## Does Length of Coax in 1/8 λ increments affect VSWR?

**(Based on analysis uasing the ARRL TLW Program)**

**Given:**

Frequency in first scenario is constant @ 28.5 MHz.

Antenna Impedance Z is constant @ 90 + j60 Ohms or |Z} = 108.167 Ohms under both scearios.

Calculated VSWR at antenna = 2.81

Coax is RG 213

Characteristic Impedance of RG213 is 50.0 -j0.24 Ohms @ 28.5 MHz., so $|Z_0|$ = 50.00 Ohms

Matched Line Loss of RG 213 = 1.153 dB/100 ft @ 28.5 MHz.

Lambda along coax = 22.779 feet @ 28.5 MHz.

Initial length of coax = 68.337 ft. = 3.00 λ @ 28.5 MHz.

| Frequency MHz. | Coax Length ft. | Coax Length ( in λ's) | VSWR at Load | \|ρ\| at Load | Matched Line Loss dB | + Line Loss due to VSWR dB | = Total Line Loss dB | Impedance Z at Transmitter Ohms | Impedance $\|Z_0\|$ at Transmitter Ohms | VSWR at Transmitter |
|---|---|---|---|---|---|---|---|---|---|---|
| **Keeping the frequency and antenna design (and its Z) constant, and changing the length of the coax** | | | | | | | | | | |
| 28.5 | 91.116 | 4.000 | 2.81 | 0.47496 | 1.051 | 0.456 | 1.507 | 83.9 + j39.21 | 92.61 | 2.19 |
| **28.5** | **68.337** | **3.000** | **2.81** | **0.47496** | **0.788** | **0.366** | **1.154** | **85.62 + j43.49** | **96.03** | **2.31** |
| 28.5 | 65.490 | 2.875 | 2.81 | 0.47496 | 0.755 | 0.359 | 1.114 | 26.44 + j20.82 | 33.66 | 2.33 |
| 28.5 | 62.642 | 2.750 | 2.81 | 0.47496 | 0.722 | 0.319 | 1.041 | 22.79 - J12.11 | 25.80 | 2.35 |
| 28.5 | 59.795 | 2.625 | 2.81 | 0.47496 | 0.689 | 0.300 | 0.989 | 57.77 - j47.36 | 74.70 | 2.36 |
| 28.5 | 56.948 | 2.500 | 2.81 | 0.47496 | 0.657 | 0.315 | 0.972 | 85.47 + j45.83 | 97.87 | 2.38 |
| 28.5 | 54.100 | 2.375 | 2.81 | 0.47496 | 0.624 | 0.308 | 0.932 | 25.75 + j21.14 | 33.32 | 2.40 |
| 28.5 | 51.253 | 2.250 | 2.81 | 0.47496 | 0.591 | 0.266 | 0.857 | 22.14 - j12.27 | 25.32 | 2.42 |
| 28.5 | 48.405 | 2.125 | 2.81 | 0.47496 | 0.558 | 0.246 | 0.804 | 57.35 - 49.04 | 75.47 | 2.43 |
| 28.5 | 45.558 | 2.000 | 2.81 | 0.47496 | 0.525 | 0.261 | 0.786 | 87.26 +j48.34 | 99.76 | 2.45 |
| 28.5 | 22.779 | 1.000 | 2.81 | 0.47496 | 0.263 | 0.141 | 0.404 | 88.75 +j53.81 | 103.79 | 2.62 |
| **Keeping the coax length (in feet) constant and the antenna's Z constant, but changing the frequency (and the antenna deign, so as to keep Z constant)** | | | | | | | | | | |
| 38.000 | 68.337 | 4.000 | 2.81 | 0.47477 | 0.923 | 0.414 | 1.337 | 84.76 + j41.22 | 94.26 | 2.25 |
| **28.500** | **68.337** | **3.000** | **2.81** | **0.47496** | **0.788** | **0.366** | **1.154** | **85.62 + j43.49** | **96.03** | **2.31** |
| 27.313 | 68.337 | 2.875 | 2.81 | 0.47499 | 0.769 | 0.364 | 1.133 | 26.62 + j20.79 | 33.70 | 2.32 |
| 26.125 | 68.337 | 2.750 | 2.81 | 0.47503 | 0.751 | 0.329 | 1.080 | 22.92 - j12.08 | 25.91 | 2.33 |
| 24.938 | 68.337 | 2.625 | 2.81 | 0.47505 | 0.732 | 0.315 | 1.047 | 57.87 - j46.84 | 74.45 | 2.34 |
| 23.750 | 68.337 | 2.500 | 2.81 | 0.47510 | 0.713 | 0.337 | 1.050 | 86.09 + j44.82 | 97.06 | 2.35 |
| 22.563 | 68.337 | 2.375 | 2.81 | 0.47514 | 0.693 | 0.336 | 1.029 | 26.12 + j20.96 | 33.49 | 2.36 |
| 21.375 | 68.337 | 2.250 | 2.81 | 0.47519 | 0.672 | 0.296 | 0.968 | 22.63 - j12.20 | 25.62 | 2.37 |
| 20.188 | 68.337 | 2.125 | 2.81 | 0.47523 | 0.652 | 0.280 | 0.932 | 57.62 - j47.91 | 74.94 | 2.38 |
| 19.000 | 68.337 | 2.000 | 2.81 | 0.47529 | 0.631 | 0.305 | 0.936 | 86.60 + j46.32 | 98.20 | 2.40 |
| 9.500 | 68.337 | 1.000 | 2.82 | 0.47599 | 0.431 | 0.220 | 0.652 | 87.80 + j50.22 | 101.14 | 2.52 |