

APPLICATION NOTES

A guide to the selection of RF coaxial cable

Choosing the best coaxial cable for a new application requires an understanding of the application and of the range of cables to choose from. The best choice can only be arrived at by a careful evaluation of the performance and cost trade-offs. Our in-depth expertise in all aspects of coaxial cable technology can help you to arrive at the best choice for your application.

Times Microwave Systems offers the broadest range of coaxial cables of any manufacturer. We also have the expertise to design and produce custom cables if there is no design available for your application.

In choosing the best coaxial cable for an application, the cable characteristics listed below should be considered. The following sections provide detailed discussions of each characteristic.

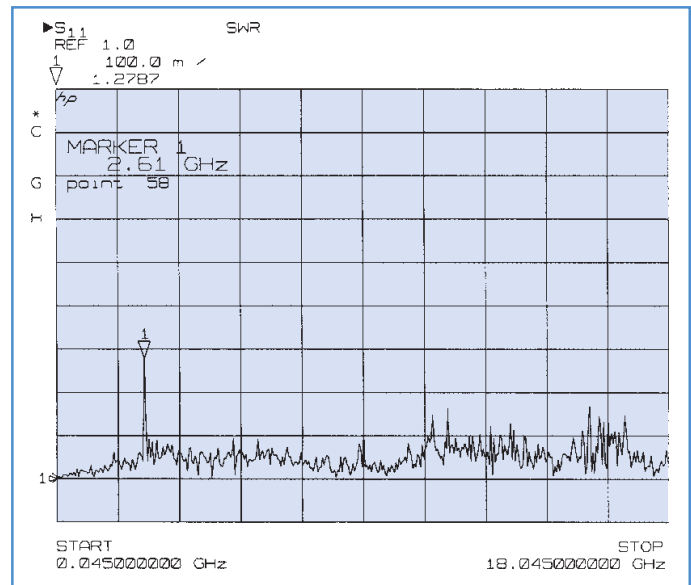
- A:** Characteristic Impedance
- B:** VSWR & Impedance Uniformity
- C:** Attenuation
 - Attenuation Uniformity
 - Attenuation Stability
- D:** Power Rating
- E:** Operating Voltage
- F:** Shielding
- G:** Capacitance
- H:** Velocity of Propagation
- I:** Electrical Length Stability
- J:** Cut-Off Frequency
- K:** Pulse Response
- L:** Self-Generated Cable Noise
- M:** Operating Temperature Range
- N:** Flexibility
- O:** Environmental Resistance
- P:** Cable Strength
- Q:** Qualification & U L Approval

Table 1 provides various formulae describing cable characteristics.

A. CHARACTERISTIC IMPEDANCE

The characteristic impedance of a coaxial cable is determined by the ratio of the diameter of the

Fig. 1
VSWR vs. Frequency



outer conductor to the inner conductor and the dielectric constant of the insulating material between the conductors. Because the RF energy in the cable travels on the surface of the conductors, the important diameters are the outside diameter of the center conductor and the inside diameter of the outer conductor. Impedance is selected to match the system requirements.

The most common coaxial cables impedances are 50, 75, and 95 ohm. Other impedances from 35 to 185 ohms are sometimes used. Fifty ohm cables are used in microwave and wireless communications applications. Seventy-five ohm cables are typically used in cable television applications and video applications. Ninety-five ohm cables are typically used for data transmission applications.

For best system performance, the cable must be selected to match the impedance of the other components in the system. Of the most commonly used coaxial cables, 75 ohms impedance provides the lowest attenuation and 35 ohms impedance provides the best power handling. For practical cables with non-ideal dielectrics and conductors, these differences are small. The availability