

sertion loss increase. However, it is recommended that cables not be operated above their cut-off frequency.

K. PULSE RESPONSE OF COAXIAL CABLES

1. The following characteristics must be considered when analyzing the Time Domain response of cable to pulses or step functions:

- a: Impedance and Reflection;
- b: Rise Time;
- c: Amplitude;
- d: Overshoot or Preshoot;
- e: Pulse Echoes.

a: Impedance and Reflection

1. Select impedance to match system requirements.
2. The impedance will vary along the length of cable. Variations of +5% are not uncommon. Cables can be produced to tolerances of 2%. Tighter tolerances are not recommended.

b: & c: Rise Time and Amplitude

1. The output rise time is a function of input rise time, pulse width and cable attenuation. A typical

pulse response is shown in Figures 11 and 12, while a typical step response is shown in Figure 13. Increased cable temperature causes an increase in rise time and decrease in amplitude.

d: Overshoot or Preshoot

1. Figure 13 shows the overshoot which can be encountered with a 0.1 ns input pulse rise time in cables due to finite reflections. Such overshoot is not common in cables with longitudinally extruded dielectrics.

2. Preshoot is encountered in some balanced delay lines and can be minimized by cable design.

e: Pulse Echoes

When a narrow pulse is placed on a cable, the distortions noted above will occur. In addition, a small pulse of energy may emerge after the initial pulse has arrived. This pulse echo is caused by finite periodic reflections within the cable. Normally the echo level can be neglected.

L. SELF-GENERATED CABLE NOISE

A noted cable phenomenon, is the generation of acoustical and electrical noise when flexed. The acoustical noise is a function of mechanical motion within the cable. Such noise (and the associated mechanical and frictional force) is minimized by proper cable design. Electrical noise generation is attributed to an electrostatic effect, which

Fig. 12
Pulse Amplitude vs. Length

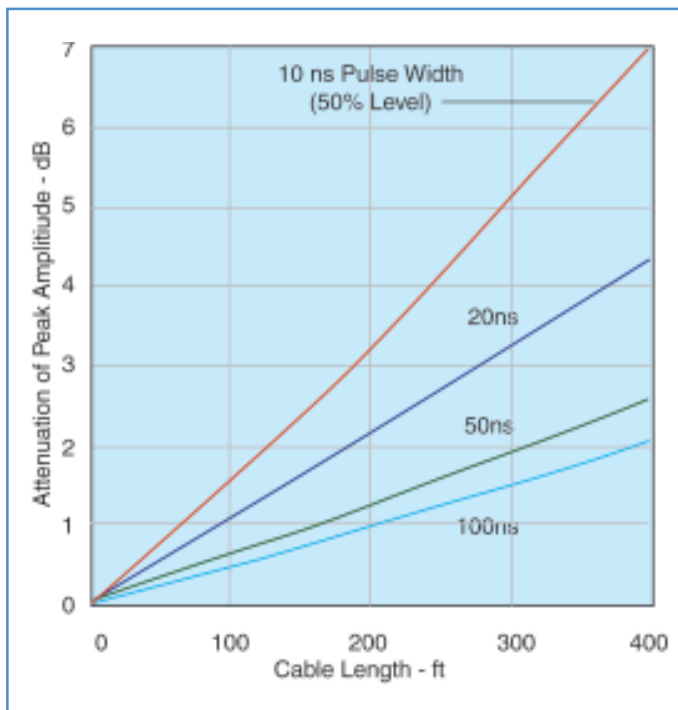


Fig. 13
Step Response (Output Amplitude vs. Time)

