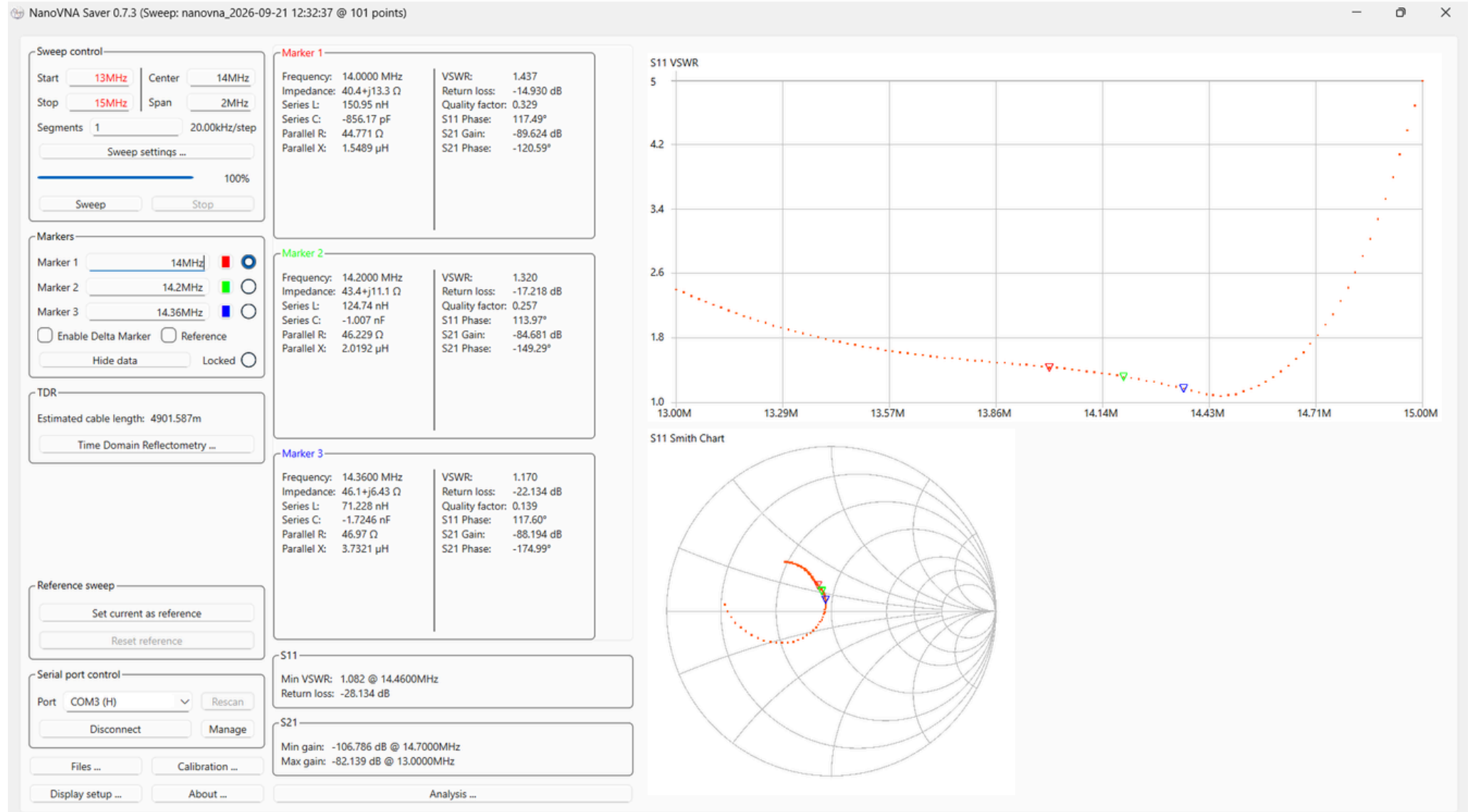


NanoVNA Plots: Antenna Height 4m 20m



17m

NanoVNA Saver 0.7.3 (Sweep: nanovna_2026-09-21 12:14:33 @ 101 points)

Sweep control

Start: Center:
 Stop: Span:
 Segments: 13.00kHz/step

Markers

Marker 1: ☒ ☐
 Marker 2: ☐ ☒
 Marker 3: ☐ ☒
☐ Enable Delta Marker ☐ Reference
 ☐ Locked

TDR

Estimated cable length: 7598.968m

Reference sweep

Serial port control

Port:

Marker 1

Frequency: 18.0630 MHz	VSWR: 1.143
Impedance: 52.7-j6.29 Ω	Return loss: -23.530 dB
Series L: -55.391 nH	Quality factor: 0.119
Series C: 1.4016 nF	S11 Phase: -62.99°
Parallel R: 53.485 Ω	S21 Gain: -89.407 dB
Parallel X: 19.639 pF	S21 Phase: -109.70°

Marker 2

Frequency: 18.1800 MHz	VSWR: 1.028
Impedance: 51.3+j505m Ω	Return loss: -37.252 dB
Series L: 4.4248 nH	Quality factor: 0.01
Series C: -17.321 nF	S11 Phase: 21.04°
Parallel R: 51.3 Ω	S21 Gain: -92.868 dB
Parallel X: 45.578 μ H	S21 Phase: -87.78°

Marker 3

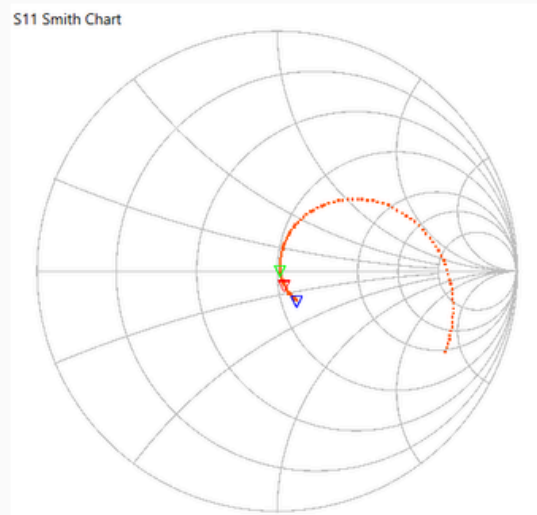
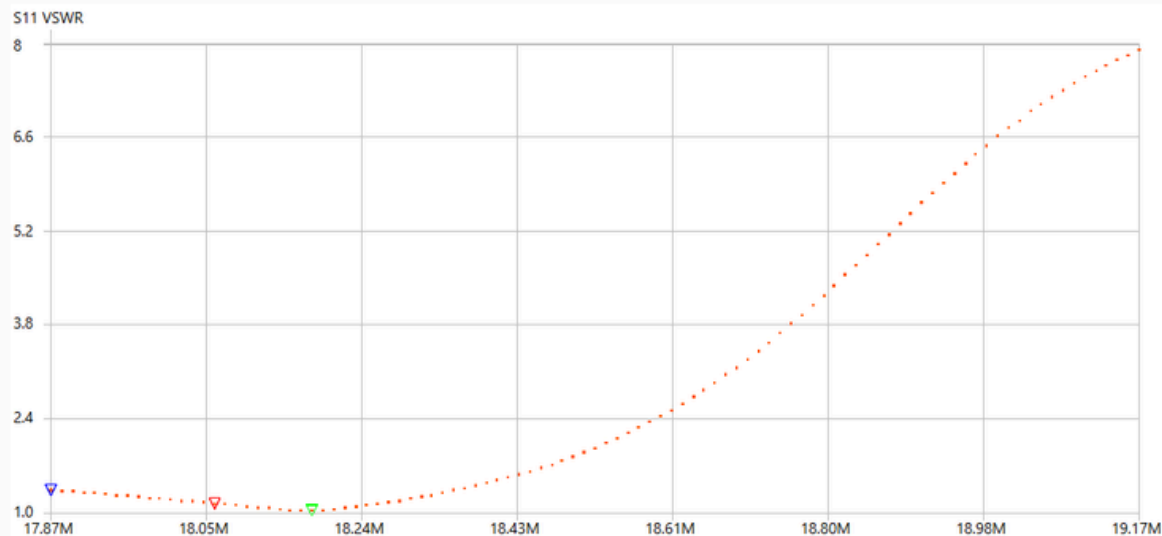
Frequency: 17.8680 MHz	VSWR: 1.341
Impedance: 56.8-j14.1 Ω	Return loss: -16.742 dB
Series L: -125.94 nH	Quality factor: 0.249
Series C: 629.99 pF	S11 Phase: -56.91°
Parallel R: 60.278 Ω	S21 Gain: -84.879 dB
Parallel X: 36.811 pF	S21 Phase: -82.17°

S11

Min VSWR: 1.028 @ 18.1800MHz
 Return loss: -37.252 dB

S21

Min gain: -110.175 dB @ 18.1670MHz
 Max gain: -82.270 dB @ 19.1420MHz



15m

NanoVNA Saver 0.7.3 (Sweep: nanovna_2026-09-21 11:52:16 @ 101 points)

Sweep control

Start **20.4MHz** Center **21.2MHz**
 Stop **22MHz** Span **1.6MHz**
 Segments **1** 16.00kHz/step
 Sweep settings ...
 100%
 Sweep Stop

Markers

Marker 1 **21.072MHz** ■ ●
 Marker 2 **21.264MHz** ■ ○
 Marker 3 **21.408MHz** ■ ○
☐ Enable Delta Marker ☐ Reference
☐ Hide data ☐ Locked

TDR

Estimated cable length: 108.696m

Time Domain Reflectometry ...

Reference sweep

Set current as reference

Reset reference

Serial port control

Port **COM3 (H)** Rescan
Disconnect Manage

Files ...

Calibration ...

Display setup ...

About ...

Analysis ...

Marker 1

Frequency: 21.0720 MHz VSWR: 1.120
 Impedance: 45.6+j3.16 Ω Return loss: -24.951 dB
 Series L: 23.833 nH Quality factor: 0.069
 Series C: -2.3936 nF S11 Phase: 142.42°
 Parallel R: 45.825 Ω S21 Gain: -89.034 dB
 Parallel X: 5.0023 μ H S21 Phase: -54.43°

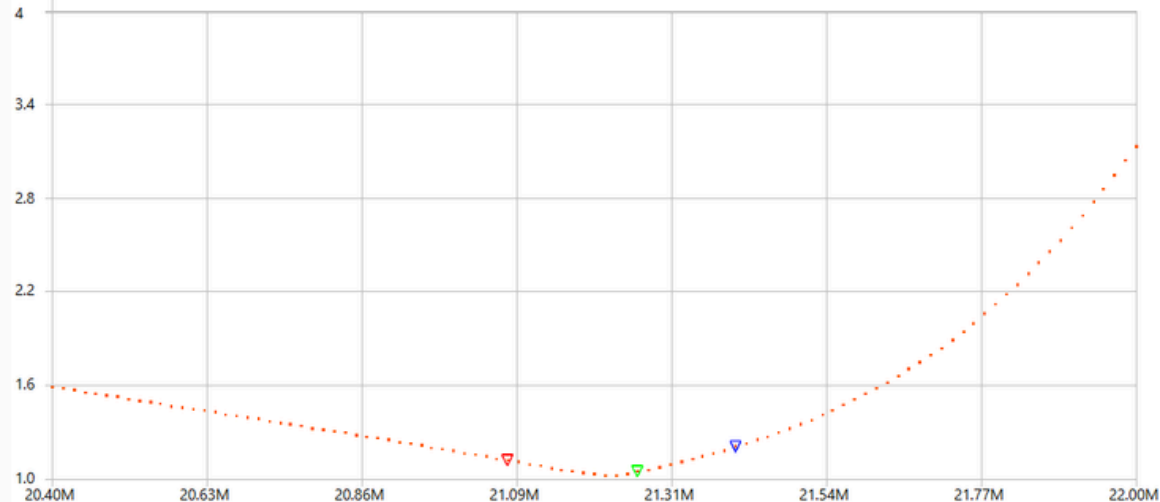
Marker 2

Frequency: 21.2640 MHz VSWR: 1.047
 Impedance: 52.3-j391m Ω Return loss: -32.773 dB
 Series L: -2.9262 nH Quality factor: 0.007
 Series C: 19.145 nF S11 Phase: -9.35°
 Parallel R: 52.321 Ω S21 Gain: -99.108 dB
 Parallel X: 1.069 pF S21 Phase: -67.37°

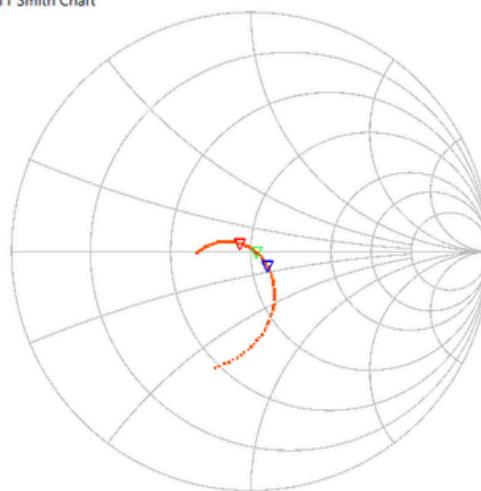
Marker 3

Frequency: 21.4080 MHz VSWR: 1.205
 Impedance: 56.9-j7.15 Ω Return loss: -20.636 dB
 Series L: -53.138 nH Quality factor: 0.126
 Series C: 1.0401 nF S11 Phase: -42.03°
 Parallel R: 57.835 Ω S21 Gain: -87.894 dB
 Parallel X: 16.136 pF S21 Phase: -130.78°

S11 VSWR



S11 Smith Chart



S11

Min VSWR: 1.023 @ 21.2160MHz
 Return loss: -39.069 dB

S21

Min gain: -109.596 dB @ 21.2800MHz
 Max gain: -82.805 dB @ 21.1360MHz

12m

NanoVNA Saver 0.7.3 (Sweep: nanovna_2026-09-21 11:41:30 @ 101 points)

Sweep control

Start Center
 Stop Span
 Segments 16.00kHz/step

Markers

Marker 1 ☒ ☐
 Marker 2 ☐ ☒
 Marker 3 ☐ ☒
☐ Enable Delta Marker ☐ Reference
 ☐ Locked

TDR

Estimated cable length: 61.142m

Reference sweep

Serial port control

Port

Marker 1

Frequency: 24.8640 MHz	VSWR: 1.214
Impedance: 46.7-j8.76 Ω	Return loss: -20.313 dB
Series L: -56.094 nH	Quality factor: 0.188
Series C: 730.43 pF	S11 Phase: -105.48°
Parallel R: 48.34 Ω	S21 Gain: -95.487 dB
Parallel X: 24.85 pF	S21 Phase: -15.01°

Marker 2

Frequency: 24.9760 MHz	VSWR: 1.233
Impedance: 42.2-j5.59 Ω	Return loss: -19.637 dB
Series L: -35.652 nH	Quality factor: 0.133
Series C: 1.139 nF	S11 Phase: -141.00°
Parallel R: 42.907 Ω	S21 Gain: -93.477 dB
Parallel X: 19.706 pF	S21 Phase: -128.98°

Marker 3

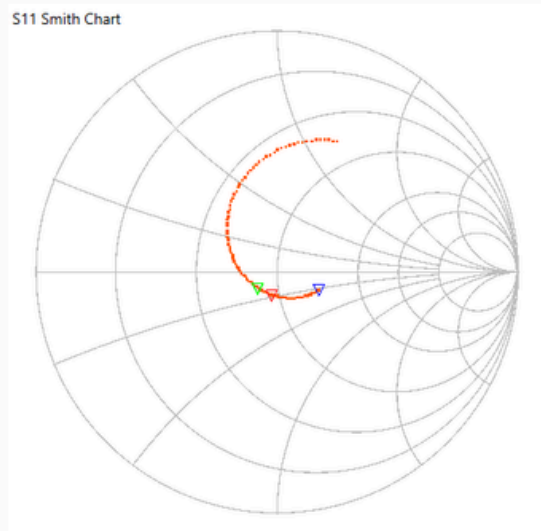
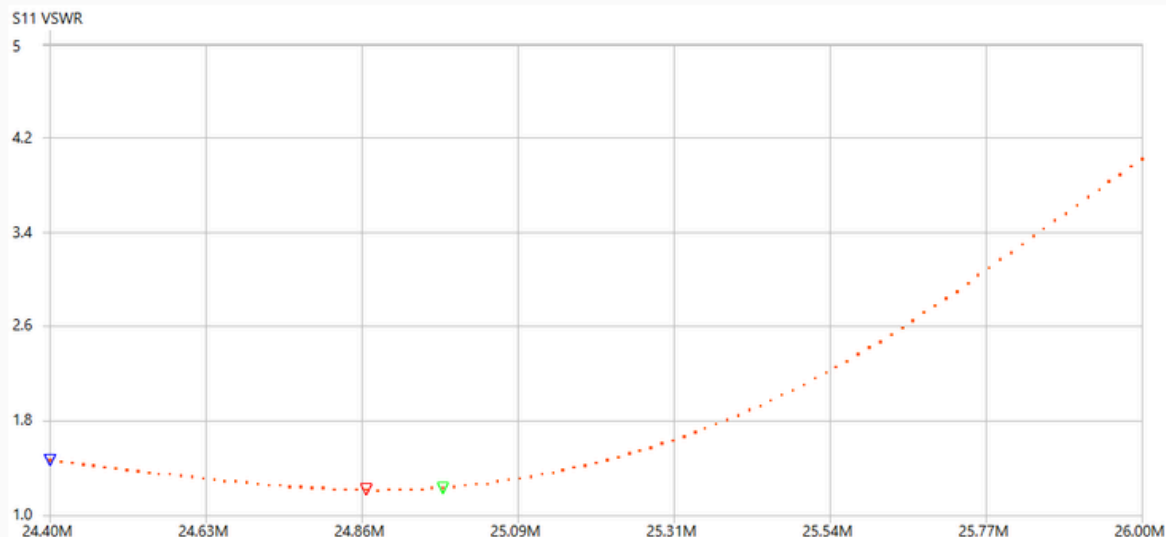
Frequency: 24.4000 MHz	VSWR: 1.463
Impedance: 69.9-j10.7 Ω	Return loss: -14.525 dB
Series L: -69.892 nH	Quality factor: 0.153
Series C: 608.74 pF	S11 Phase: -23.18°
Parallel R: 71.556 Ω	S21 Gain: -92.131 dB
Parallel X: 13.971 pF	S21 Phase: -161.98°

S11

Min VSWR: 1.213 @ 24.8800MHz
 Return loss: -20.338 dB

S21

Min gain: -109.110 dB @ 24.4640MHz
 Max gain: -84.587 dB @ 25.7440MHz



10m

NanoVNA Saver 0.7.3 (Sweep: nanovna_2026-09-21 11:32:25 @ 101 points)

Sweep control

Start Center
 Stop Span
 Segments 22.00kHz/step

Markers

Marker 1 ☒ ☐
 Marker 2 ☐ ☒
 Marker 3 ☐ ☐
☐ Enable Delta Marker ☐ Reference
 ☐ Locked

TDR

Estimated cable length: 83.443m

Reference sweep

Serial port control

Port

Marker 1

Frequency: 28.0200 MHz	VSWR: 1.428
Impedance: 35+j260m Ω	Return loss: -15.068 dB
Series L: 1.4779 nH	Quality factor: 0.007
Series C: -21.83 nF	S11 Phase: 178.83°
Parallel R: 35.006 Ω	S21 Gain: -89.423 dB
Parallel X: 26.749 μ H	S21 Phase: -81.83°

Marker 2

Frequency: 28.4600 MHz	VSWR: 1.223
Impedance: 48+j9.69 Ω	Return loss: -19.970 dB
Series L: 54.201 nH	Quality factor: 0.202
Series C: -576.99 pF	S11 Phase: 95.74°
Parallel R: 50.004 Ω	S21 Gain: -102.306 dB
Parallel X: 1.3863 μ H	S21 Phase: -53.01°

Marker 3

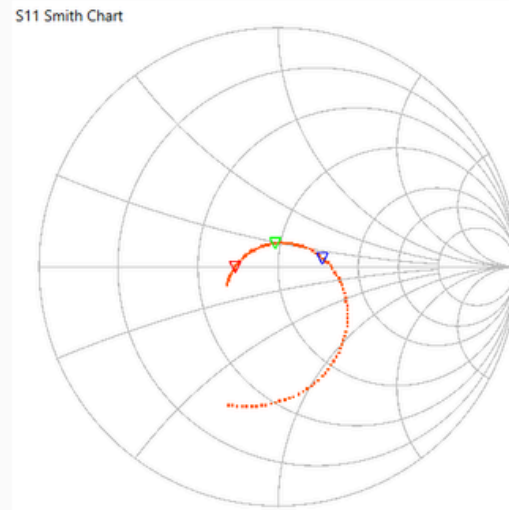
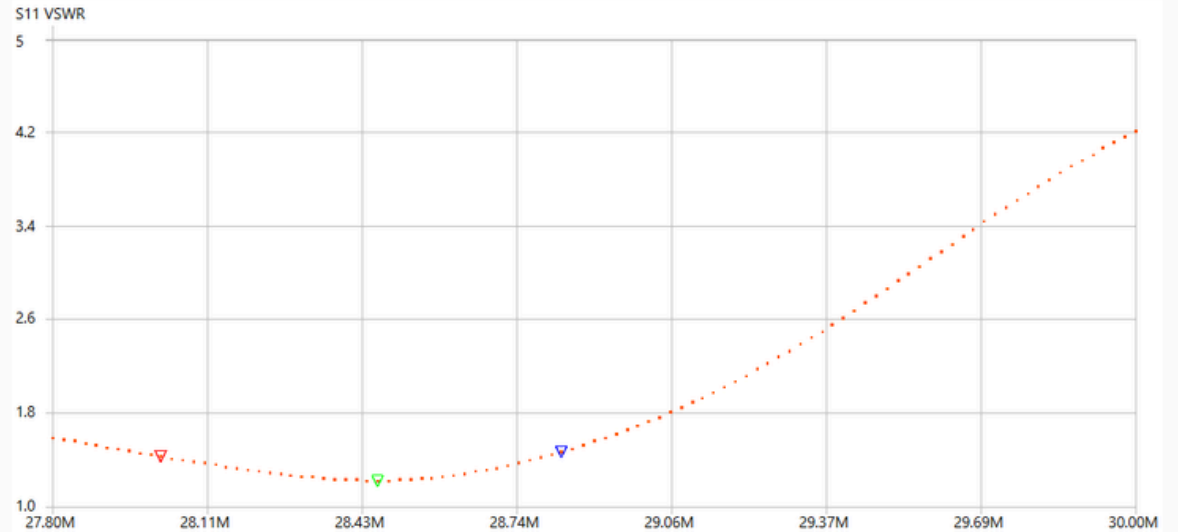
Frequency: 28.8340 MHz	VSWR: 1.469
Impedance: 72.7+j5.32 Ω	Return loss: -14.431 dB
Series L: 29.344 nH	Quality factor: 0.073
Series C: -1.0383 nF	S11 Phase: 10.70°
Parallel R: 73.095 Ω	S21 Gain: -100.003 dB
Parallel X: 5.5178 μ H	S21 Phase: -170.46°

S11

Min VSWR: 1.223 @ 28.4600MHz
 Return loss: -19.970 dB

S21

Min gain: -112.098 dB @ 28.4160MHz
 Max gain: -83.096 dB @ 29.9560MHz



Analysis ...

6m

Sweep control

Start Center

Stop Span

Segments 70.00kHz/step

Markers

Marker 1 ☒ ☐

Marker 2 ☐ ☒

Marker 3 ☐ ☒

☐ Enable Delta Marker ☐ Reference

☐ Locked

TDR

Estimated cable length: 17.426m

Reference sweep

Serial port control

Port

Marker 1

Frequency: 50.0300 MHz	VSWR: 1.151
Impedance: 52.4-j6.8 Ω	Return loss: -23.059 dB
Series L: -21.643 nH	Quality factor: 0.13
Series C: 467.6 pF	S11 Phase: -66.70°
Parallel R: 53.292 Ω	S21 Gain: -85.876 dB
Parallel X: 7.7491 pF	S21 Phase: -81.51°

Marker 2

Frequency: 48.0000 MHz	VSWR: 1.828
Impedance: 35.1+j20.9 Ω	Return loss: -10.670 dB
Series L: 69.345 nH	Quality factor: 0.595
Series C: -158.54 pF	S11 Phase: 111.61°
Parallel R: 47.58 Ω	S21 Gain: -87.806 dB
Parallel X: 264.99 nH	S21 Phase: -102.23°

Marker 3

Frequency: 48.0000 MHz	VSWR: 1.828
Impedance: 35.1+j20.9 Ω	Return loss: -10.670 dB
Series L: 69.345 nH	Quality factor: 0.595
Series C: -158.54 pF	S11 Phase: 111.61°
Parallel R: 47.58 Ω	S21 Gain: -87.806 dB
Parallel X: 264.99 nH	S21 Phase: -102.23°

S11

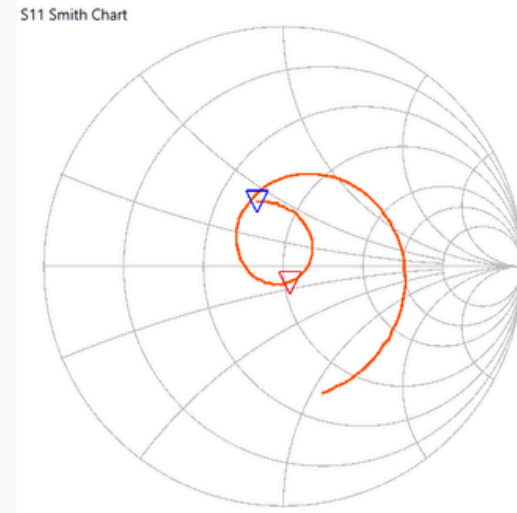
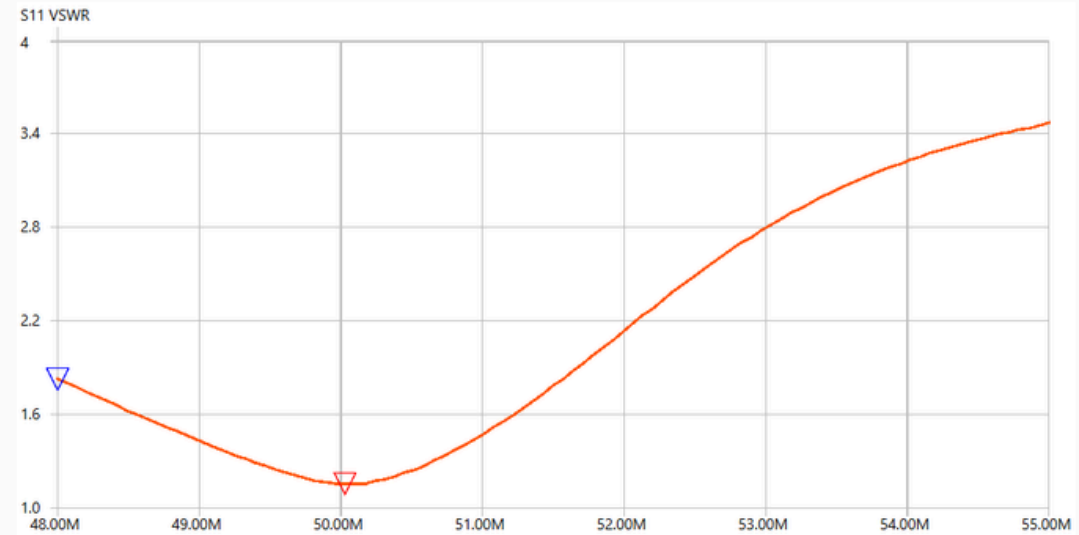
Min VSWR: 1.151 @ 50.0300MHz

Return loss: -23.059 dB

S21

Min gain: -101.622 dB @ 49.8900MHz

Max gain: -79.791 dB @ 54.6500MHz



4m

