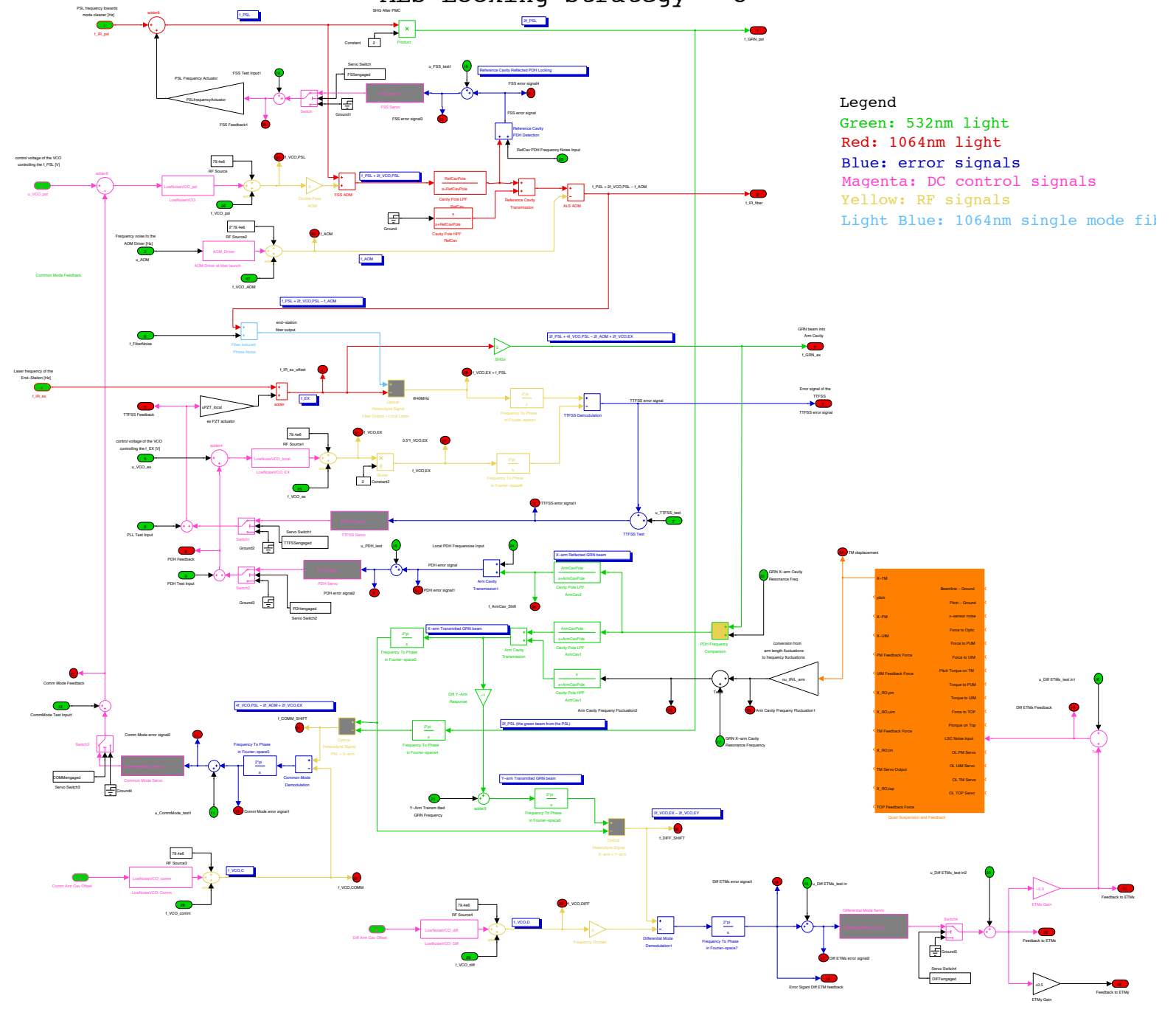
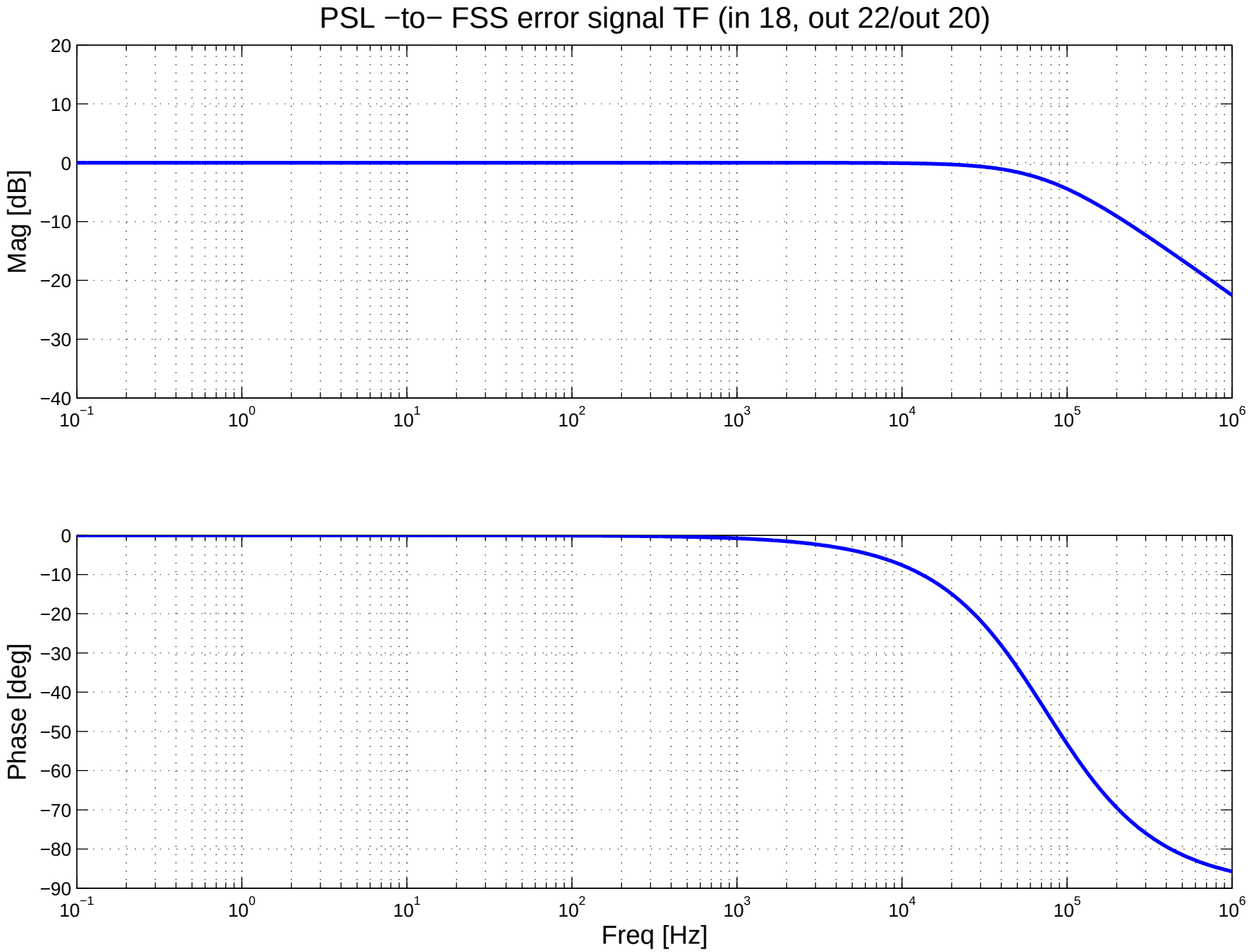
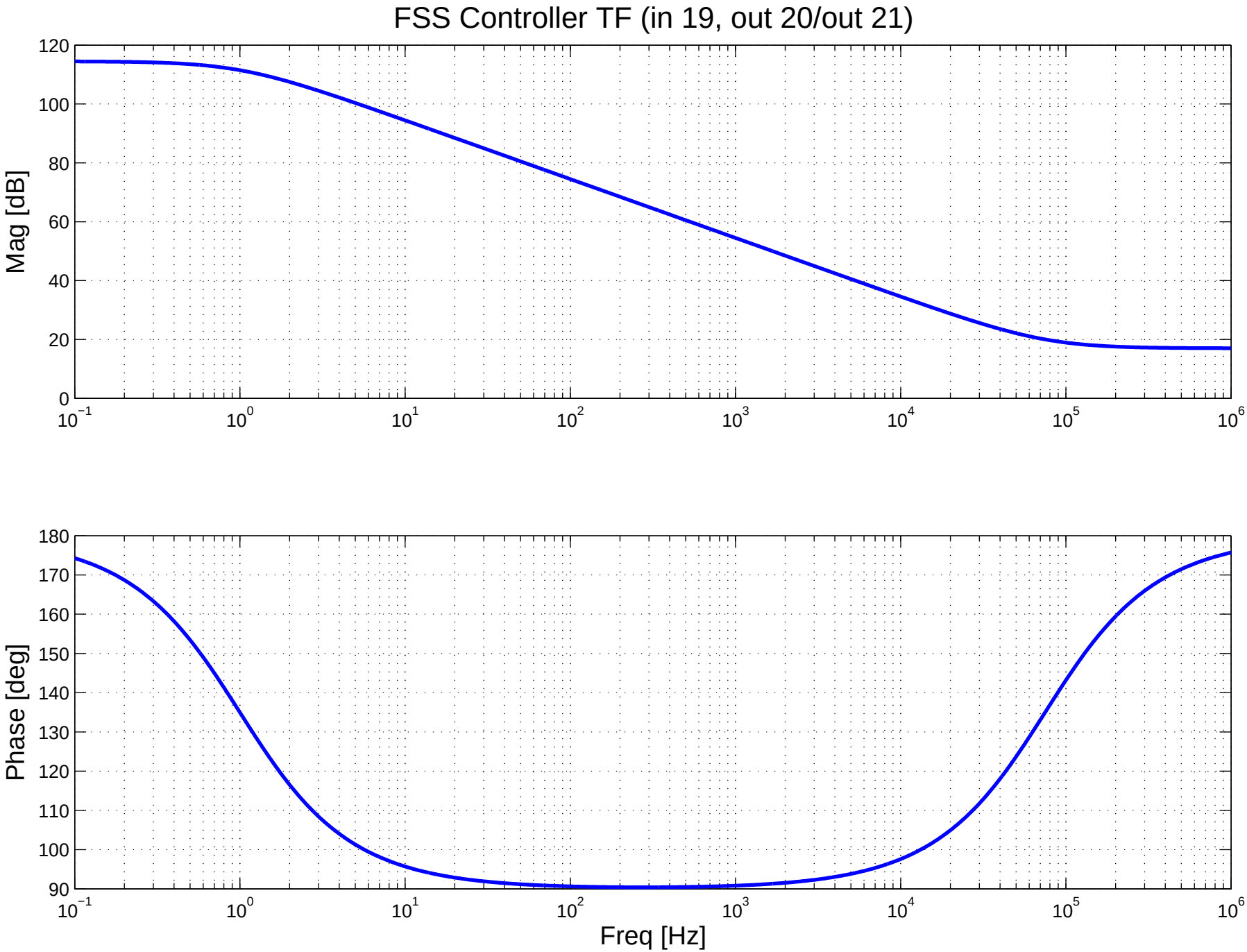
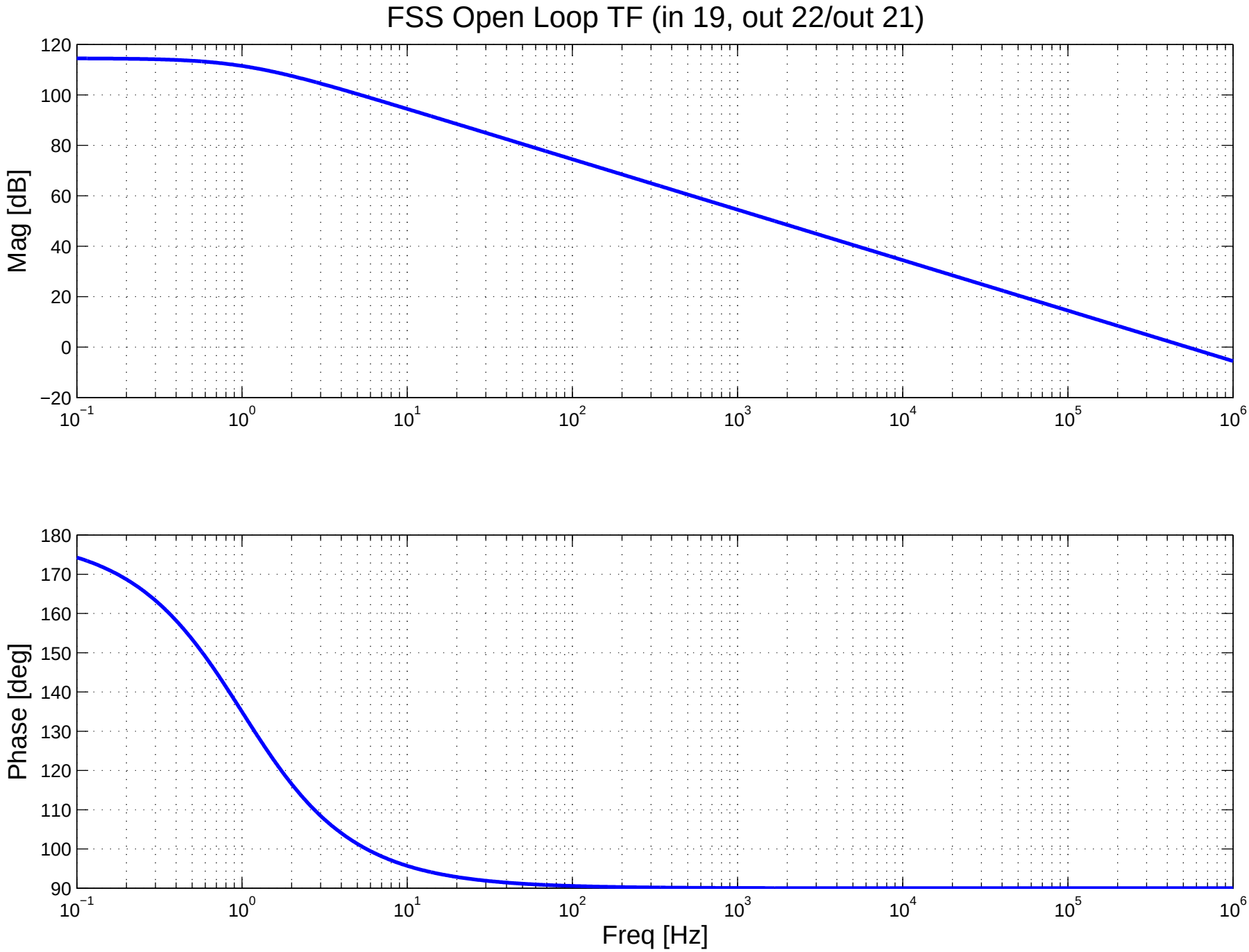
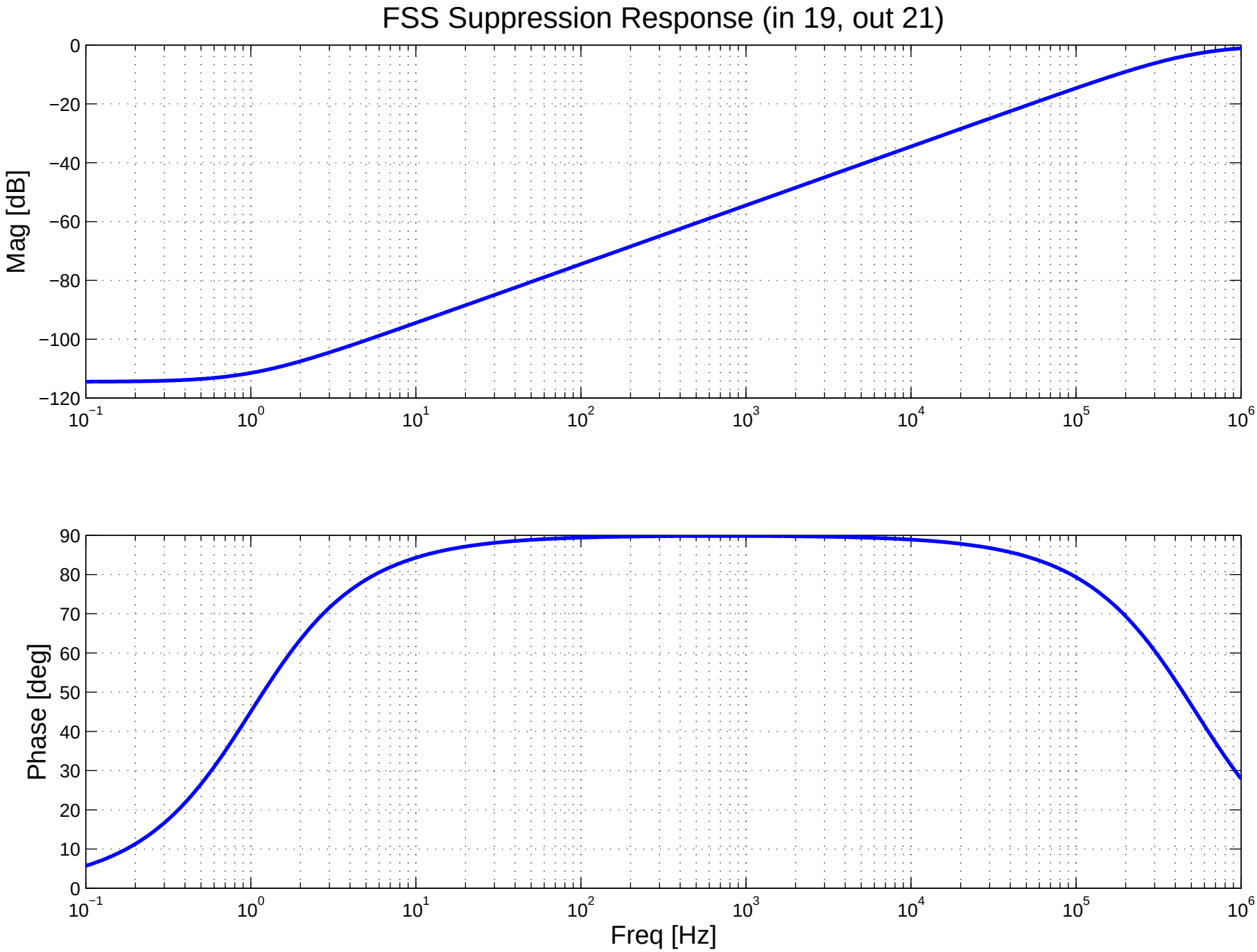
ALS Locking Strategy - 3

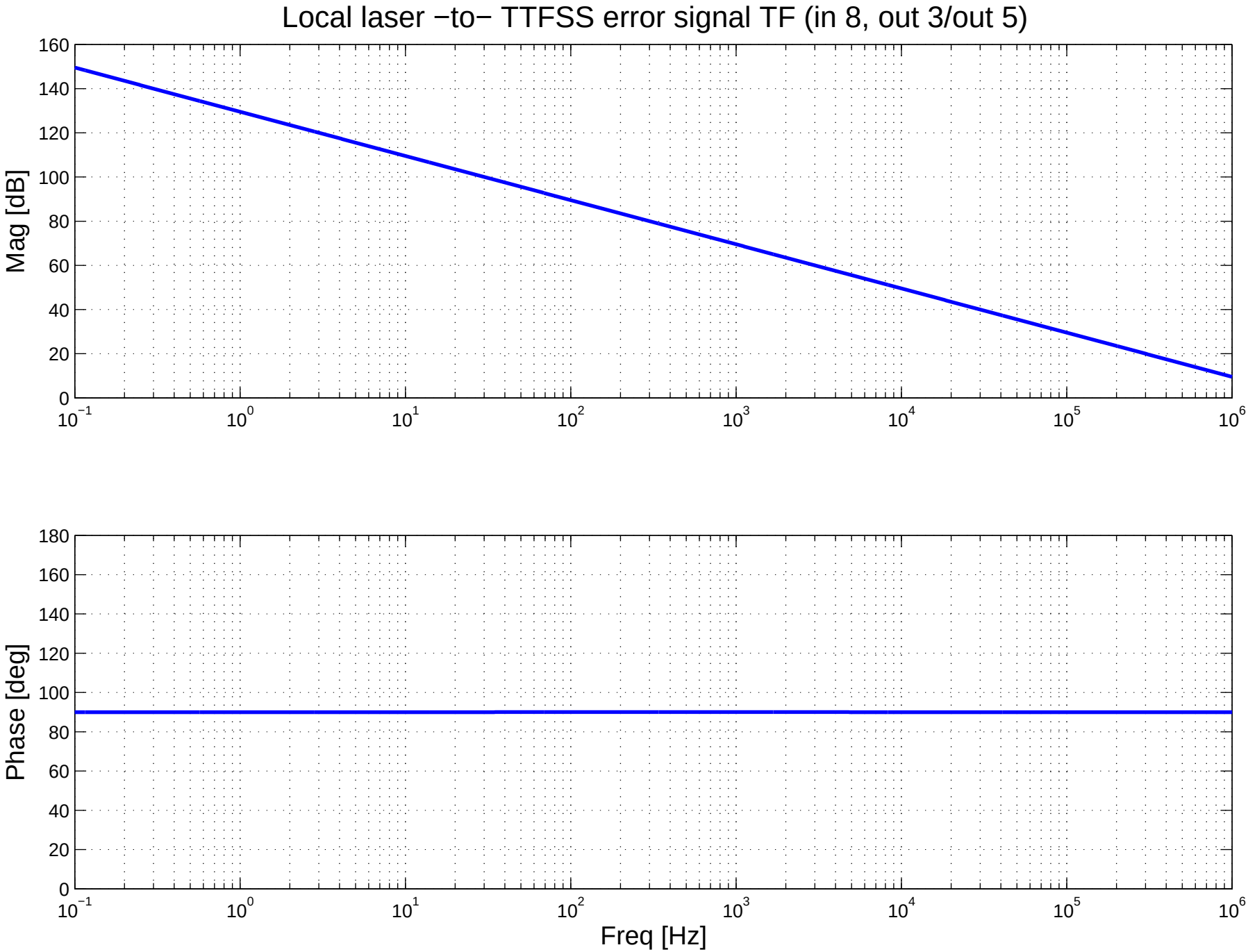


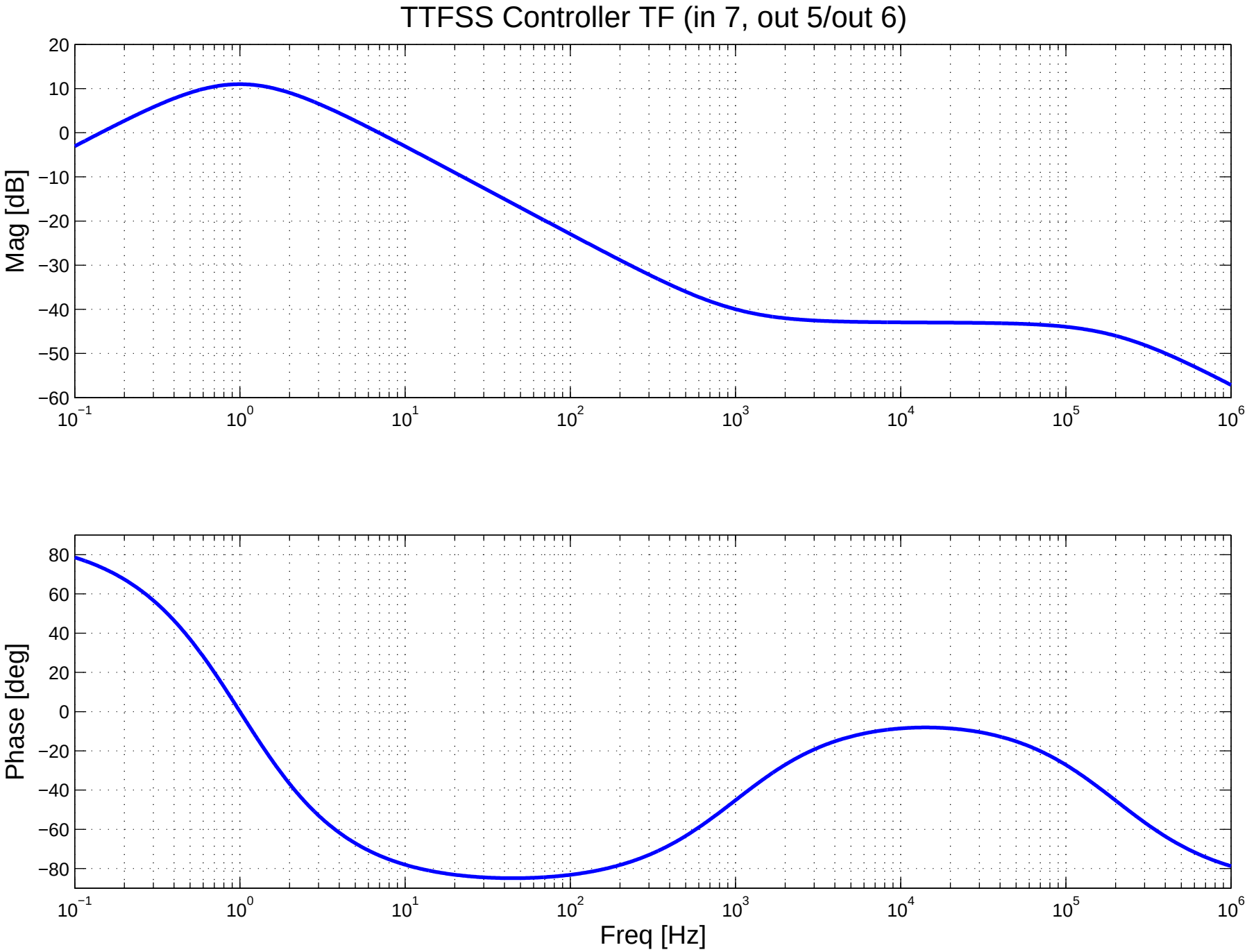

PSL −to− FSS error signal TF (in 18, out 22/out 20)
Mag [dB]
20
10
0
−10
−20
−30
−40
Phase [deg]
0
−10
−20
−30
−40
−50
−60
−70
−80
−90
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
10^{6}
Freq [Hz]

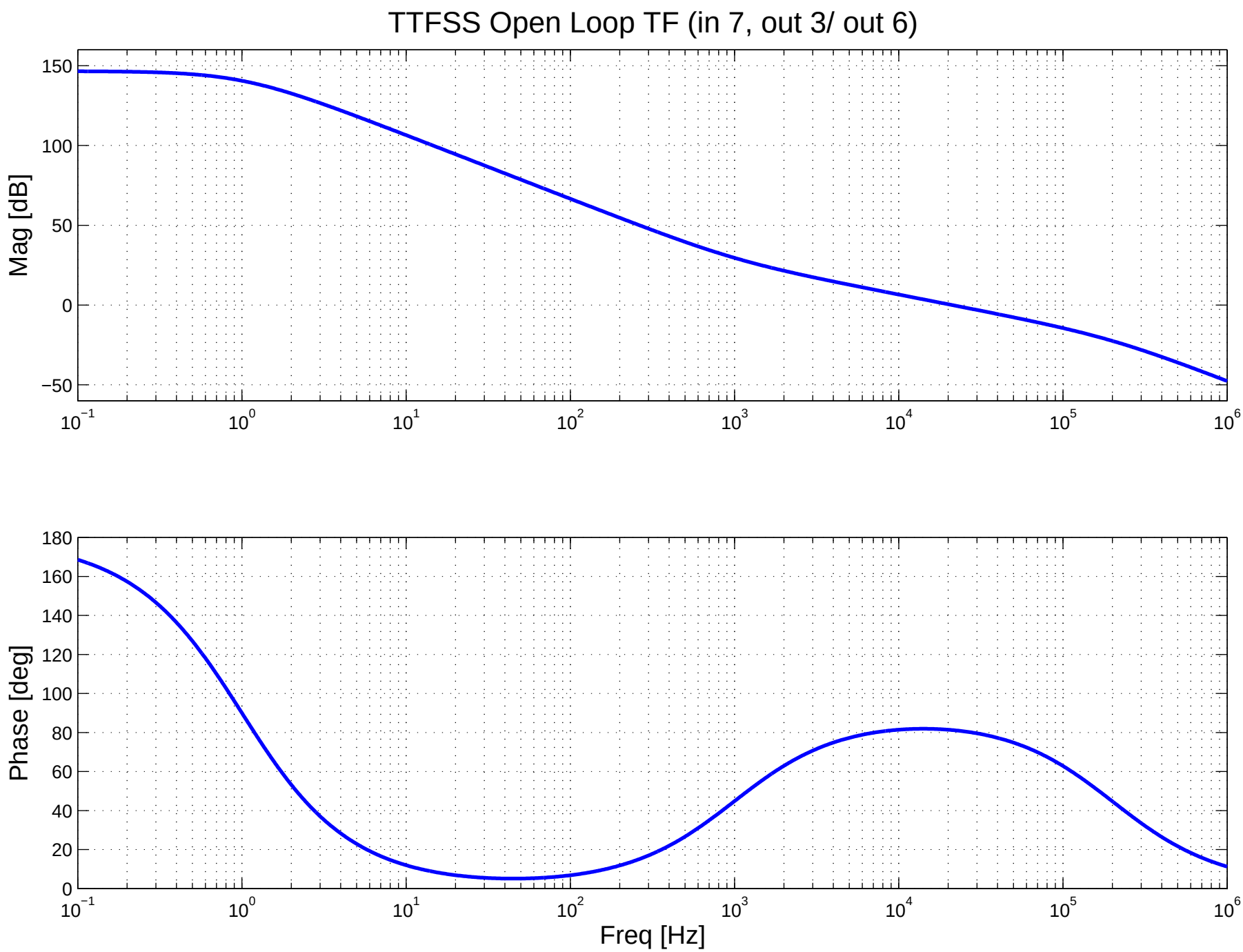

FSS Controller TF (in 19, out 20/out 21)
Mag [dB]
120
100
80
60
40
20
0
Phase [deg]
180
170
160
150
140
130
120
110
100
90
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
10^{6}
Freq [Hz]

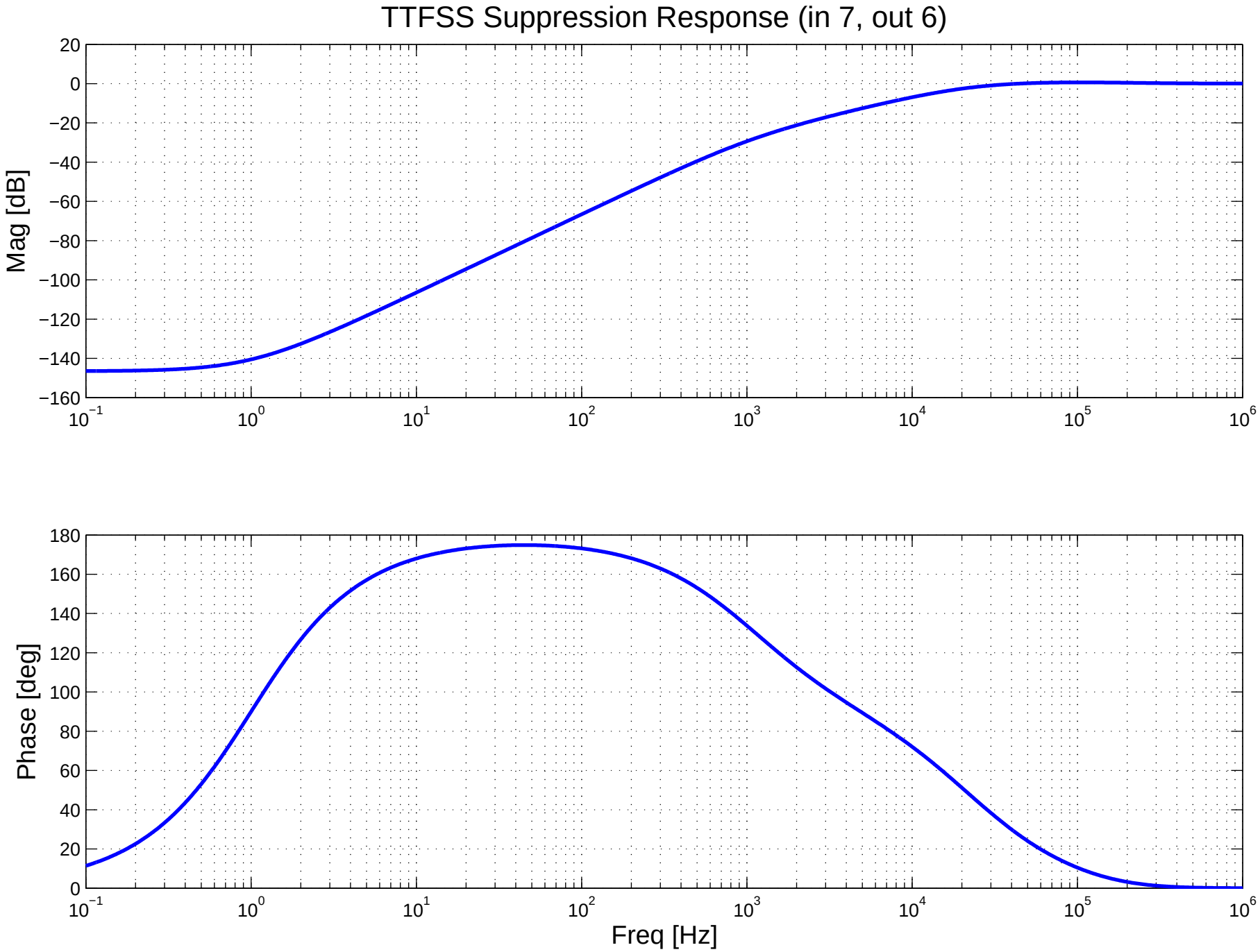

FSS Open Loop TF (in 19, out 22/out 21)
Mag [dB]
120
100
80
60
40
20
0
−20
Phase [deg]
180
170
160
150
140
130
120
110
100
90
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
10^{6}
Freq [Hz]

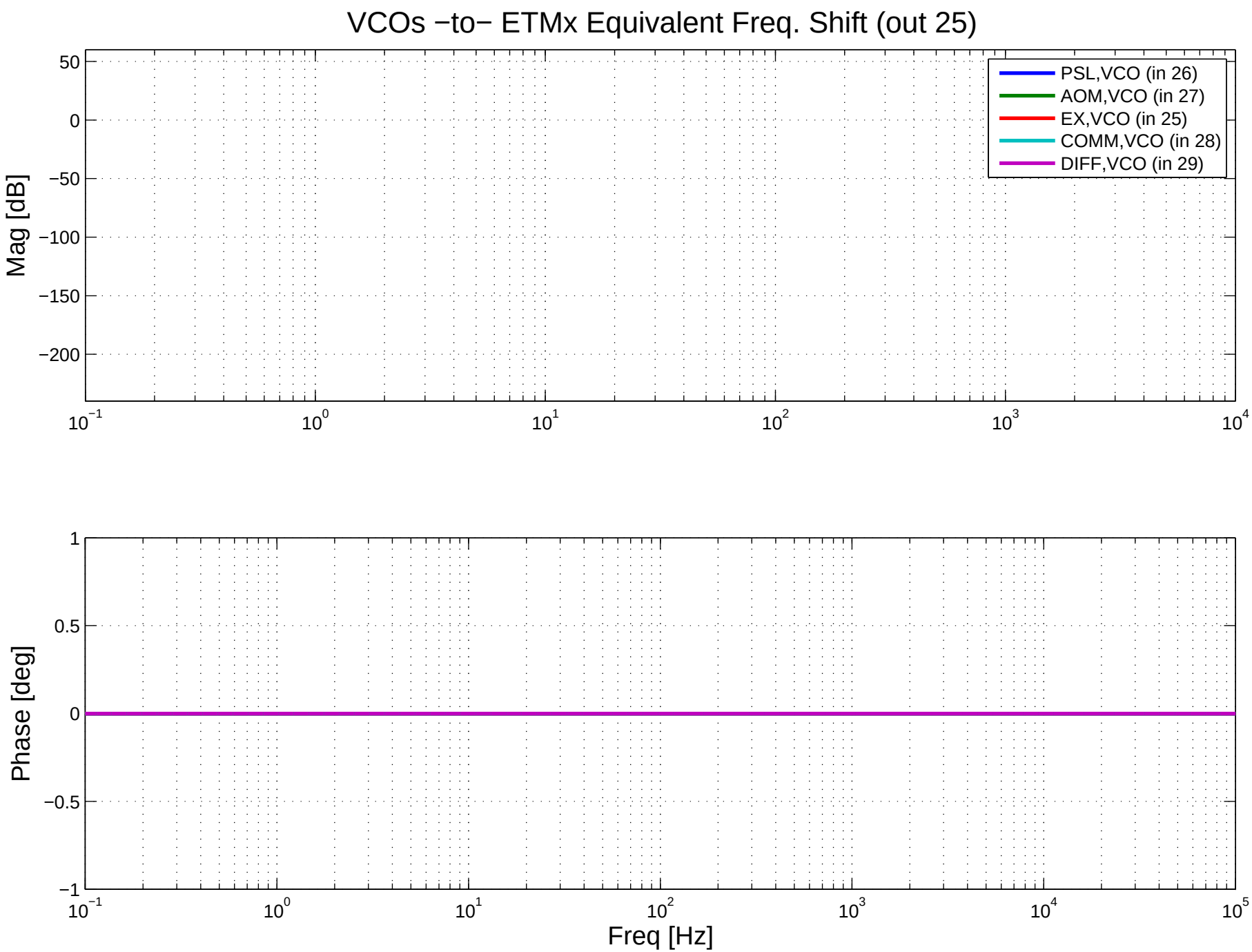

FSS Suppression Response (in 19, out 21)
Mag [dB]
0
−20
−40
−60
−80
−100
−120
Phase [deg]
90
80
70
60
50
40
30
20
10
0
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
10^{6}
Freq [Hz]

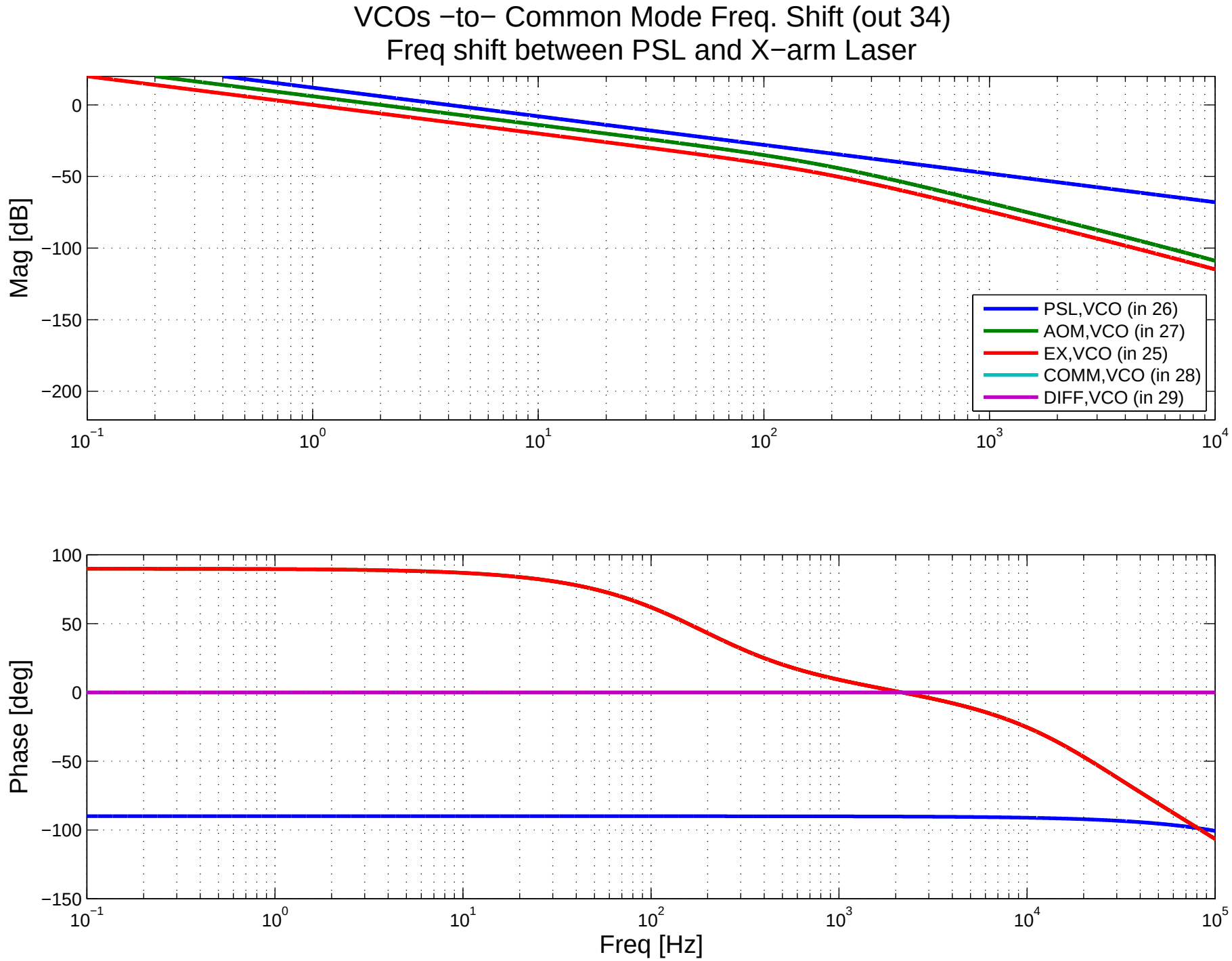

Local laser −to− TTFSS error signal TF (in 8, out 3/out 5)
Mag [dB]
160
140
120
100
80
60
40
20
0
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
10^{6}
Phase [deg]
180
160
140
120
100
80
60
40
20
0
Freq [Hz]

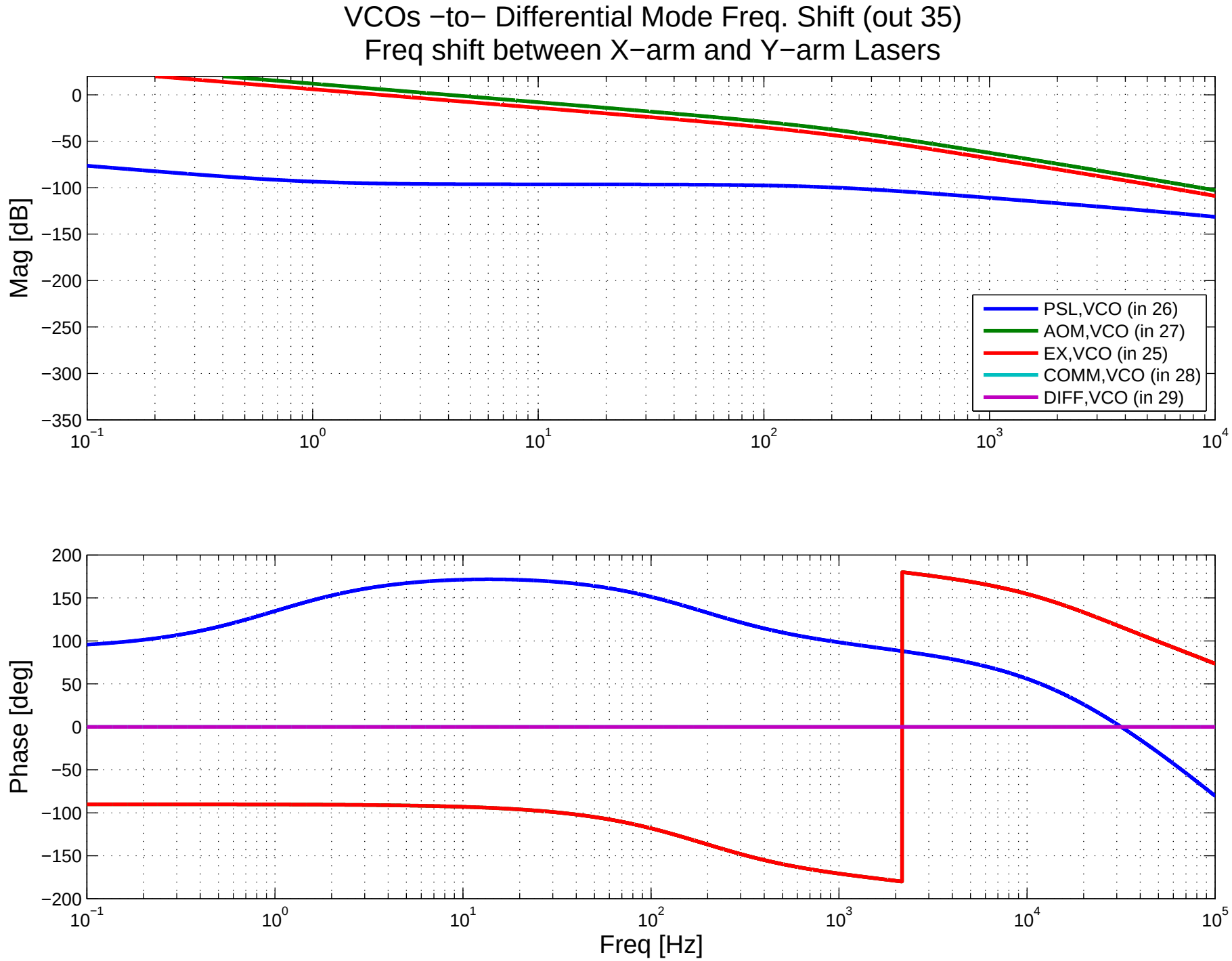

TTFSS Controller TF (in 7, out 5/out 6)
Mag [dB]
20
10
0
−10
−20
−30
−40
−50
−60
Phase [deg]
80
60
40
20
0
−20
−40
−60
−80
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
10^{6}
Freq [Hz]

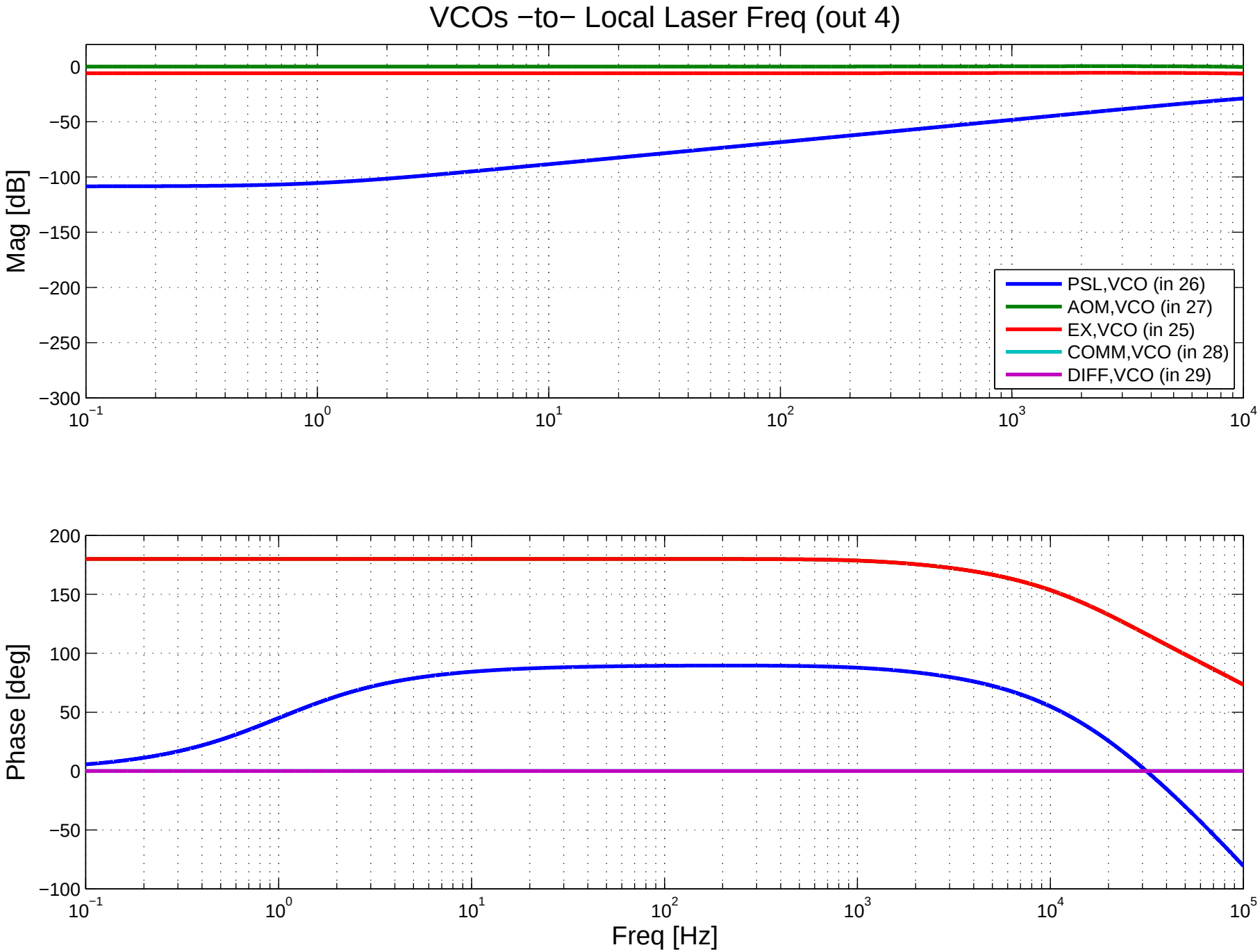

TTFSS Open Loop TF (in 7, out 3/ out 6)
Mag [dB]
150
100
50
0
−50
Phase [deg]
180
160
140
120
100
80
60
40
20
0
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
10^{6}
Freq [Hz]

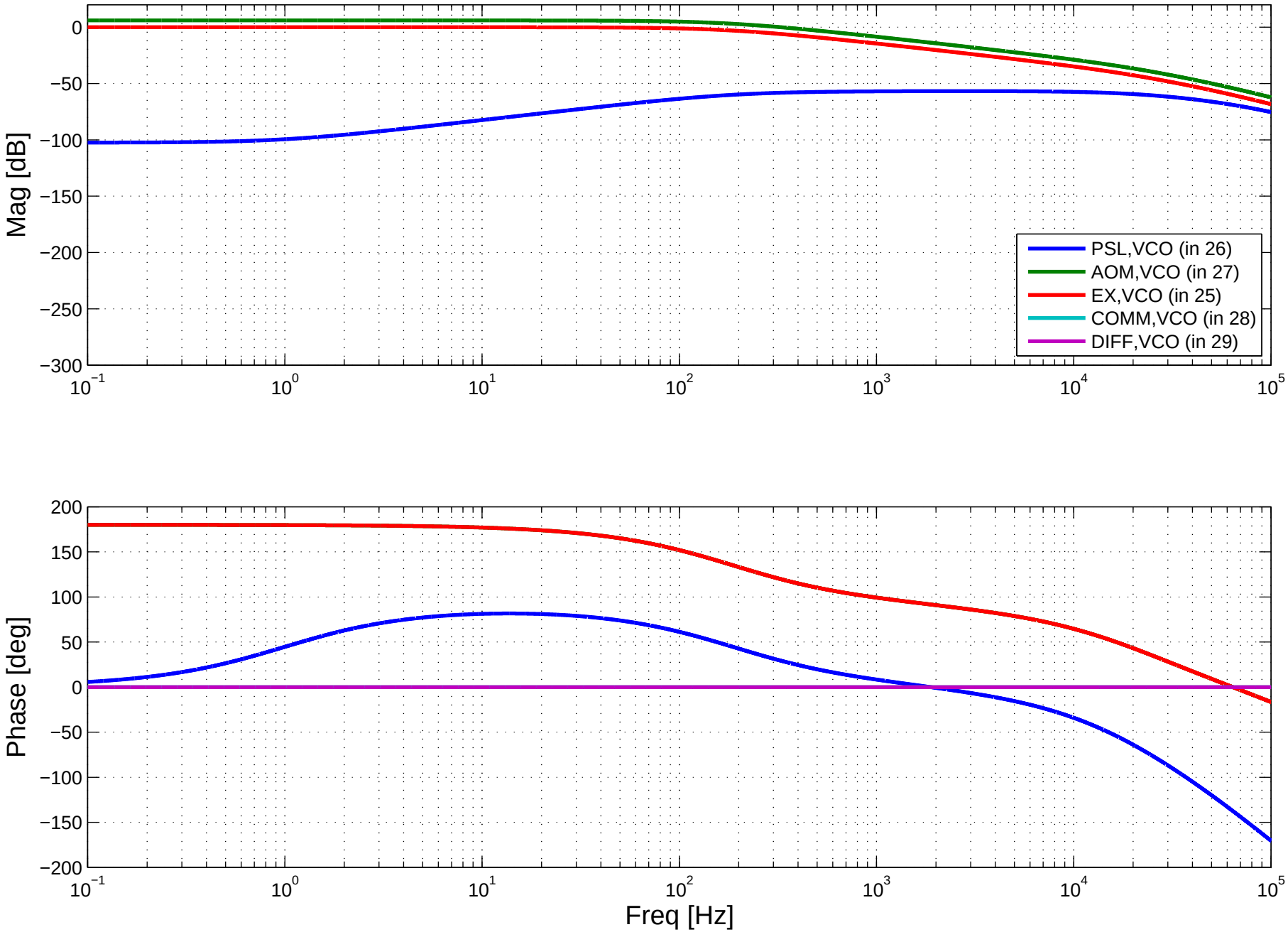

TTFSS Suppression Response (in 7, out 6)
Mag [dB]
20
0
−20
−40
−60
−80
−100
−120
−140
−160
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
10^{6}
Phase [deg]
180
160
140
120
100
80
60
40
20
0
Freq [Hz]


VCOs −to− ETMx Equivalent Freq. Shift (out 25)
Mag [dB]
50
0
−50
−100
−150
−200
PSL,VCO (in 26)
AOM,VCO (in 27)
EX,VCO (in 25)
COMM,VCO (in 28)
DIFF,VCO (in 29)
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
Phase [deg]
1
0.5
0
−0.5
−1
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
Freq [Hz]


VCOs −to− Common Mode Freq. Shift (out 34)
Freq shift between PSL and X−arm Laser
Mag [dB]
0
−50
−100
−150
−200
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
PSL,VCO (in 26)
AOM,VCO (in 27)
EX,VCO (in 25)
COMM,VCO (in 28)
DIFF,VCO (in 29)
Phase [deg]
100
50
0
−50
−100
−150
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
Freq [Hz]


VCOs −to− Differential Mode Freq. Shift (out 35)
Freq shift between X−arm and Y−arm Lasers
Mag [dB]
0
−50
−100
−150
−200
−250
−300
−350
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
PSL,VCO (in 26)
AOM,VCO (in 27)
EX,VCO (in 25)
COMM,VCO (in 28)
DIFF,VCO (in 29)
Phase [deg]
200
150
100
50
0
−50
−100
−150
−200
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
Freq [Hz]


VCOs −to− Local Laser Freq (out 4)
Mag [dB]
0
−50
−100
−150
−200
−250
−300
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
PSL,VCO (in 26)
AOM,VCO (in 27)
EX,VCO (in 25)
COMM,VCO (in 28)
DIFF,VCO (in 29)
Phase [deg]
200
150
100
50
0
−50
−100
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
Freq [Hz]


VCOs −to− PDH Freq Shift (out 10)
Freq shift away from Arm Resonance
Mag [dB]
0
−50
−100
−150
−200
−250
−300
PSL,VCO (in 26)
AOM,VCO (in 27)
EX,VCO (in 25)
COMM,VCO (in 28)
DIFF,VCO (in 29)
Phase [deg]
200
150
100
50
0
−50
−100
−150
−200
10^{-1}
10^{0}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
Freq [Hz]