

# DARM MEASUREMENT STATUS

## @KAGRA

CAL MEETING 4<sup>TH</sup> MARCH 2019

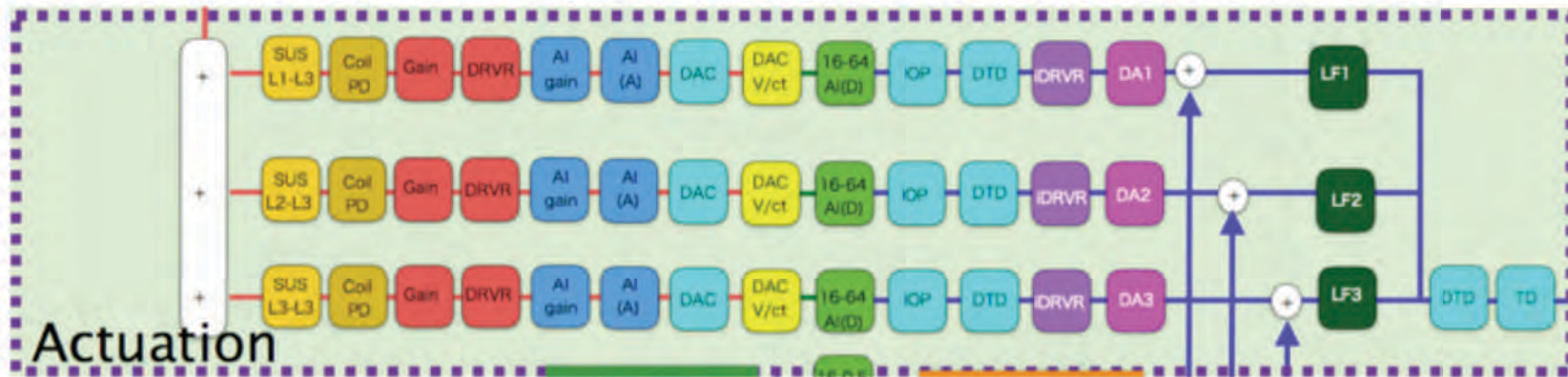
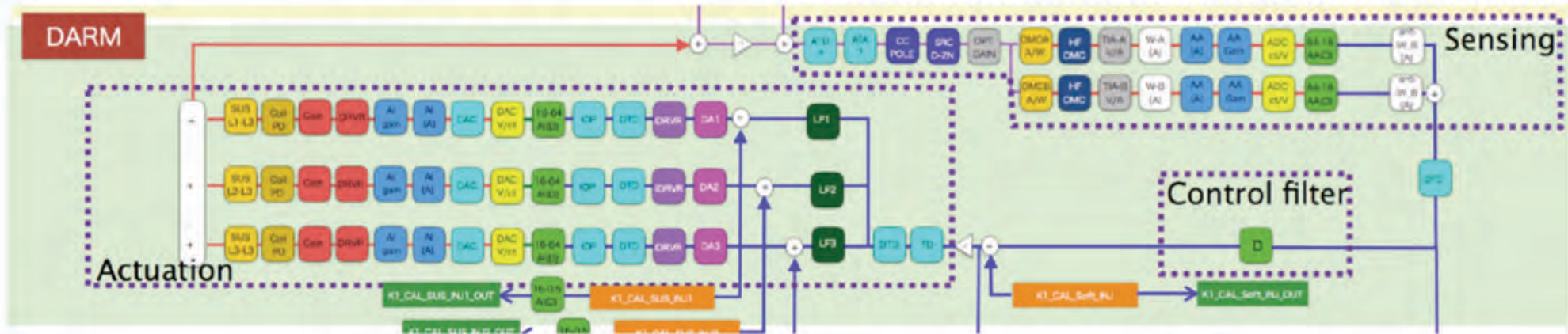
PANG HARN FUNG

# OUTLINE

- DARM Model
- Characterization of Spectrum Analyzer, SEtoD, DtoSE
- Transfer Functions Measurement
  - Low Power Coil Driver
  - AI Chassis

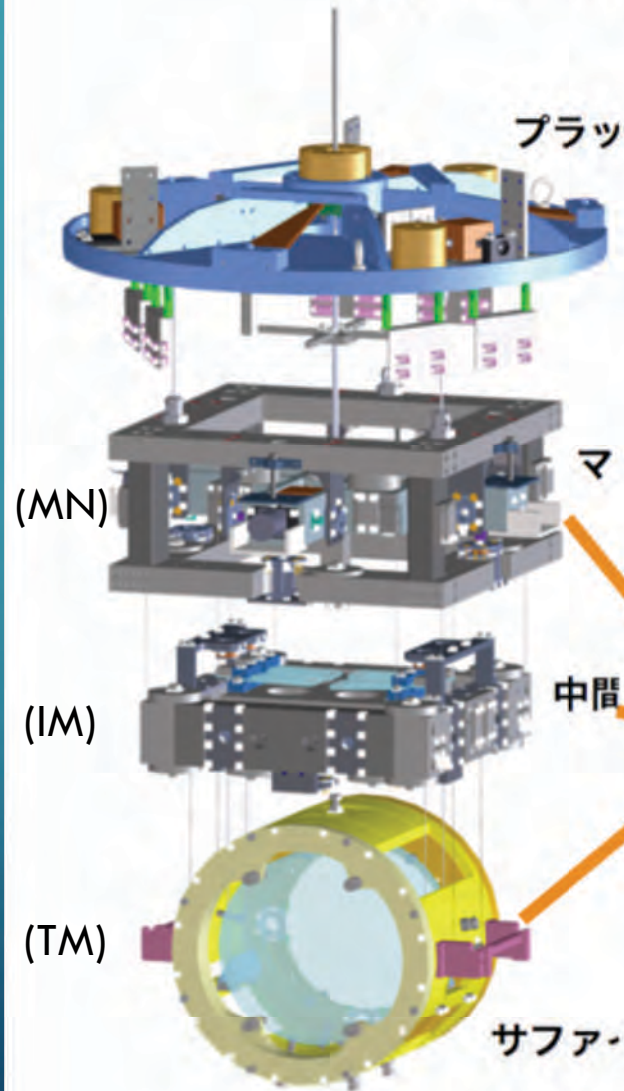


# Darm model (Actuation)





# Specification of Actuator



Type	Type-A
Mirrors	ITM/ETM
Mirror diameter [mm]	220
Mirror thickness [mm]	150
Mirror mass [kg]	22.8
IM (MN) mass [kg]	20.5 (22.5)
Wire length for OP [m]	0.35
Wire length for IM (MN) [m]	0.26 (0.35)
OP coil turns	100
OP coil resistance [ $\Omega$ ]	0.6
OP magnet size [mm]	$\phi 2 \times 2t$
OP actuation per coil [N/A]	0.0015
# of OP longitudinal coils	4
OP coil driver type	Low
IM coil turns	600
IM coil resistance [ $\Omega$ ]	2
IM magnet size [mm]	$\phi 2 \times 2t$
IM actuation per coil [N/A]	0.016
# of IM longitudinal coils	2
IM coil driver type	Modified low
MN coil turns	600
MN coil resistance [ $\Omega$ ]	2
MN magnet size [mm]	$\phi 5 \times 13t$
MN actuation per coil [N/A]	0.43
# of MN longitudinal coils	2
MN coil driver type	Modified low

# SPECTRUM ANALYZER- 35670A

- Two-Channel
- Limitation: Maximum frequency  $\sim 51$  kHz
- Measurement of one channel at a time
- Calibration Routine
- Floppy Disk Formatting Issues

## Keysight 35670A Dynamic Signal Analyzer

Versatile two- or four-channel  
high-performance FFT-based  
spectrum/network analyzer  
122  $\mu$ Hz to 102.4 kHz 16-bit ADC

Technical Overview



 KEYSIGHT  
TECHNOLOGIES



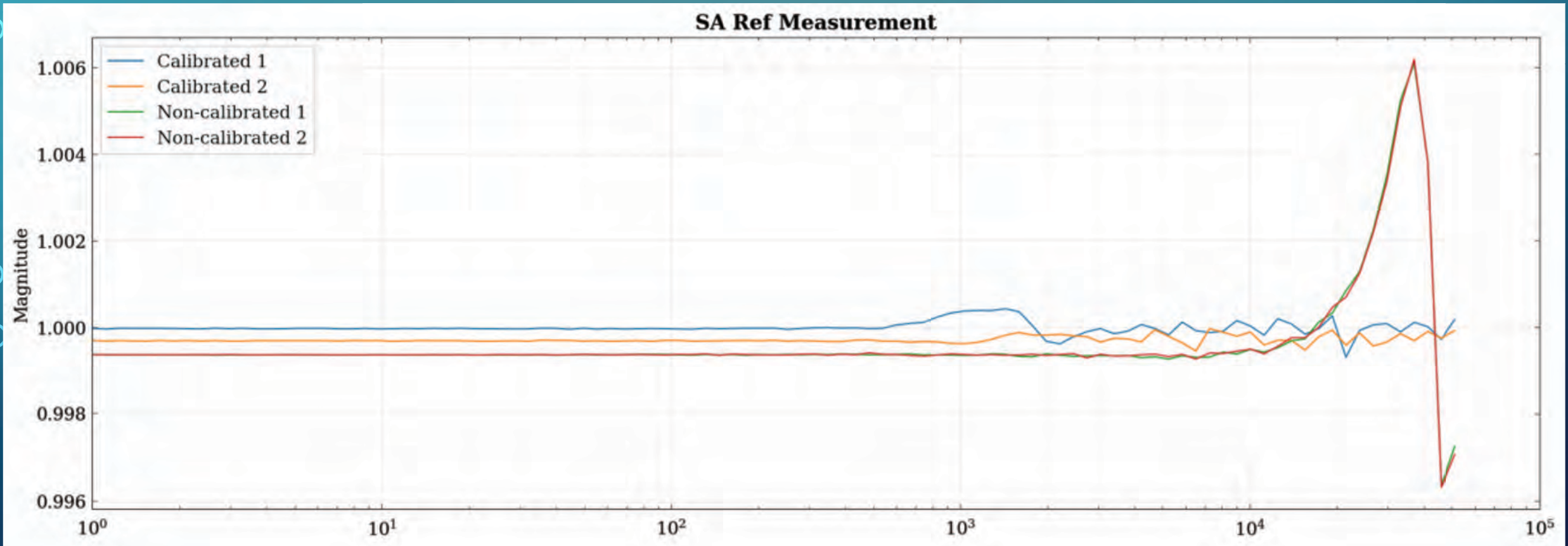
# CALIBRATION ROUTINE DESCRIPTION

The calibration routine consists of a dc-offset calibration and a frequency calibration. The calibration routine occurs immediately following the power-on tests and periodically afterwards to compensate for any drift. The calibration routine sets the input relays to disconnect the internal circuitry from the BNC center conductor and shell, and connect the source (via CALP) to the input channels. Measurements are then taken using several input paths to produce correction curves for all input ranges. If calibration fails, the calibration routine is repeated up to two more times. Each time calibration fails, a calibration failure message is added to the fault log. If calibration fails all three times, a calibration failure message is displayed on the screen. If you abort a self test before the self test is finished, the analyzer may fail its calibration routine. To prevent this from happening, press [ **Preset** ] [ DO PRESET ] or cycle power after you abort a self test.

To manually start the calibration routine, press the [ **System Utility** ] [ CALIBRATN ] [ SINGLE CAL ].

To prevent the calibration routine from occurring, set the power switch to on ( I ), then as soon as Booting System appears on the display, press and hold in the [ **Preset** ] key until Autorange in progress appears. This not only prevents the calibration routine from occurring but also bypasses the auto start file if one exists.

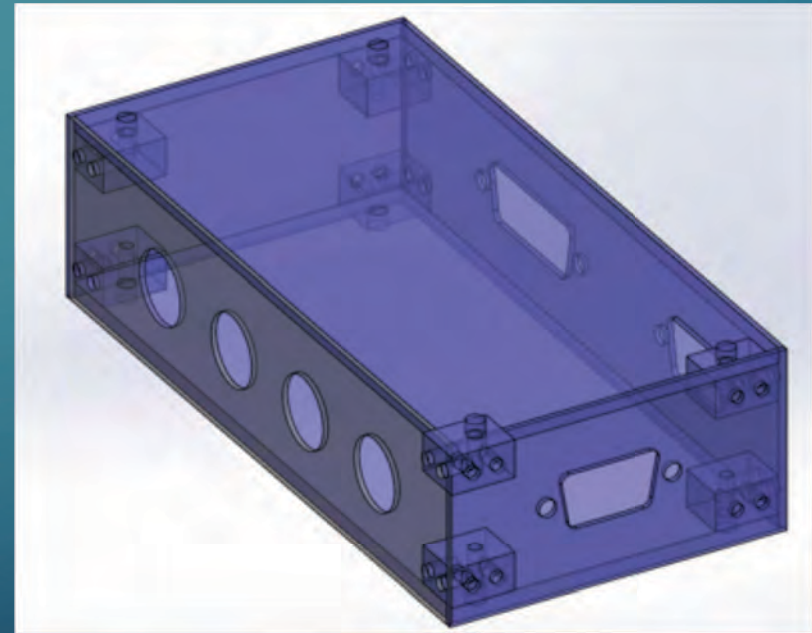
# CHARACTERIZATION OF 35670A



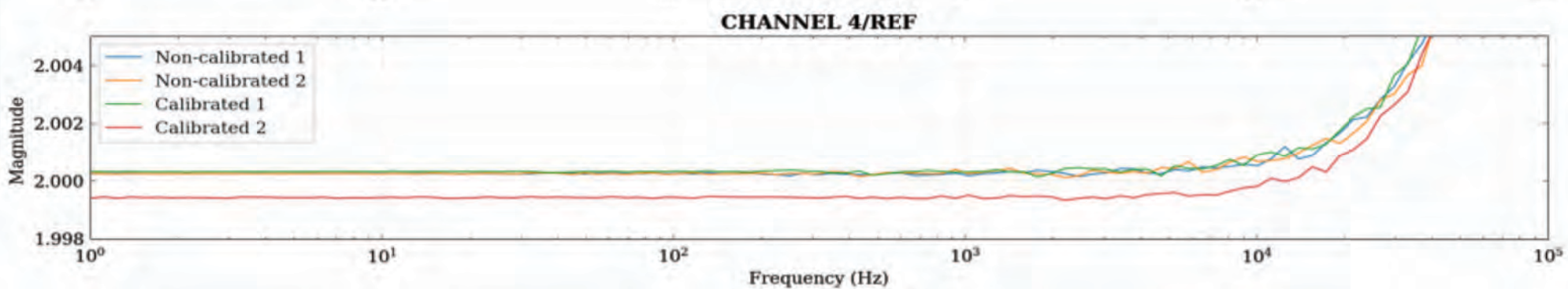
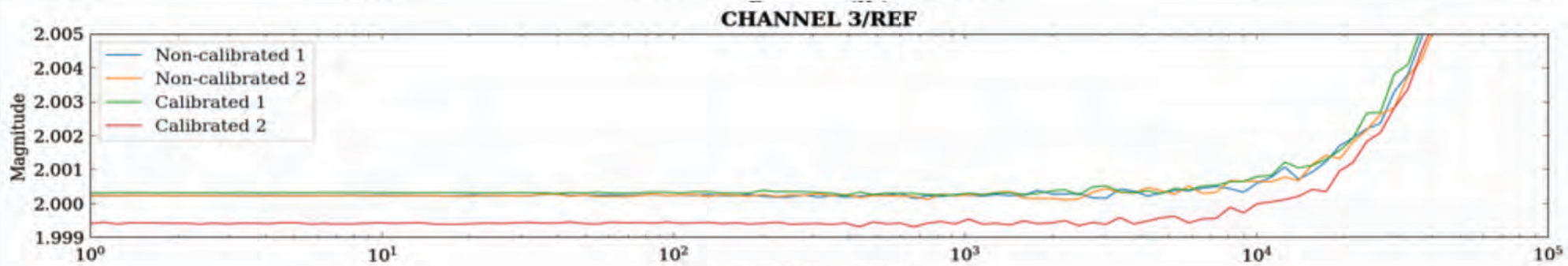
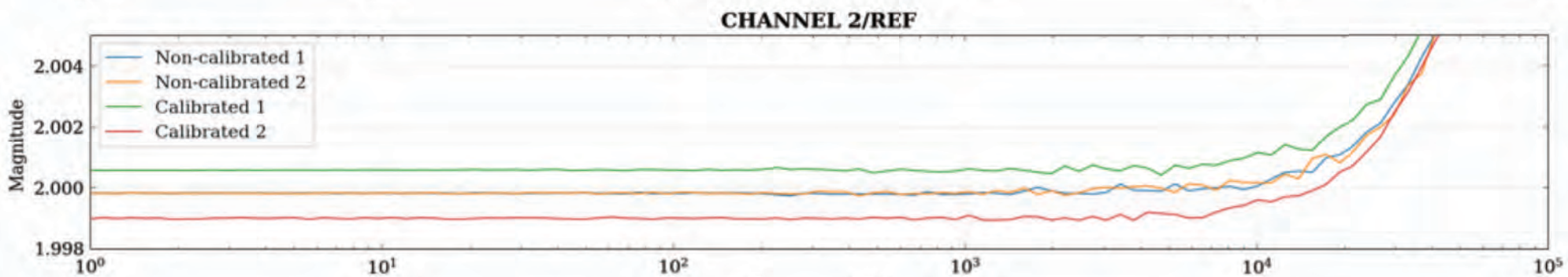
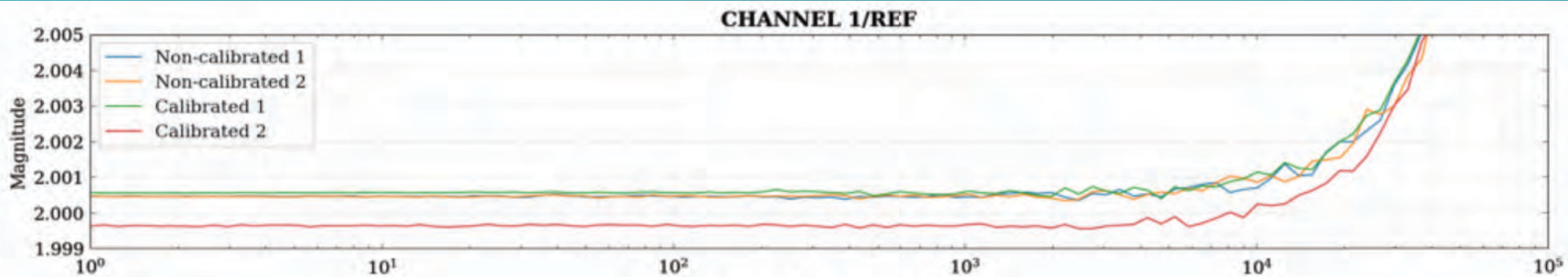


# SE-TO-D >> D-TO-SE

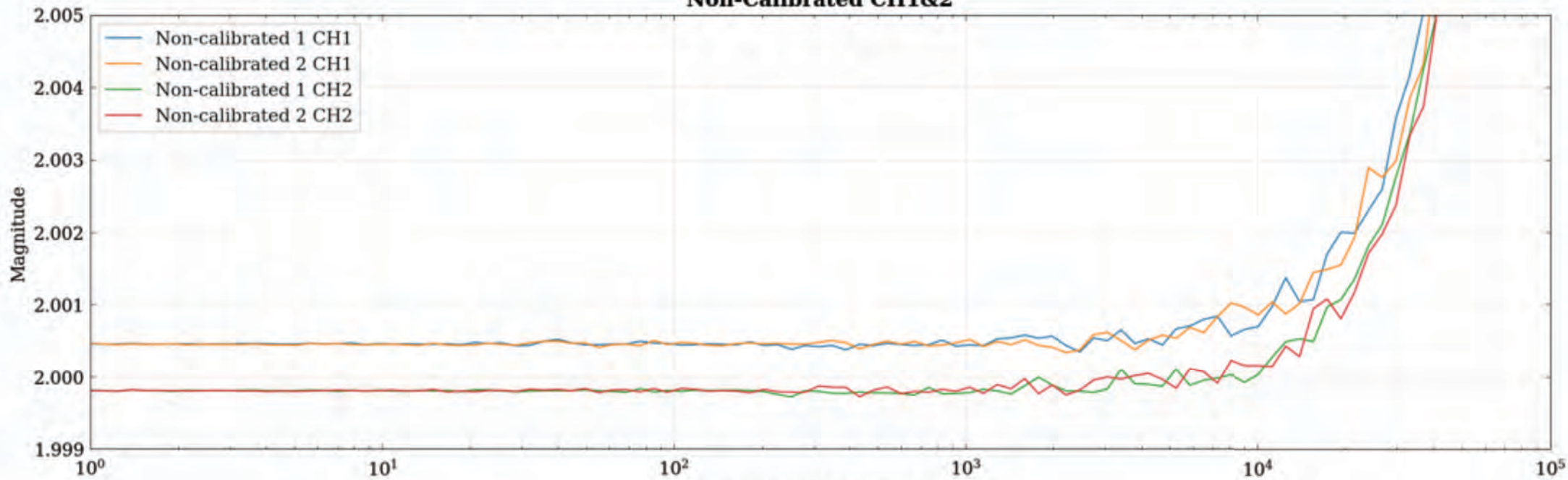
- Status of board
- Box/Holder
- Possible future additional parts for the board
  - TVS diode
  - For regulator, feedback/bypass capacitor



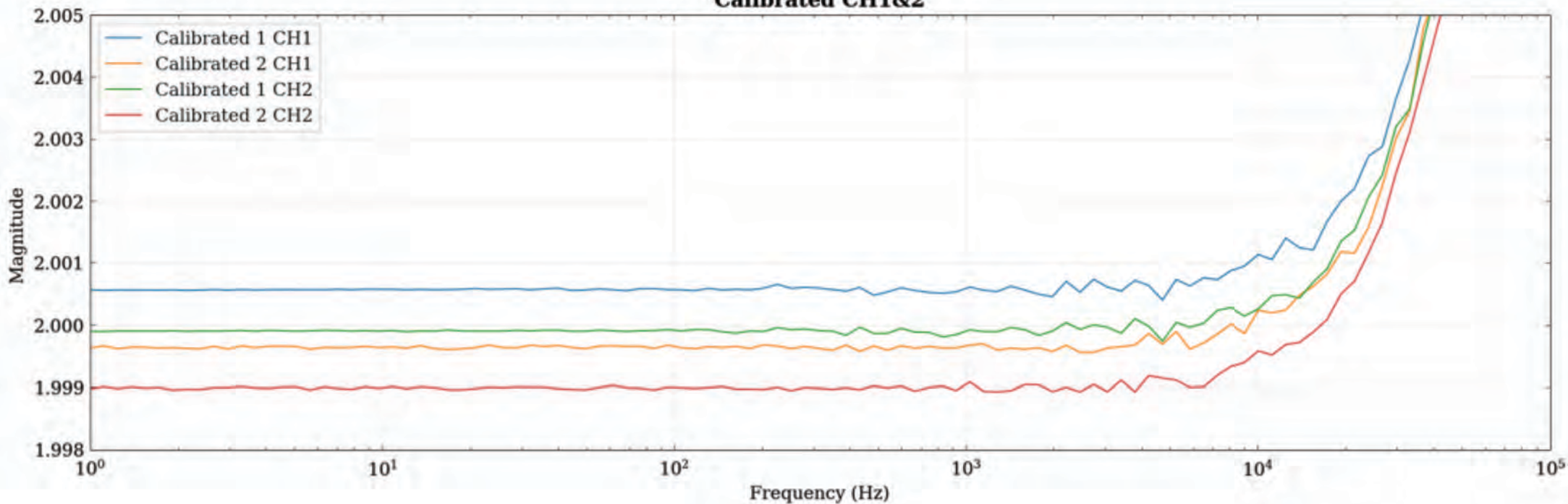




### Non-Calibrated CH1&2

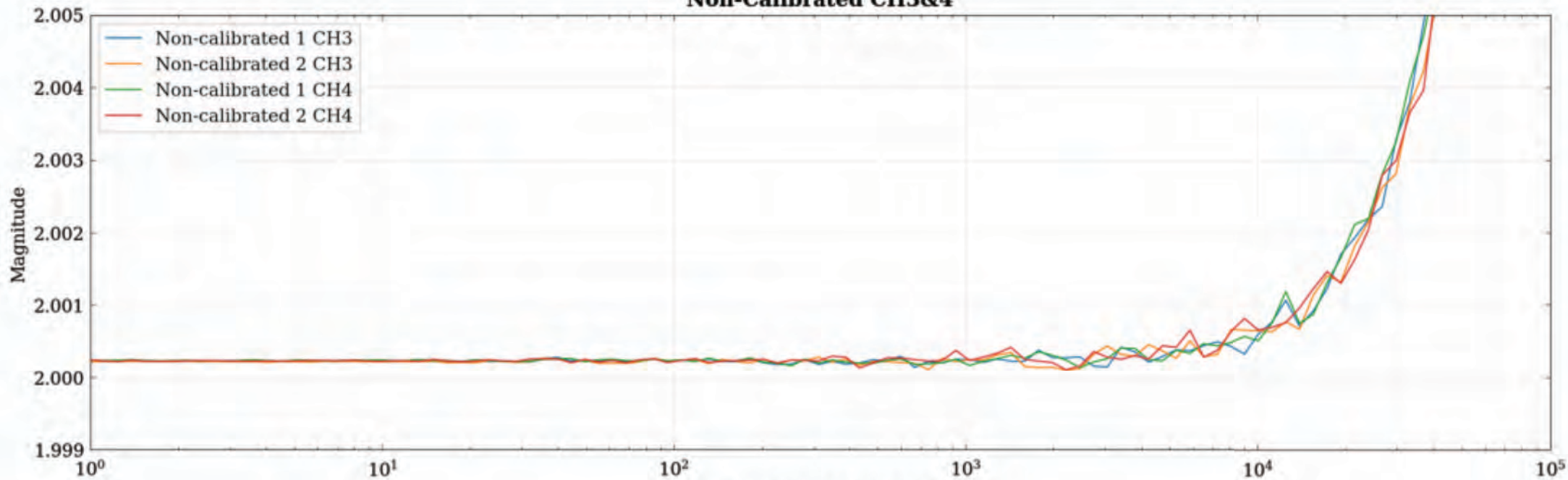


### Calibrated CH1&2

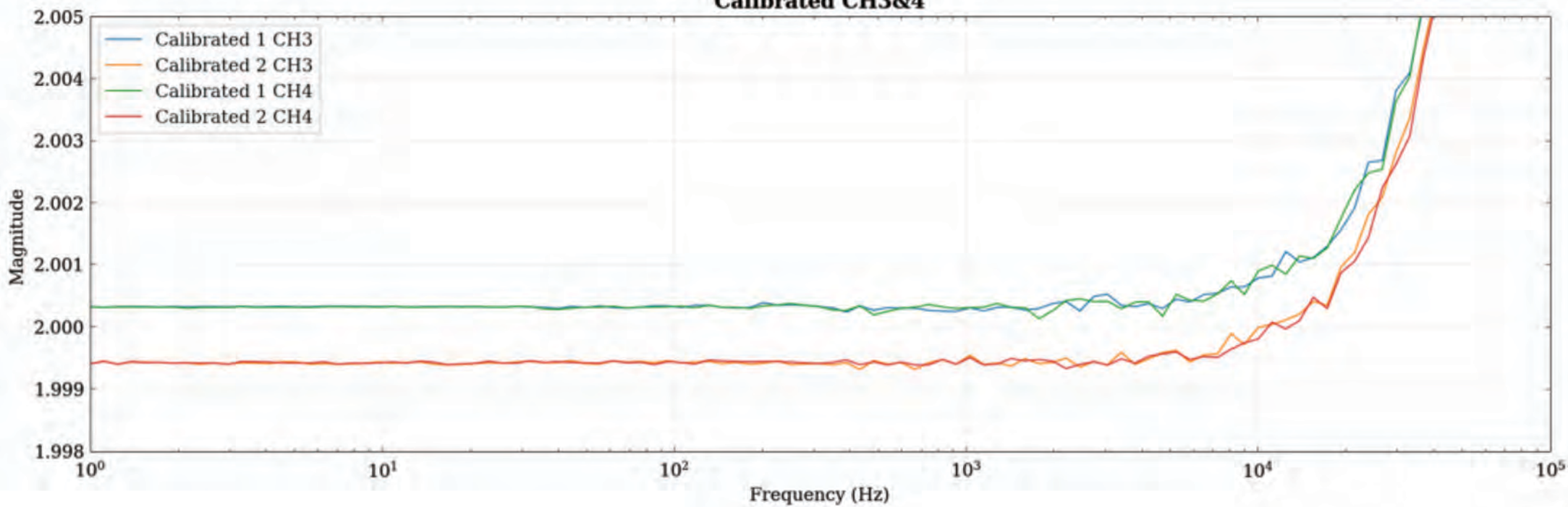




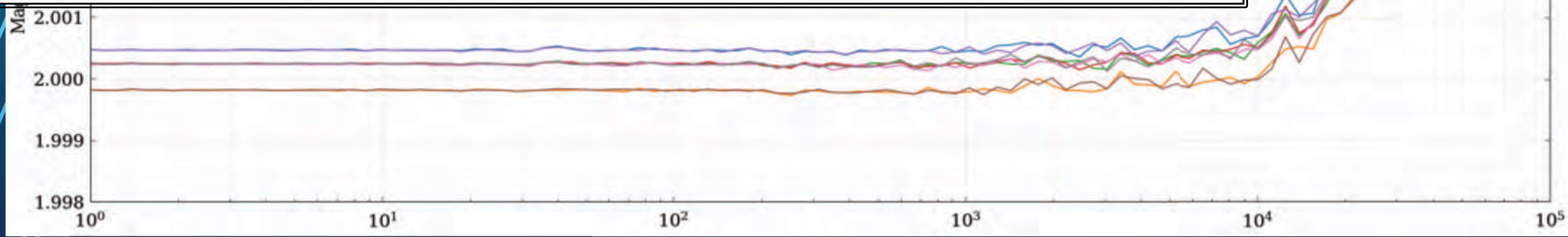
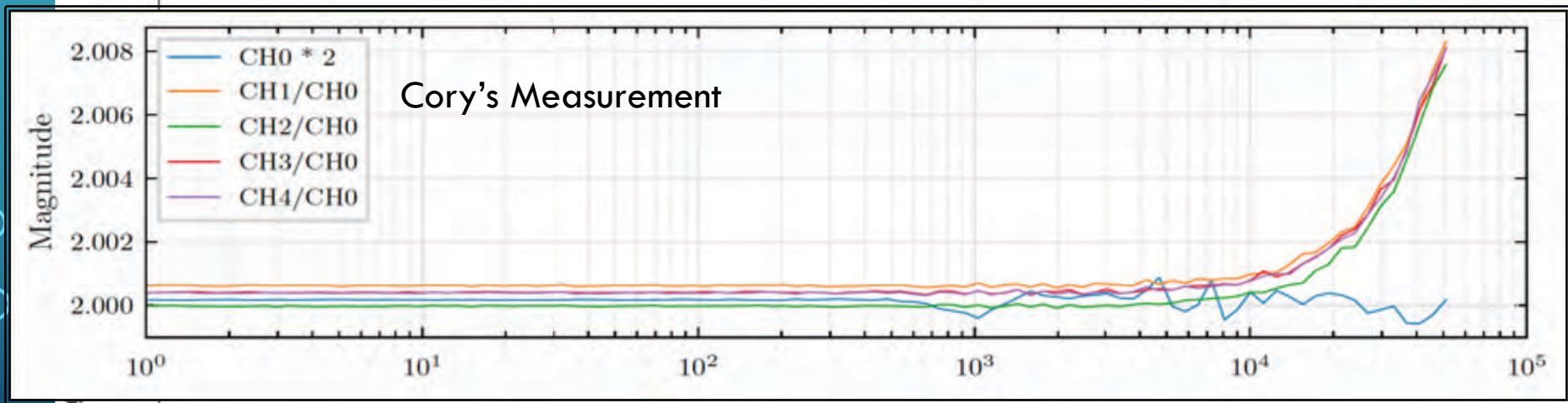
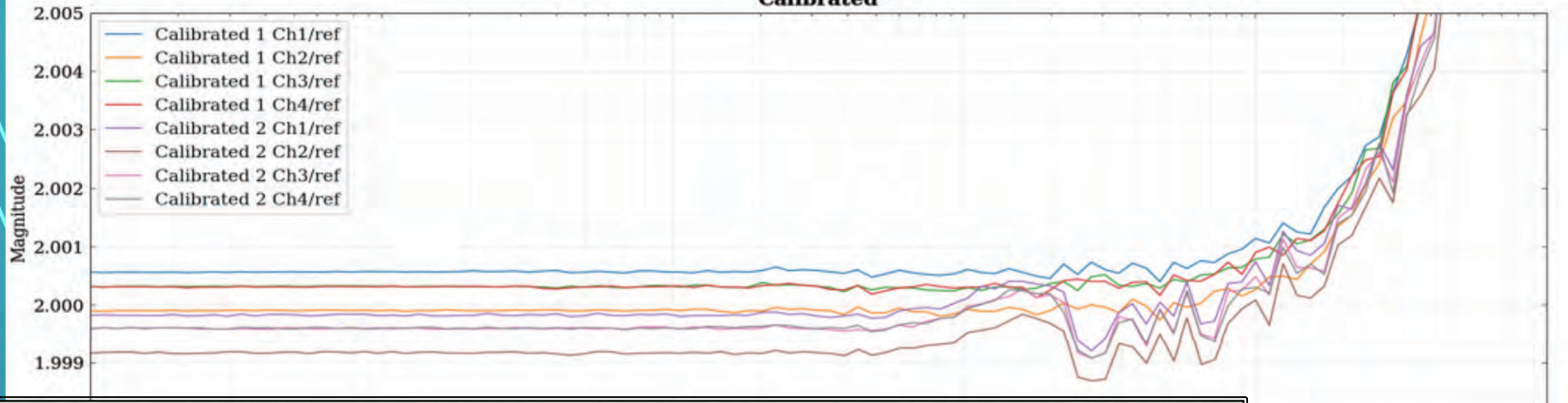
**Non-Calibrated CH3&4**



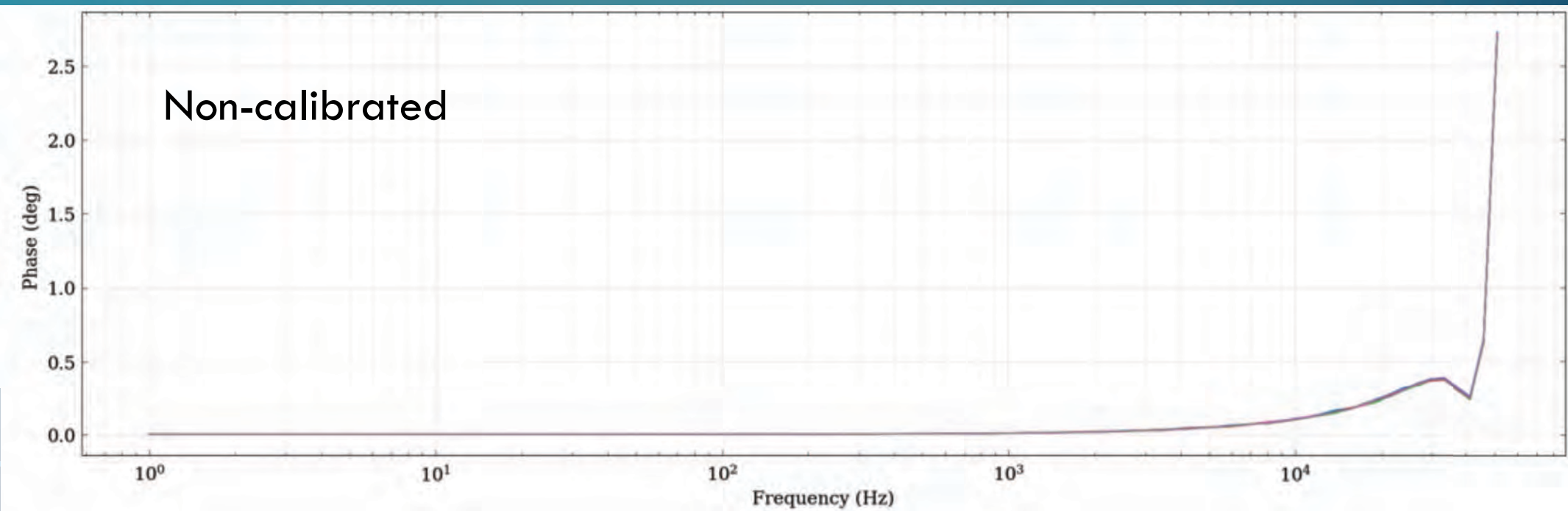
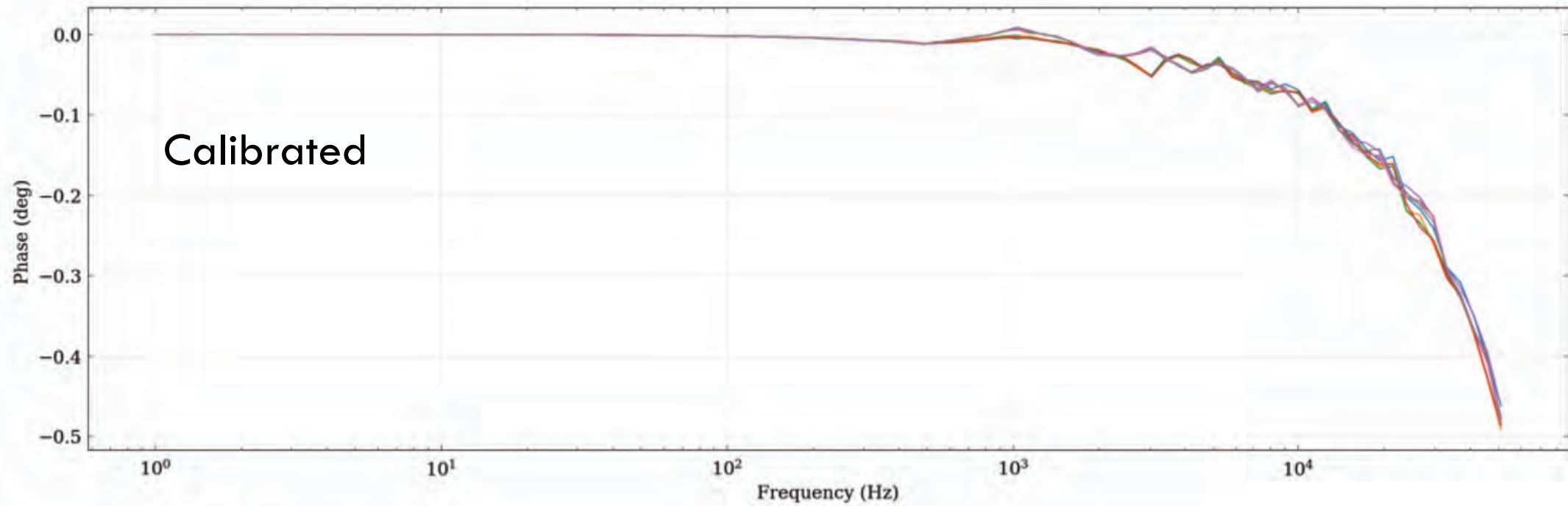
**Calibrated CH3&4**



# Calibrated

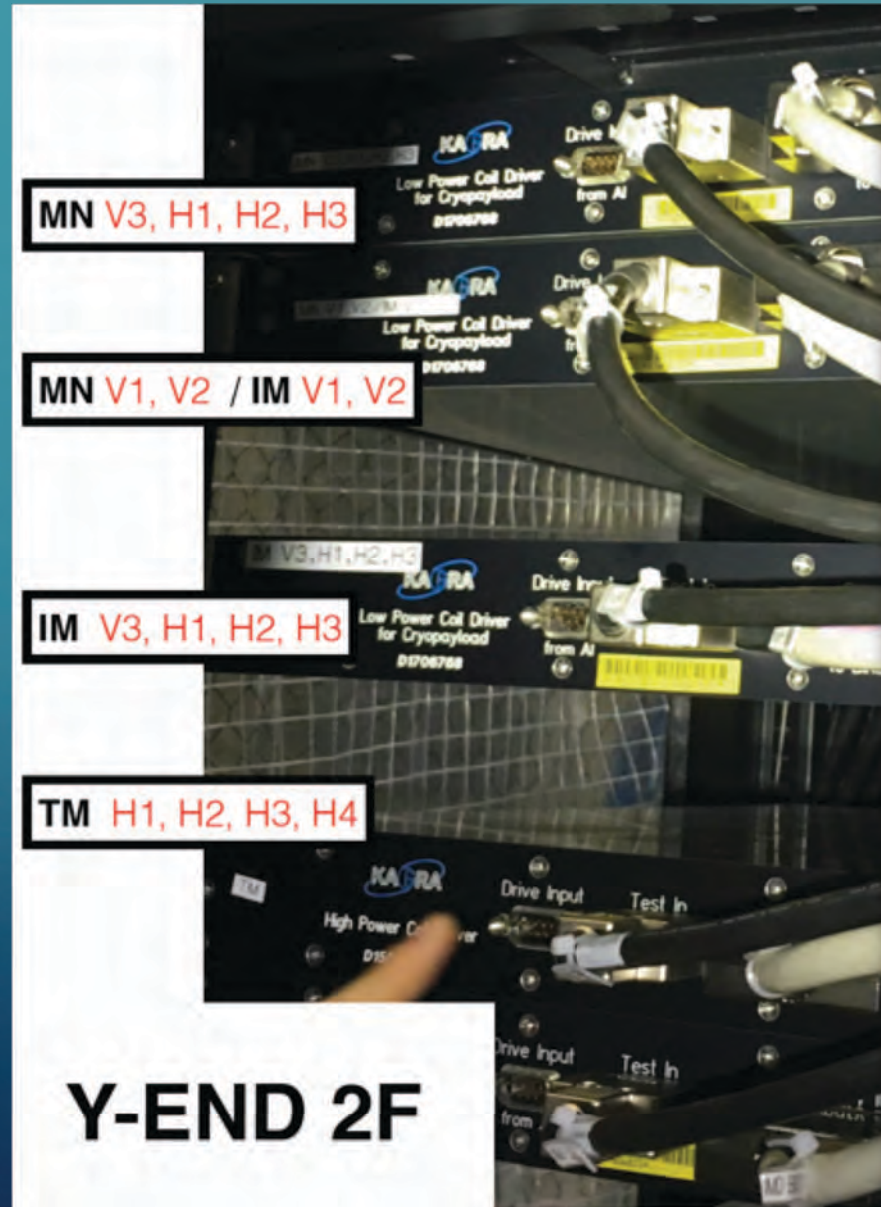






# X-END LOW POWER COIL DRIVER MEASUREMENT

From Cory's slide



**Y-END 2F**

CRY\_CUST\_TYPEA\_BIO.adl

CRYO PAYLOAD BIO | TYPE A BIO

BIO ETMXCRYO PAYLOAD WD STATUS

VIEW FROM HR SIDE

PF	Tripped	Not Tripped	RESET CH
MN	H1	<input checked="" type="checkbox"/>	1
	H2	<input checked="" type="checkbox"/>	1
	H3	<input checked="" type="checkbox"/>	1
	V1	<input checked="" type="checkbox"/>	2
	V2	<input checked="" type="checkbox"/>	2
	V3	<input checked="" type="checkbox"/>	1
	IM	H1	<input checked="" type="checkbox"/>
H2		<input checked="" type="checkbox"/>	3 H1
H3		<input checked="" type="checkbox"/>	3 H2
V1		<input checked="" type="checkbox"/>	2 H3
V2		<input checked="" type="checkbox"/>	2 H4
V3		<input checked="" type="checkbox"/>	3
TM		H1	<input checked="" type="checkbox"/>
	H2	<input checked="" type="checkbox"/>	5
	H3	<input checked="" type="checkbox"/>	5
	H4	<input checked="" type="checkbox"/>	5

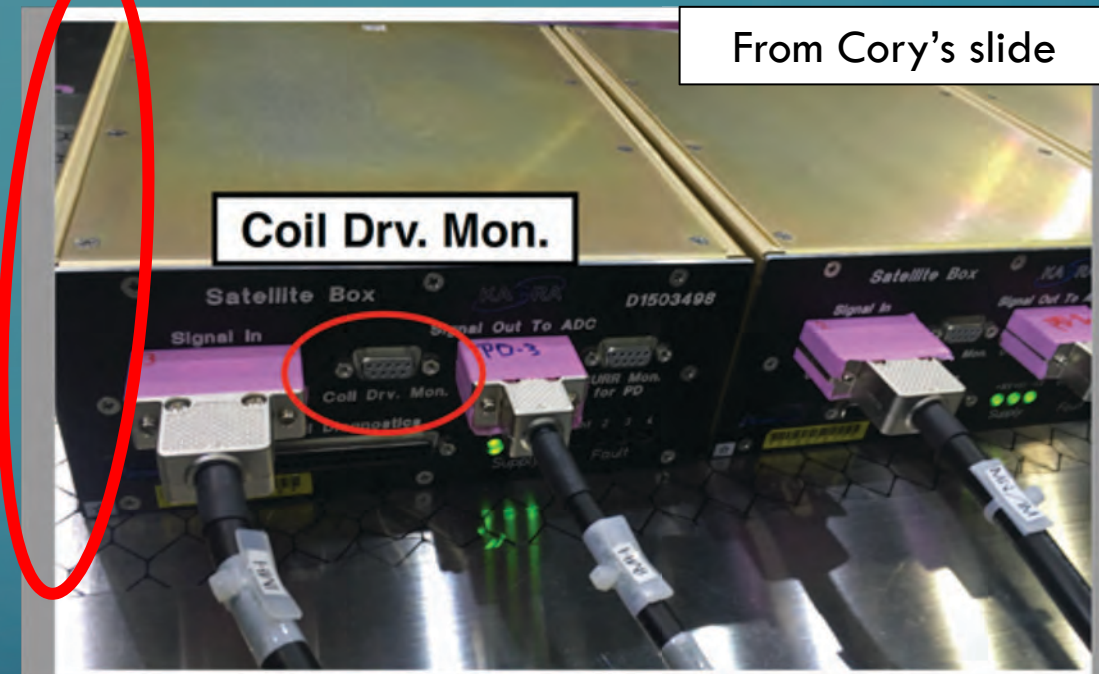
WD RESET CHANNEL

1 RESET 2 RESET 3 RESET 4 RESET 5 RESET



# SATELLITE BOX

- MN- 4 channels  
(V3) (H1) (H2) (H3) →
- MN- 2 channels/ IM- 2 channels  
(V1) (V2) (V1) (V2) →
- IM- 4 channels  
(V3) (H1) (H2) (H3) →
- TM- 4 channels  
(H1) (H2) (H3) (H4) →

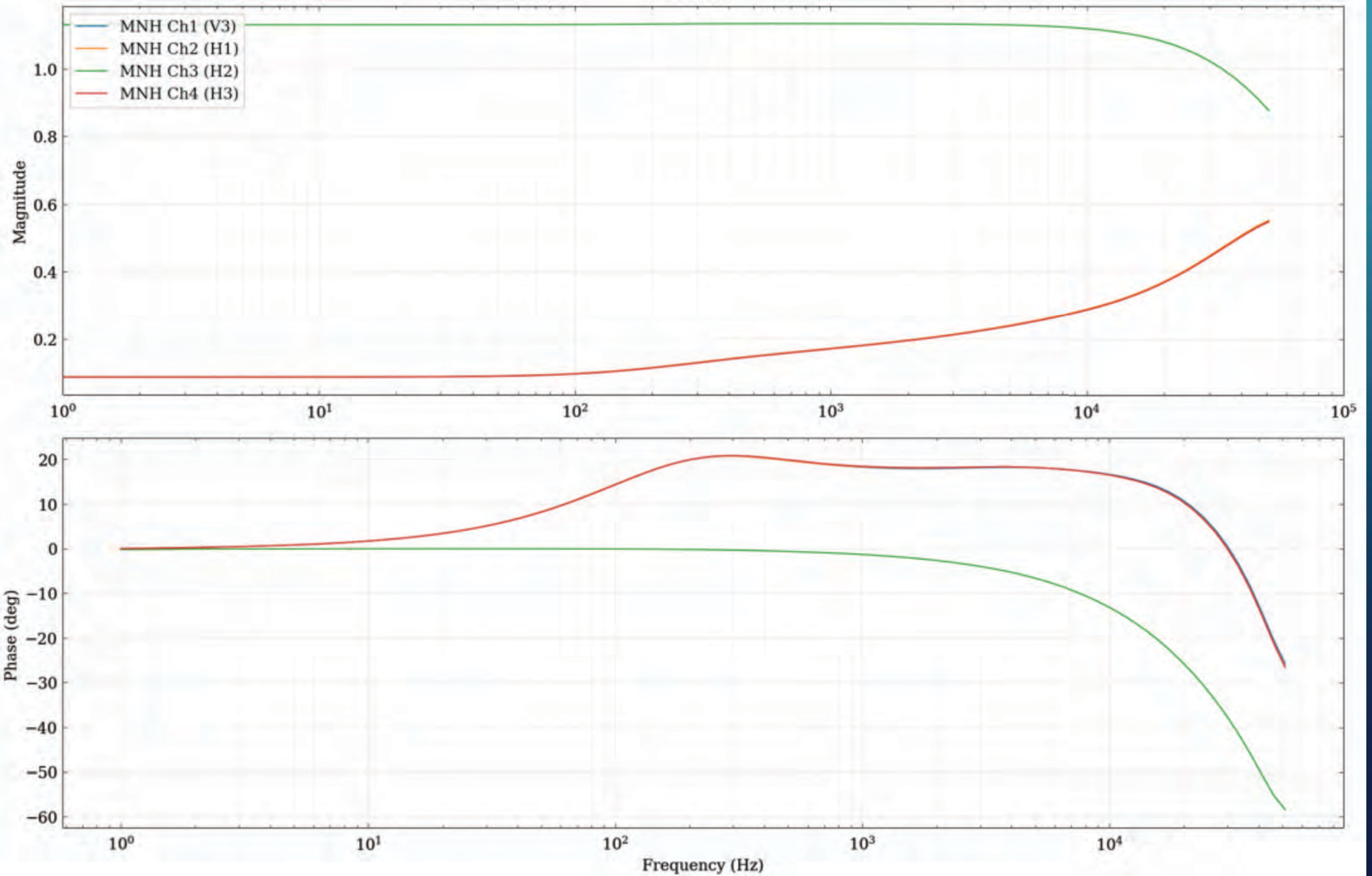


It seems that there is no TM satellite box in Y-end too.

From Cory's slide

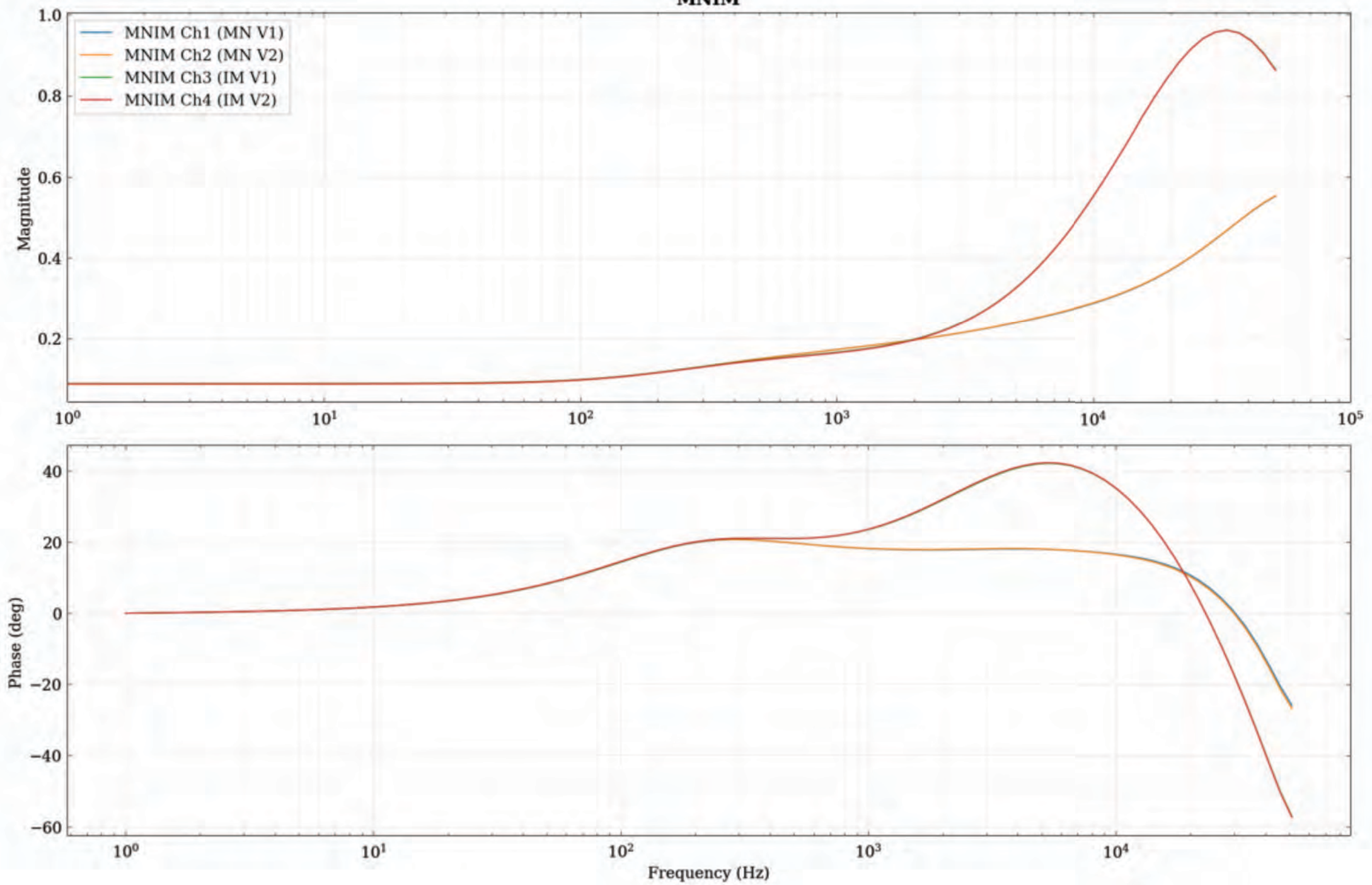
Each correspond to Channel 1~4 output for the measurement

# MNH

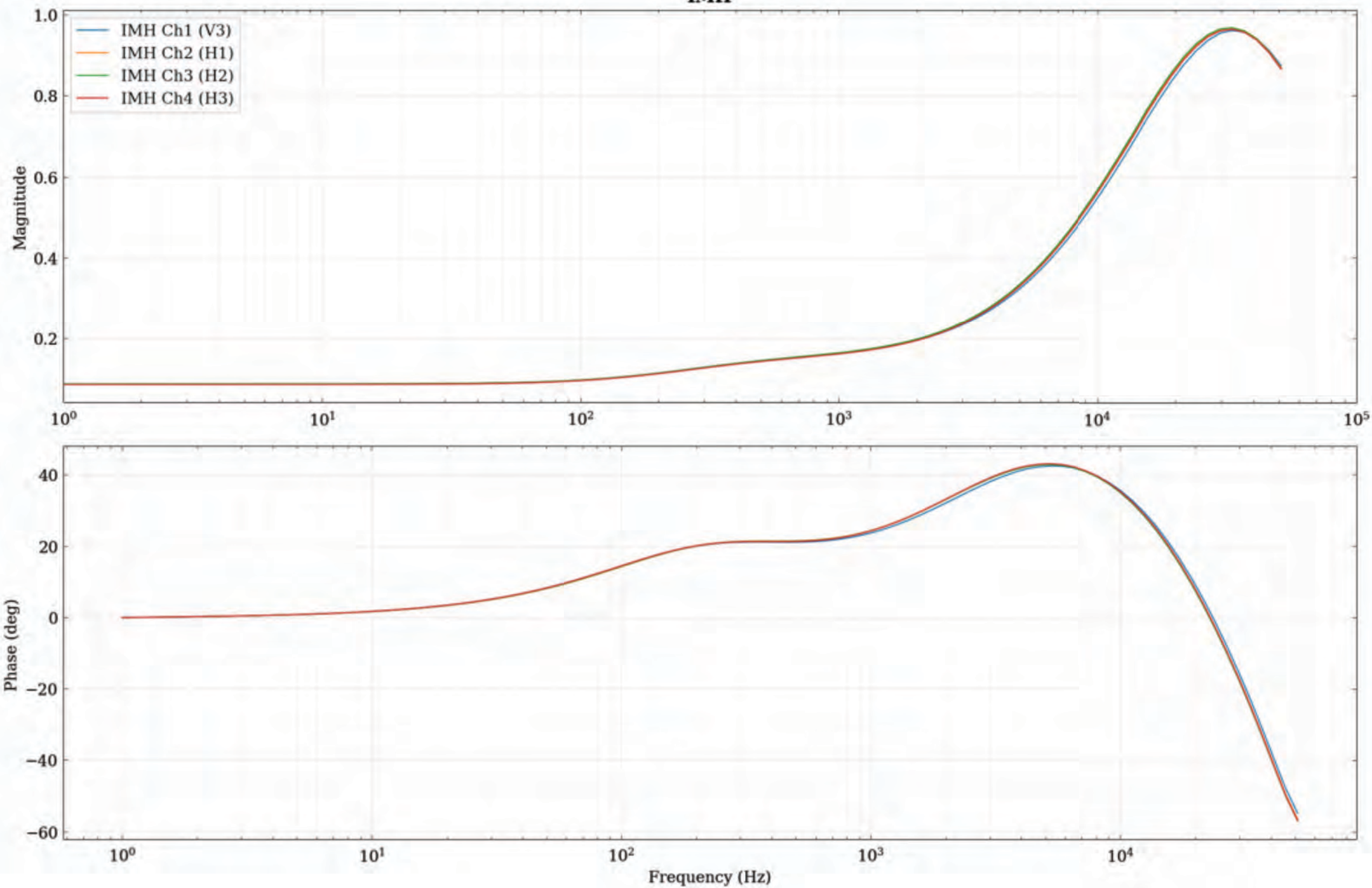




# MNIM



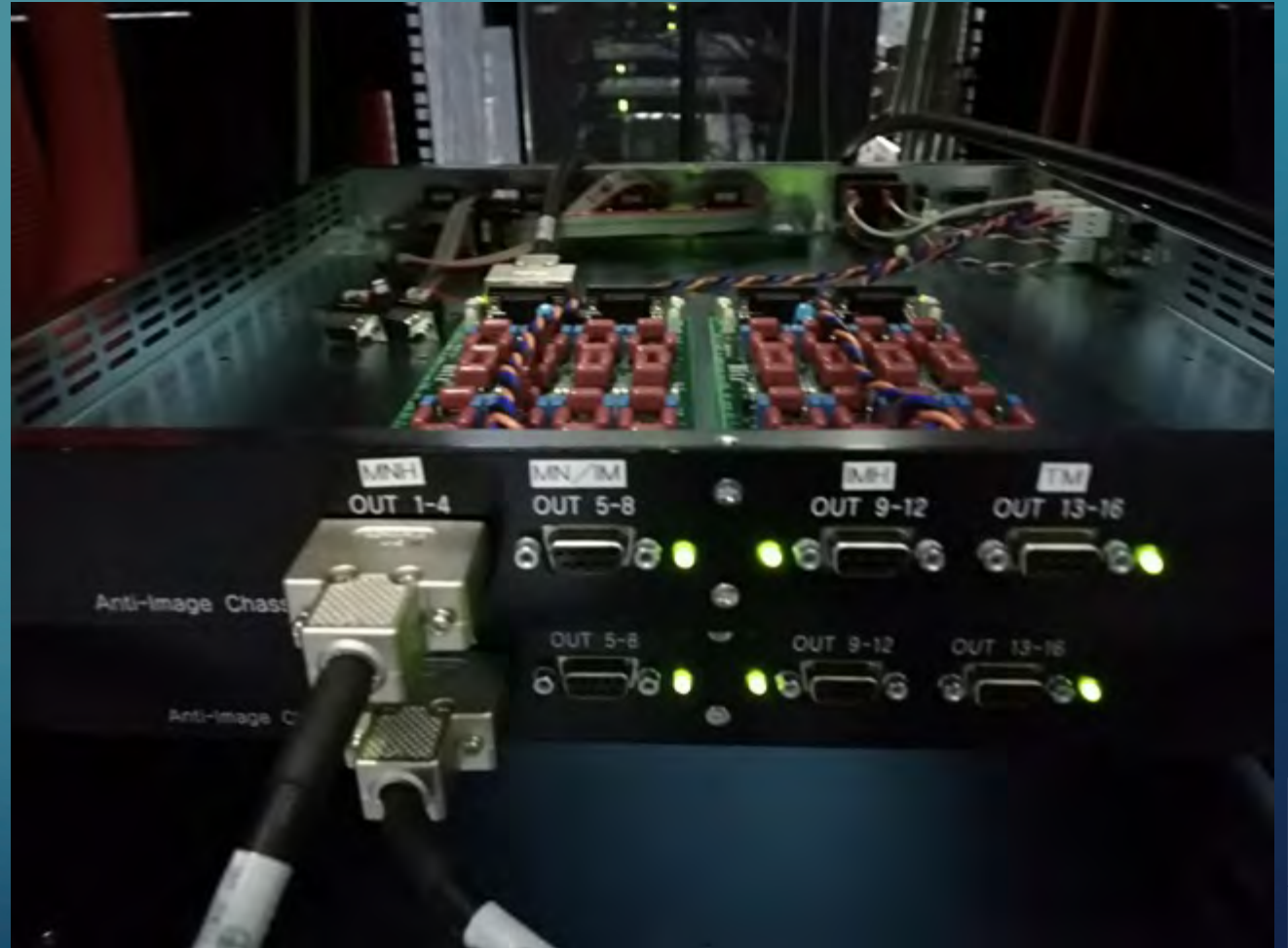
# IMH



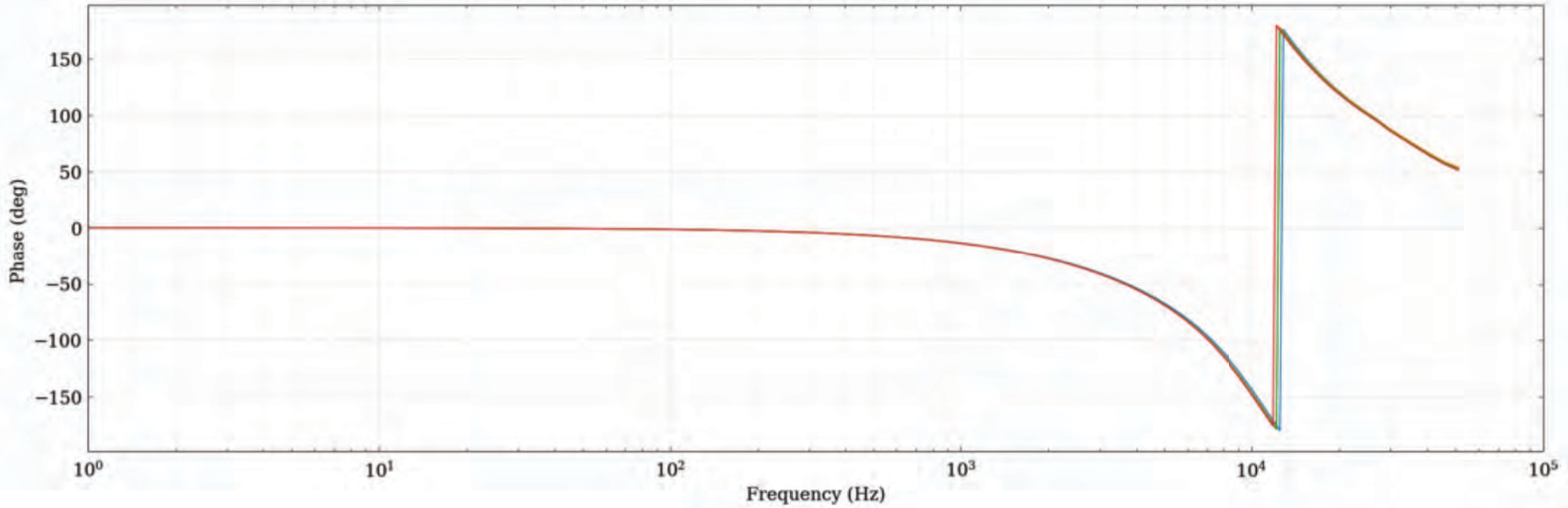
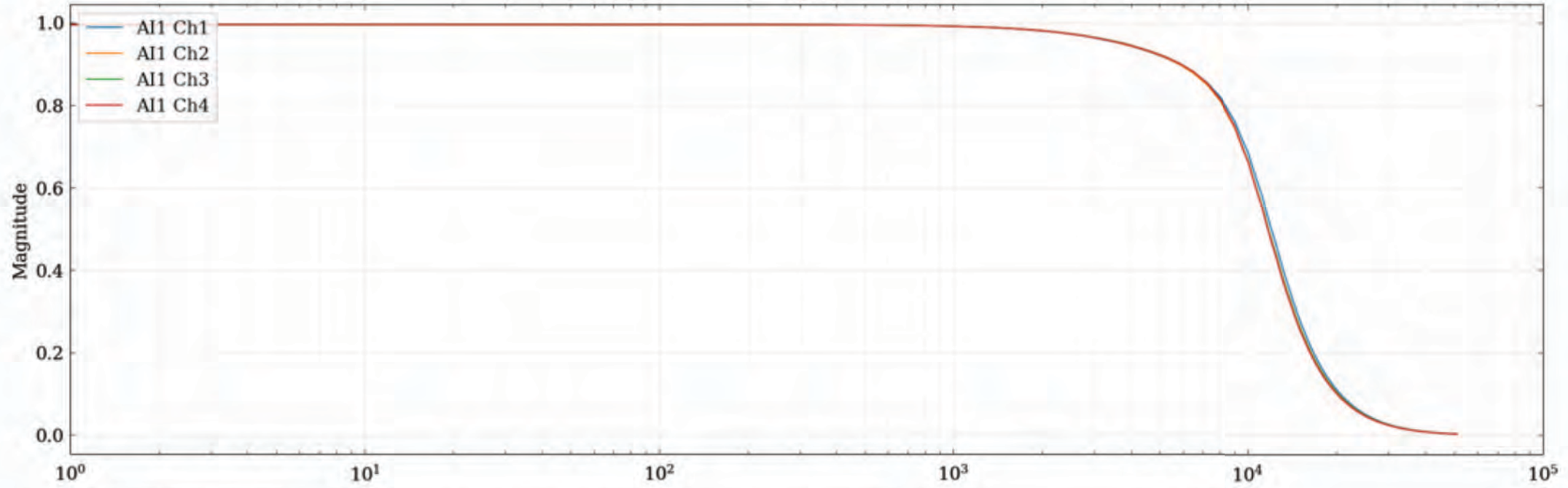


# ANTI-IMAGE CHASSIS MEASUREMENT

- Measurement with/without adapter
- Difference between open/closed cover.
- Each output 4 channels

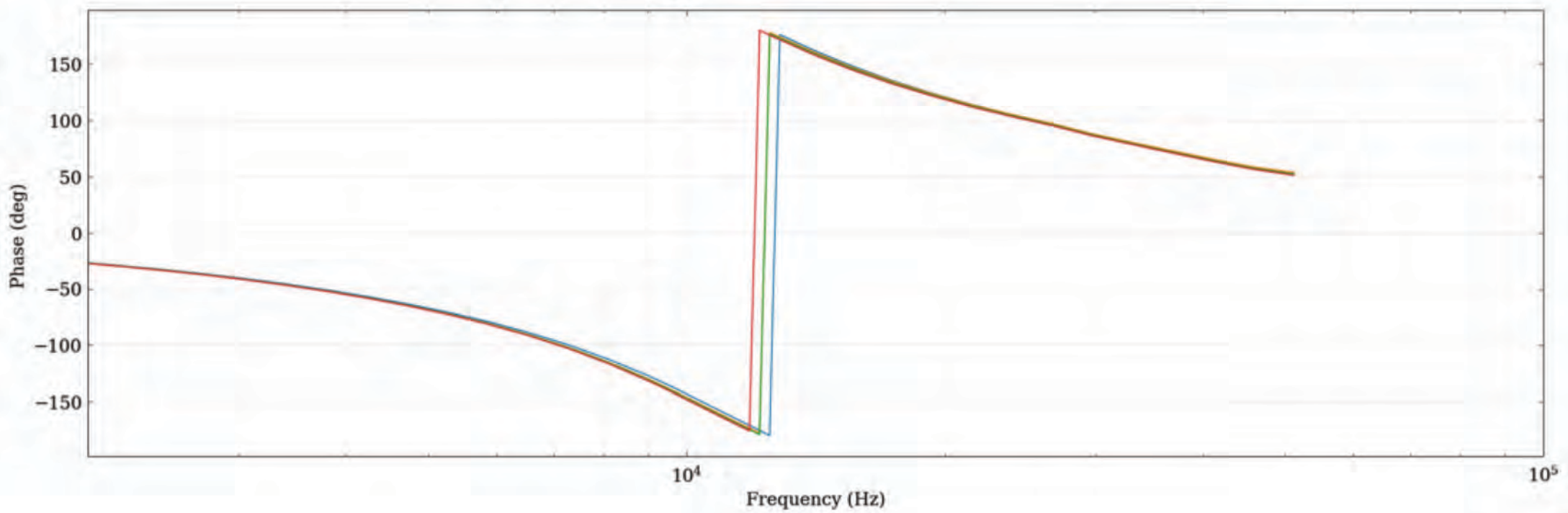
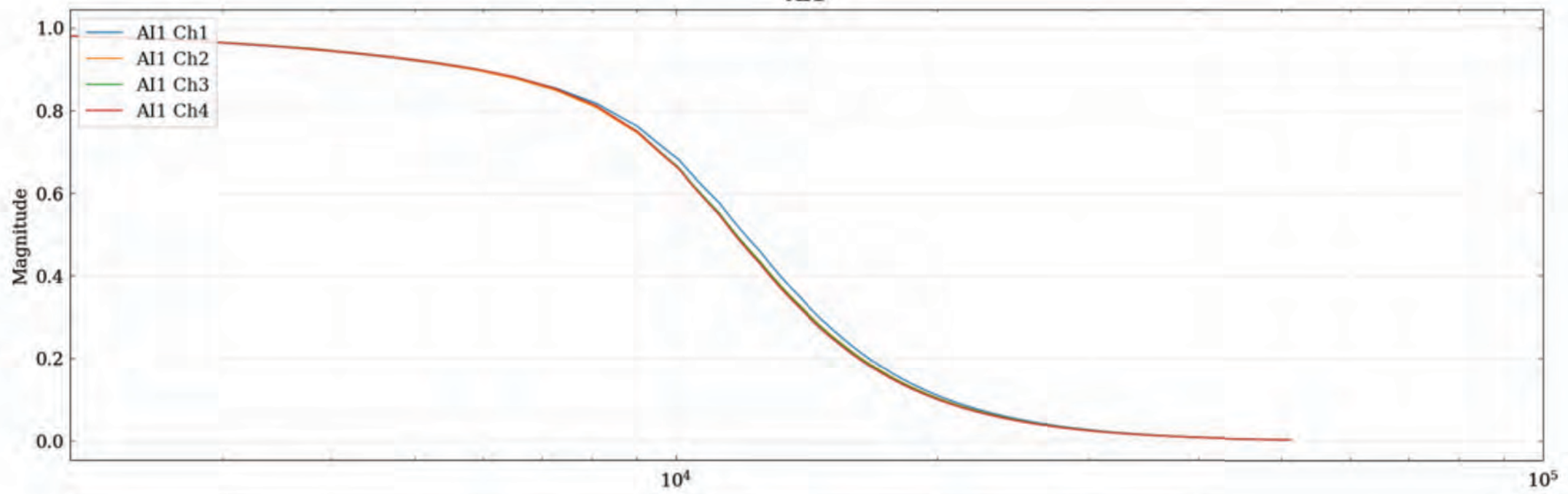


# AI1

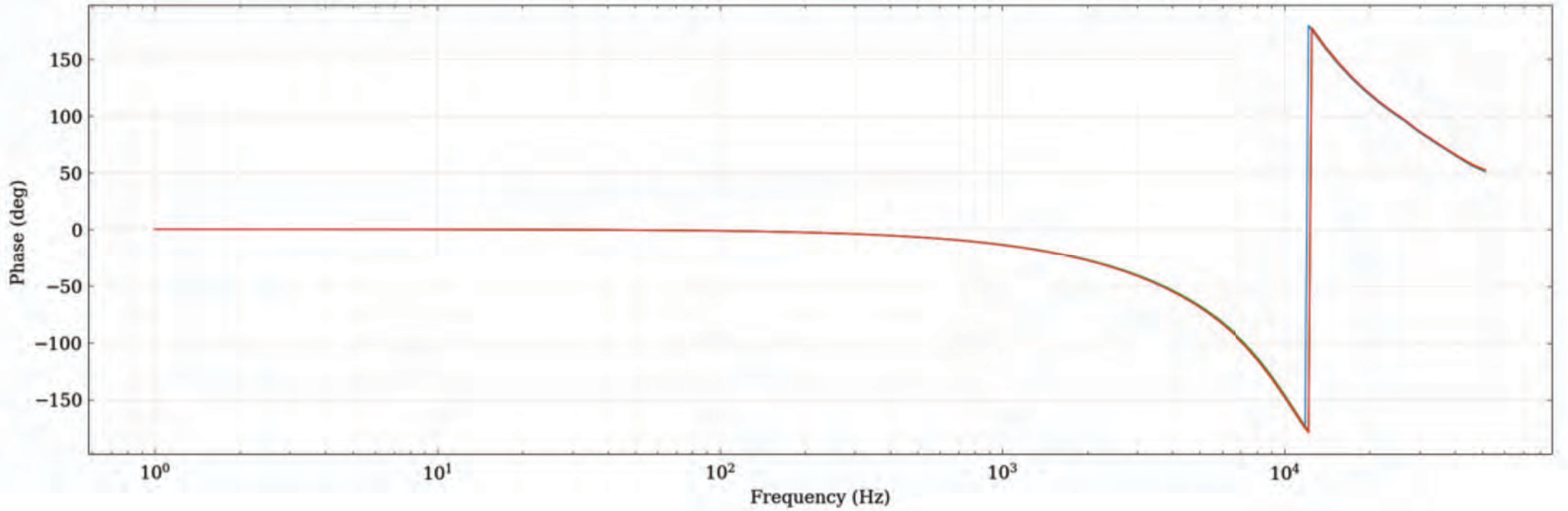
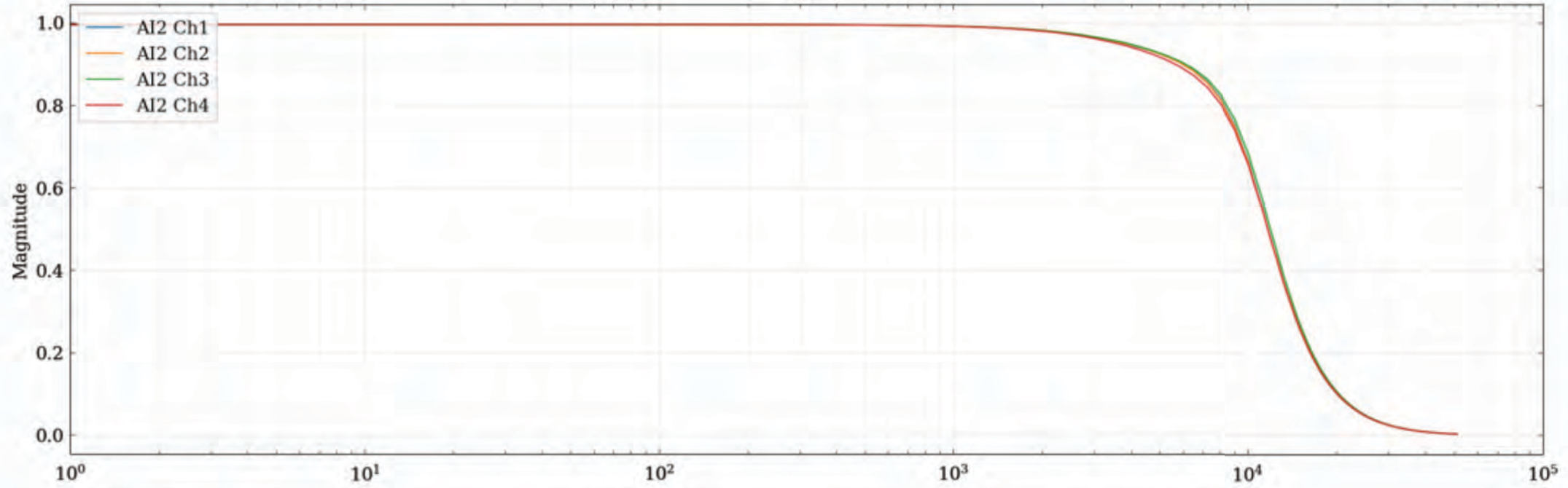




# AI1

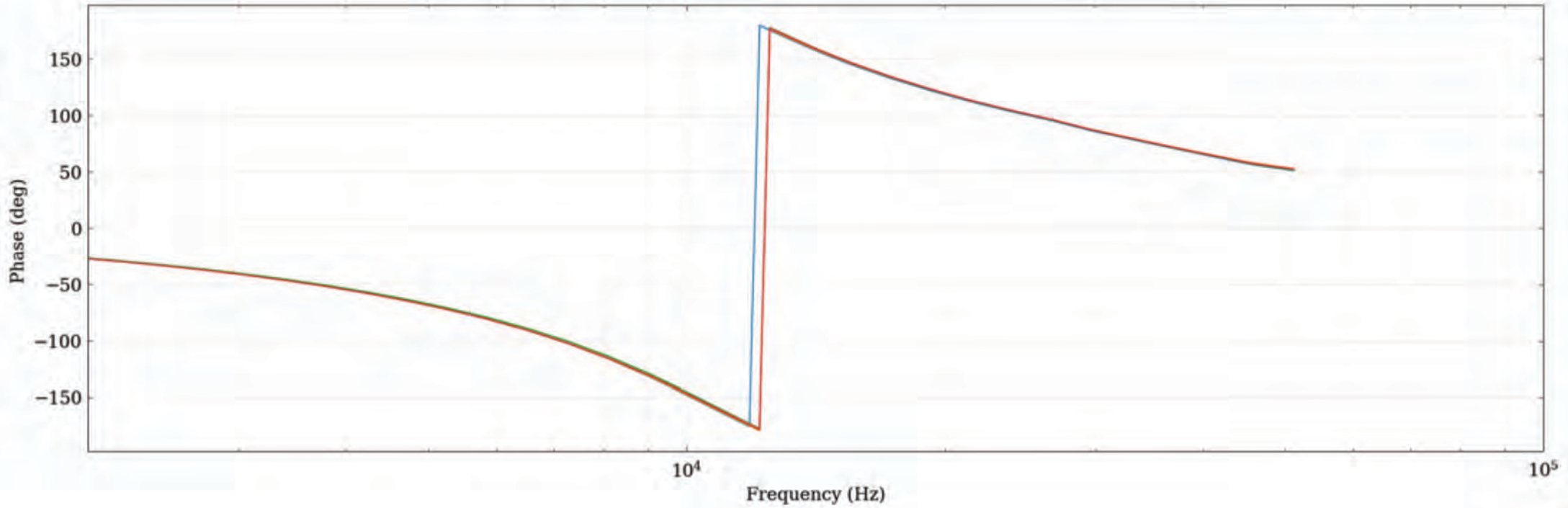
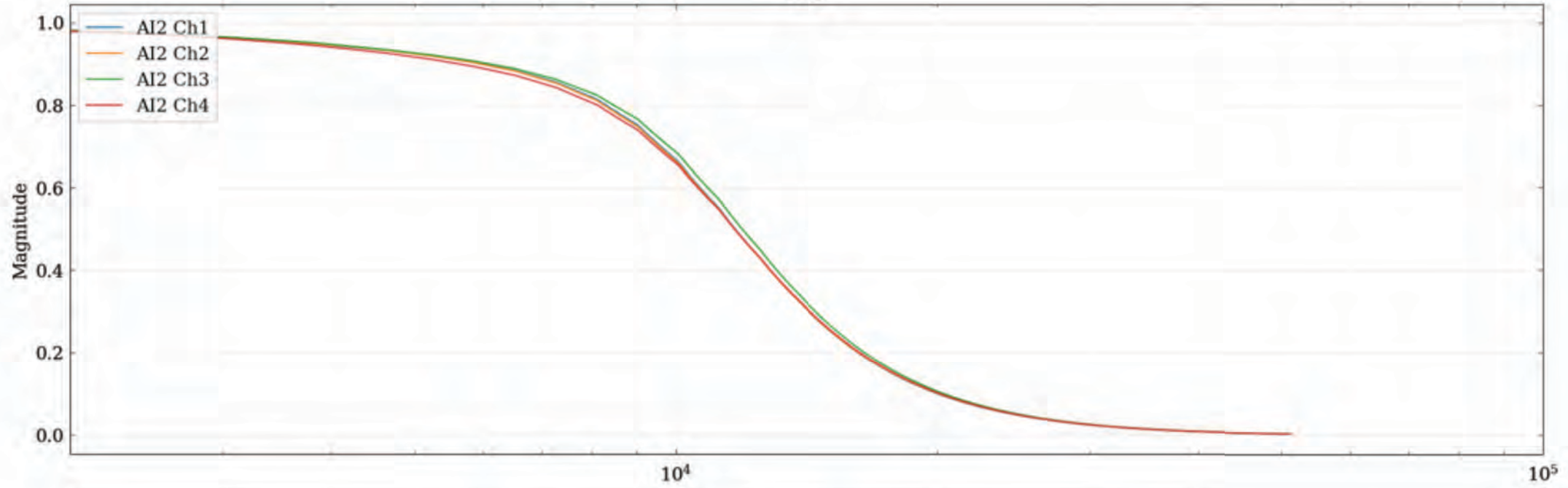


# AI2

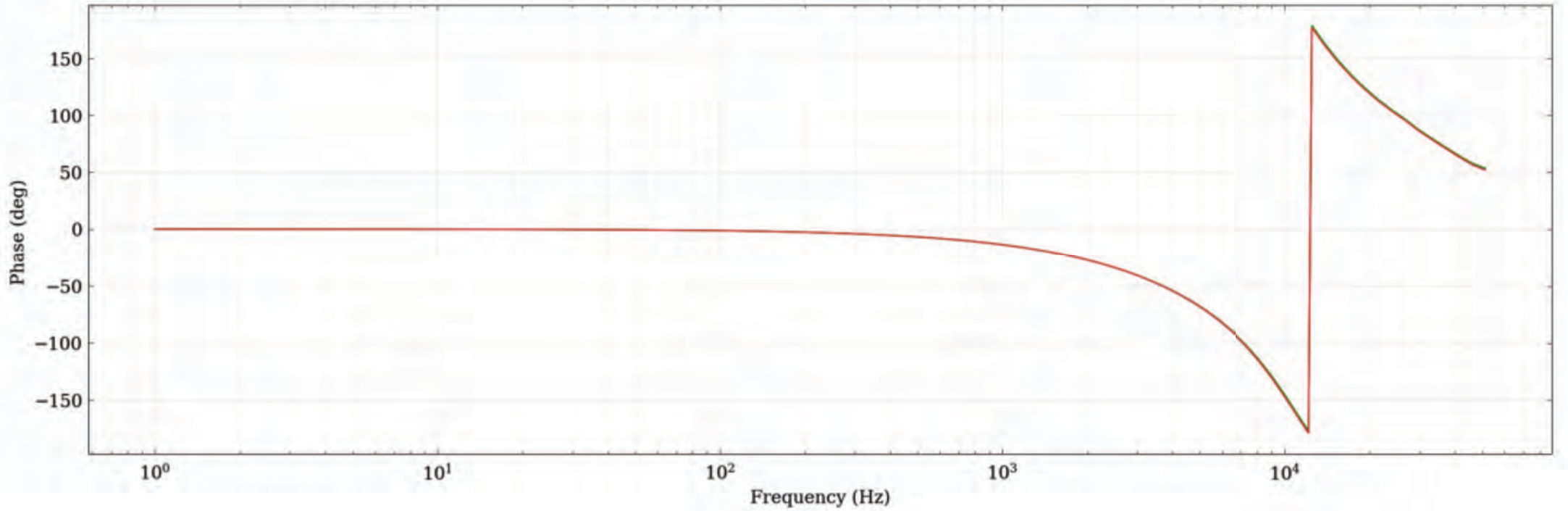
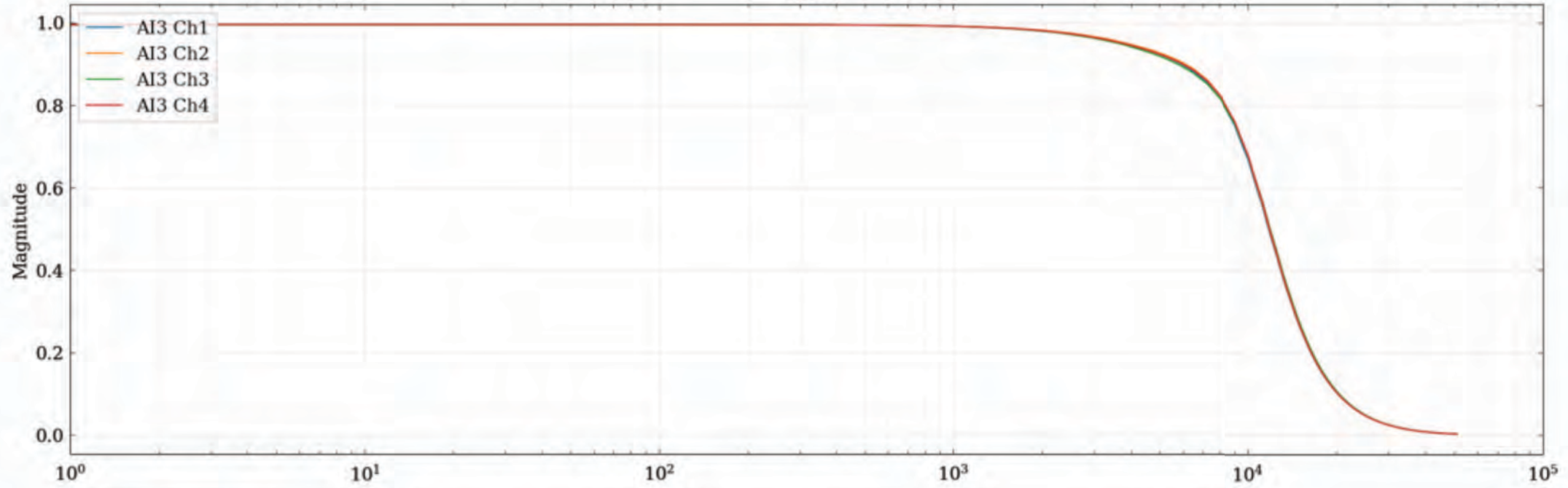




# AI2

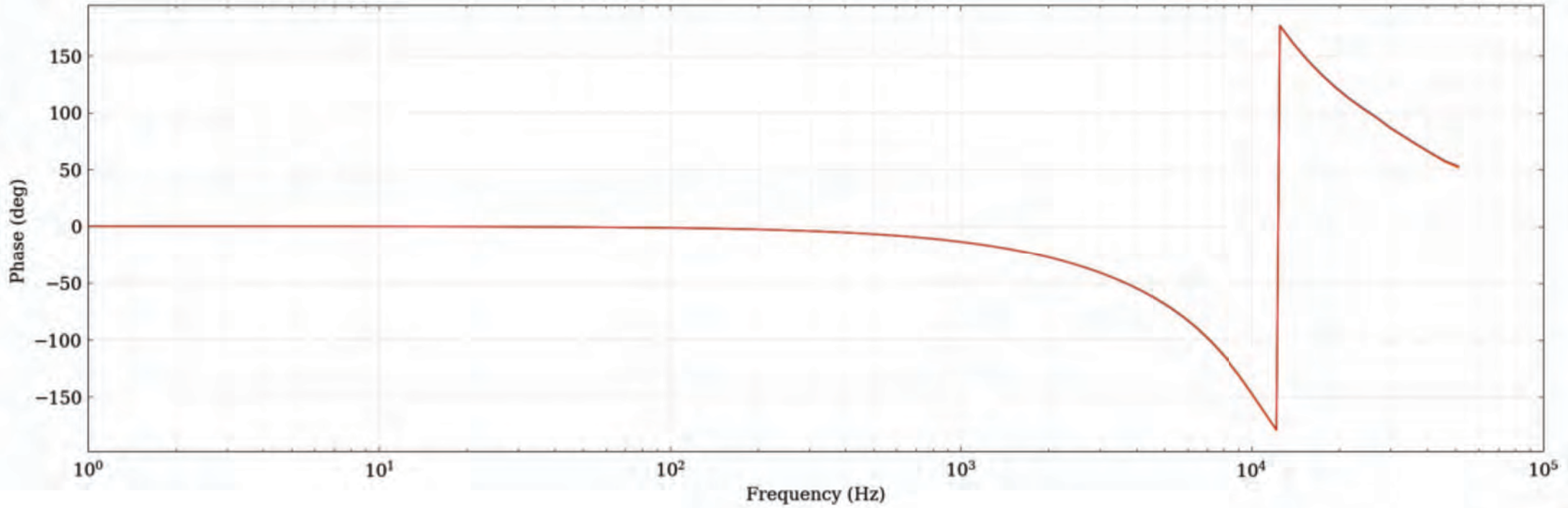
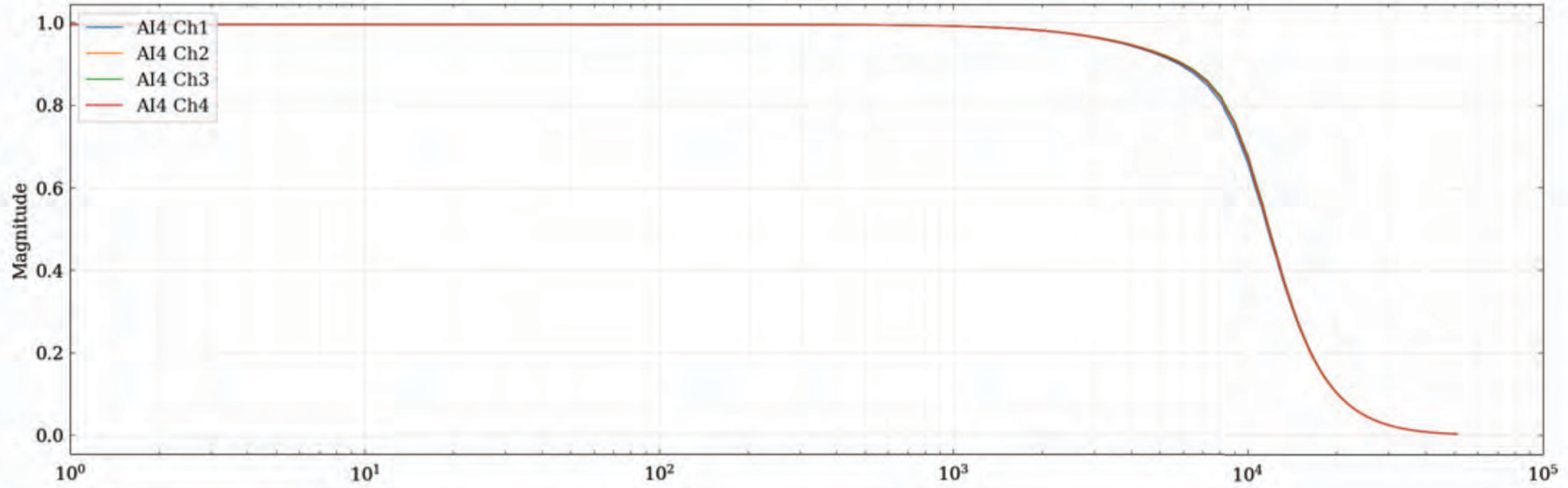


# AI3





# AI4



# WHAT'S NEXT?

- Coherence measurement
- TM satellite box at X-end
- Sensing part
- Measurement at Y-end



The background is a solid teal color. In the four corners, there are decorative white line-art patterns resembling circuit traces or a stylized tree structure. These patterns consist of thin lines connecting small circles, some of which are enclosed in squares.

*Thank You !*