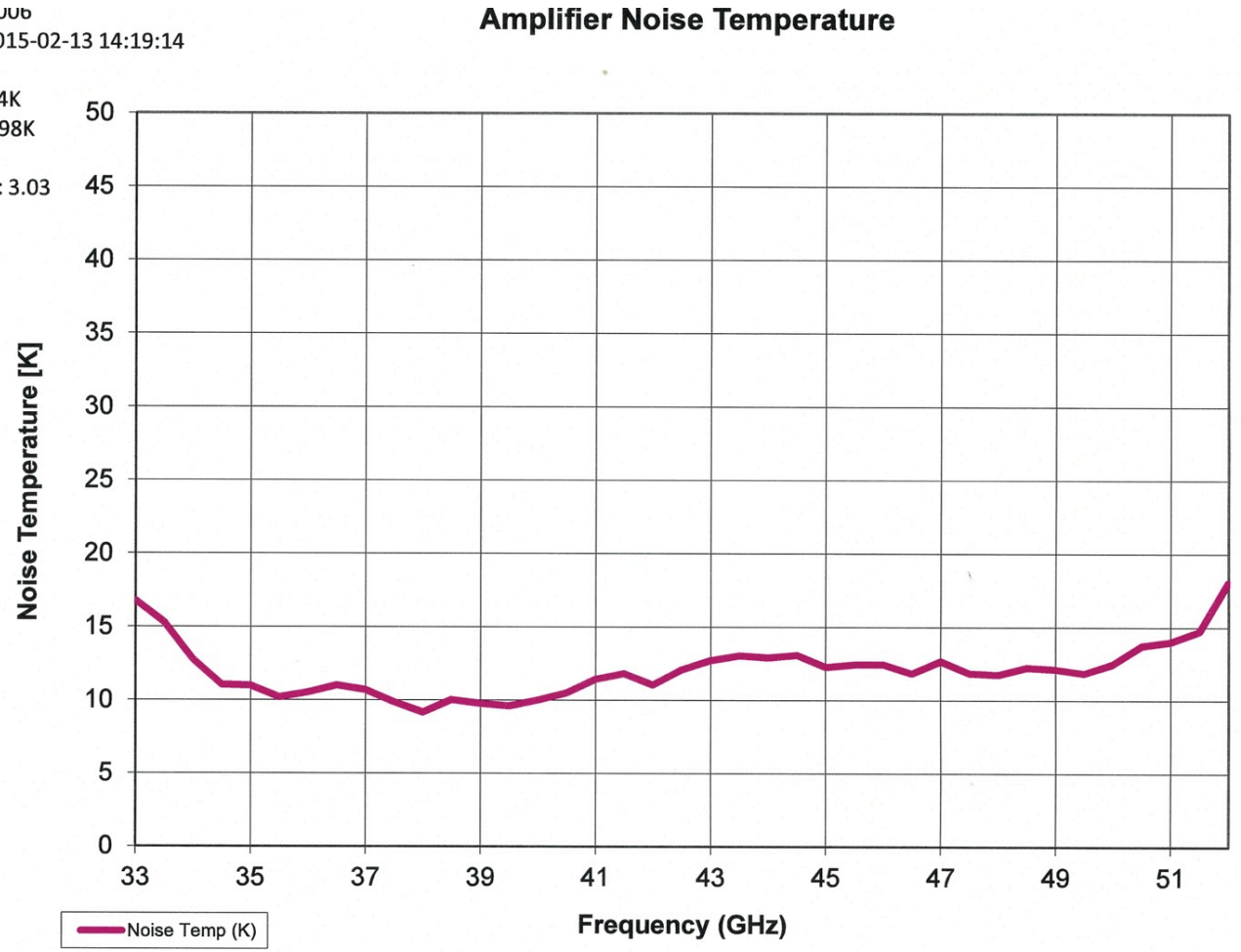
Contribution of the optics to the noise



CLNA performance QA006

Amplifier ID: QA-006
Timestamp: Fri 2015-02-13 14:19:14
Measured by: LP
Dewar Temp: 22.4K
Ambient Temp: 298K
Noise Diode:
Software Version: 3.03

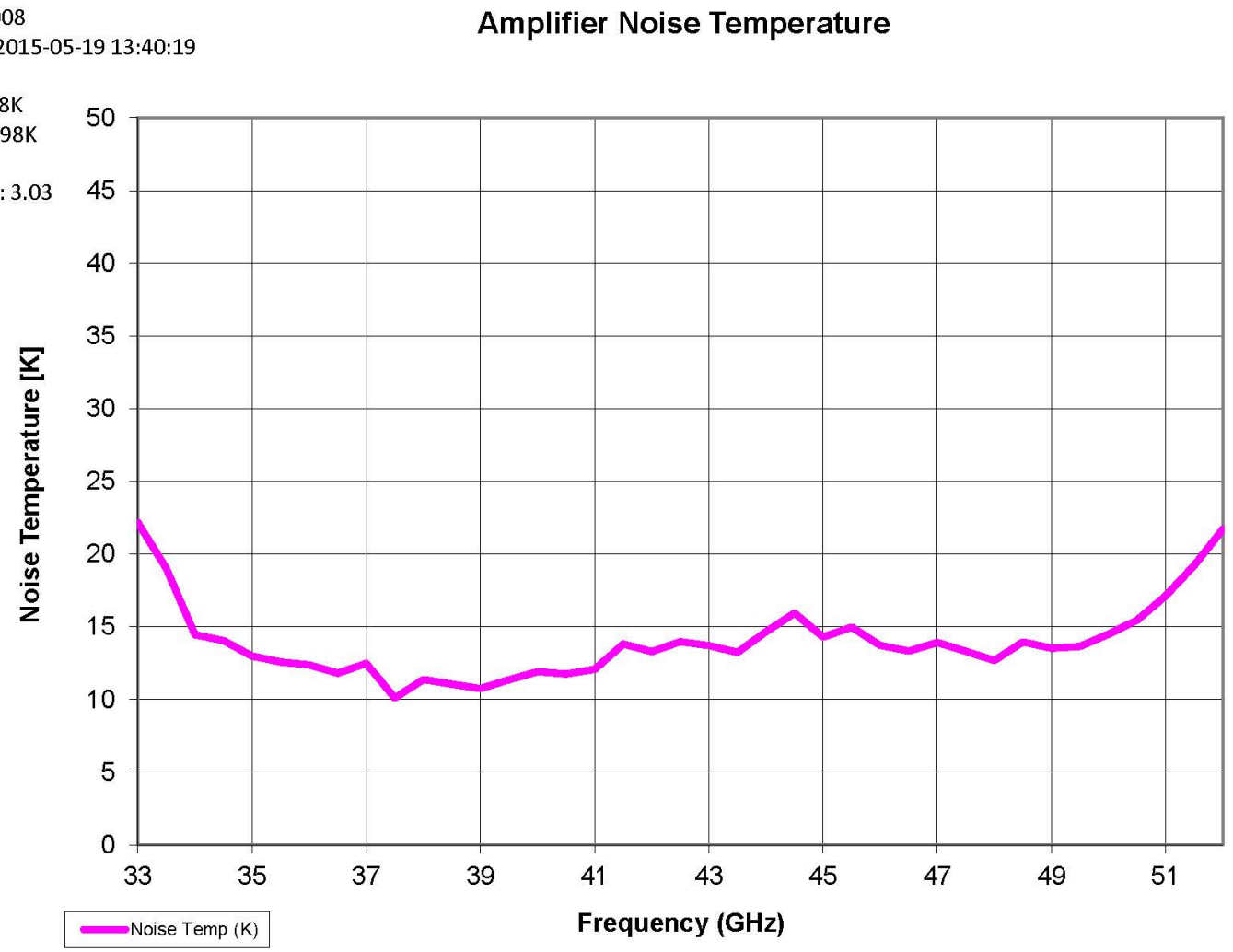
VD1 = 0.671V
ID1 = 3.066mA
VG1 = 0.115V
VD2 = 0.977V
ID2 = 4.059mA
VG2 = 0.122V
VD3 = 1.491V
ID3 = 5.104mA
VG3 = -0.207V
VD4 = 1.486V
ID4 = 7.094mA
VG4 = -0.086V
VD5 = 1.496V
ID5 = 7.104mA
VG5 = -0.127V



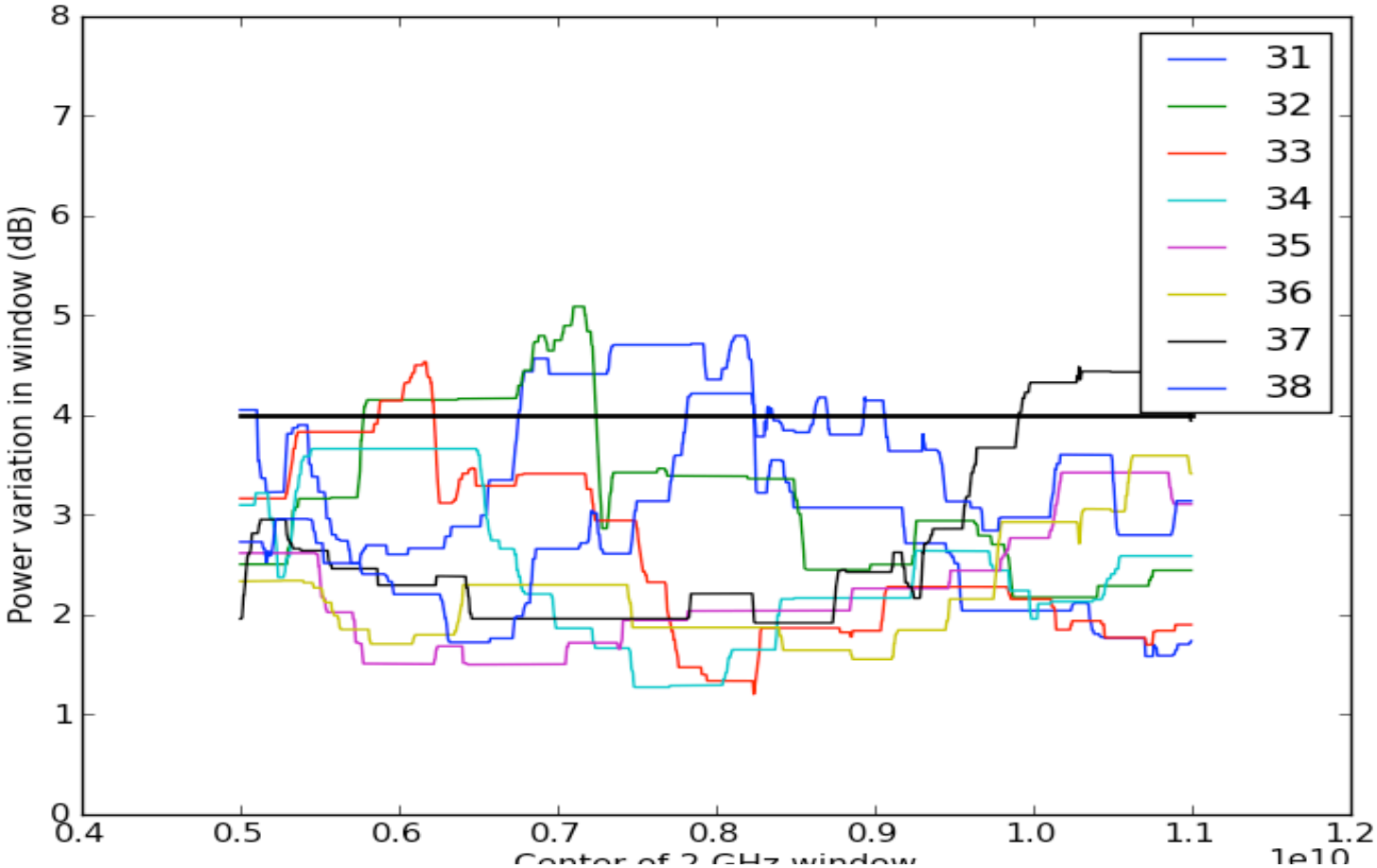
CLNA QA008

Amplifier ID: QA008
Timestamp: Tue 2015-05-19 13:40:19
Measured by: LP
Dewar Temp: 21.8K
Ambient Temp: 298K
Noise Diode:
Software Version: 3.03

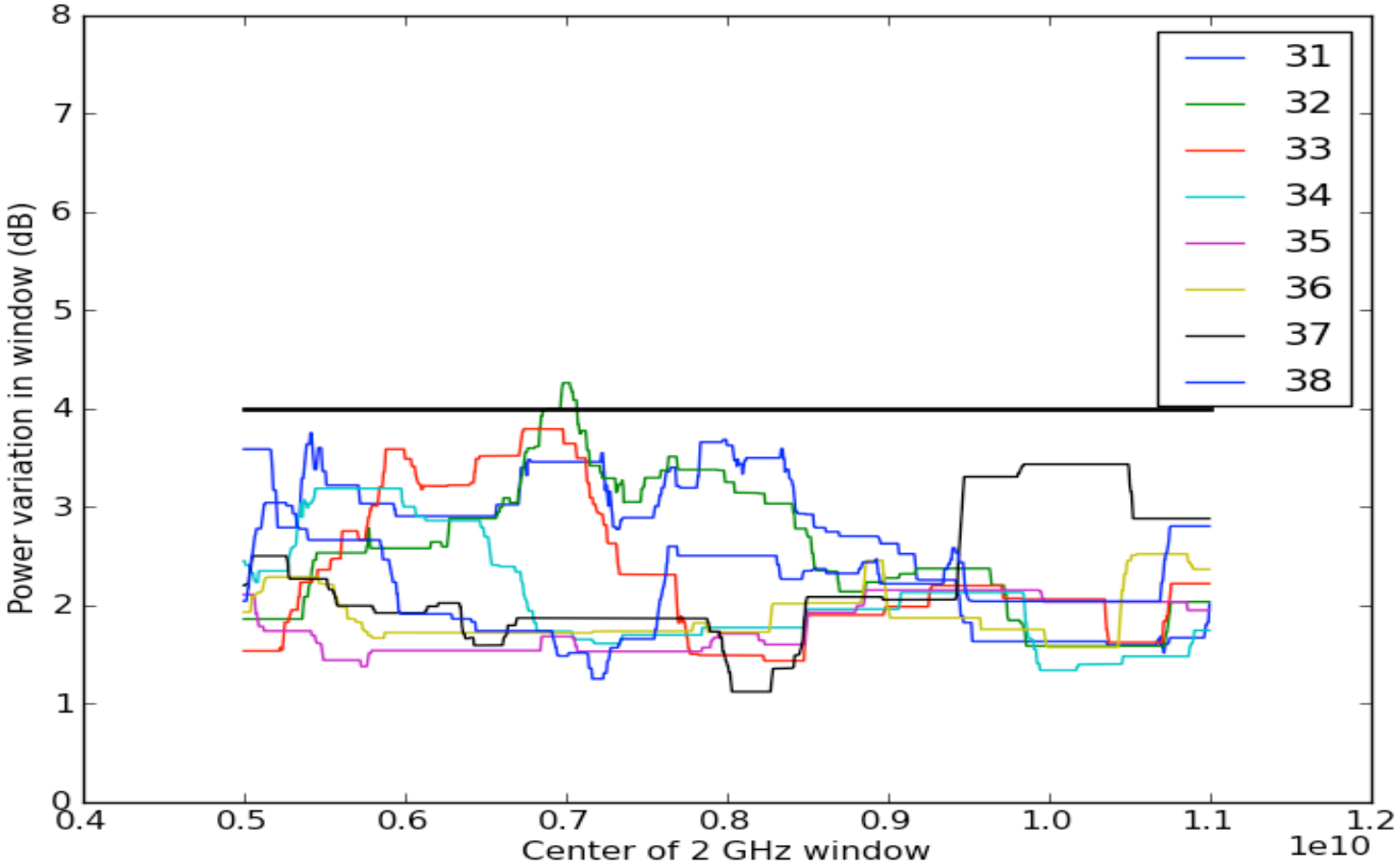
VD1 = 0.677V
ID1 = 3.064mA
VG1 = 0.142V
VD2 = 0.785V
ID2 = 4.056mA
VG2 = 0.113V
VD3 = 1.496V
ID3 = 5.049mA
VG3 = -0.239V
VD4 = 1.464V
ID4 = 7.081mA
VG4 = -0.057V
VD5 = 1.497V
ID5 = 6.082mA
VG5 = -0.105V



IF Ripple: Pol 0



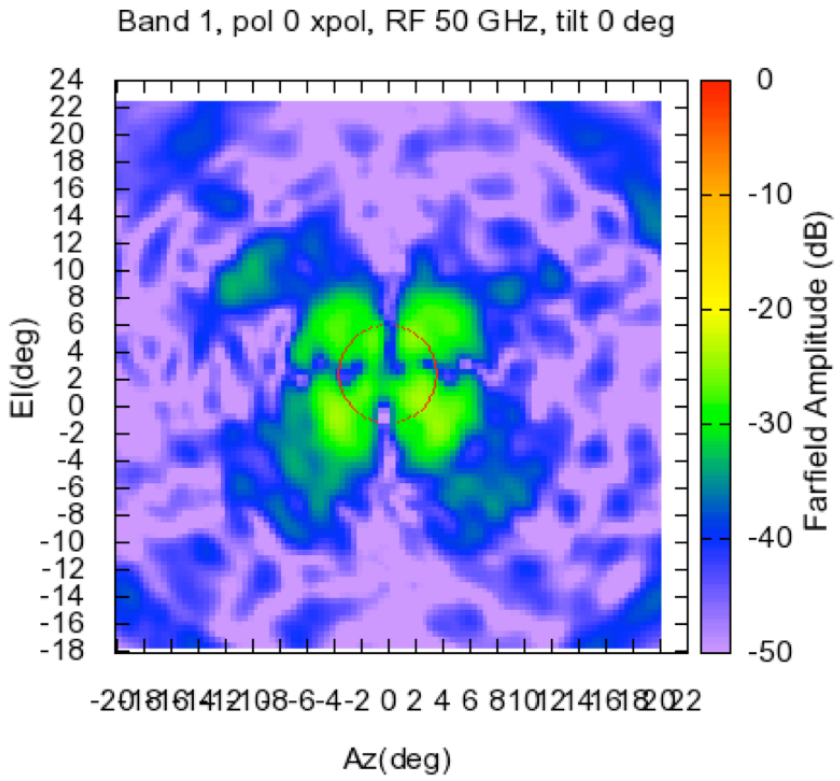
IF Ripple: Pol 1

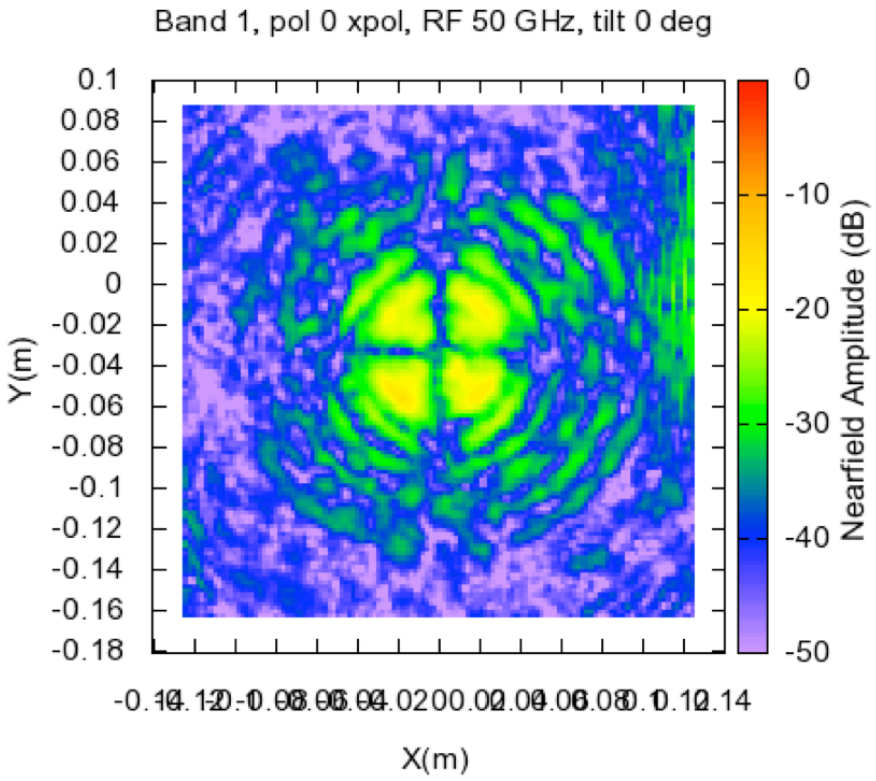


Optical performance

Frequency	Polarization	Tilt Angle (deg)	Aperture Efficiency (%)
35	0	0	81.23
35	1	0	81.20
37	0	0	81.65
37	1	0	81.23
39	0	0	81.18
39	1	0	80.33
41	0	0	80.91
41	1	0	81.04
42.5	0	0	81.28
42.5	1	0	80.68
44	0	0	80.91
44	1	0	80.36
47	0	0	80.74
47	1	0	80.08
50	0	0	79.59
50	1	0	79.83

Pol 0 Far field and near field pattern





Pol 1 Far field and near field pattern