A Cost Effective Method for Transmitting Composite Video

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Historically, video designers have used coaxial cables to route and transmit composite video signals over distances up to several hundred feet (> 100 meters). In the last few years, however, telephone lines such as twisted pairs have been used successfully in local area networks to transmit data between data terminals and computers. Techniques similar to these may be used by video designers who want to trade the cost of a coaxial cable for the more cost effective twisted pair. For example, RG59 is currently priced at 20 to 25 cents per foot; whereas, a twisted pair cable is under 10 cents a foot. Clearly, in applications in which cable lengths are 500 feet or more, a cost trade-off can be made between a simple single-ended circuit employing a single op amp used to drive coax and a slightly more complicated differential driver using a twisted pair. Presented in this paper is such a device.

Circuit Description

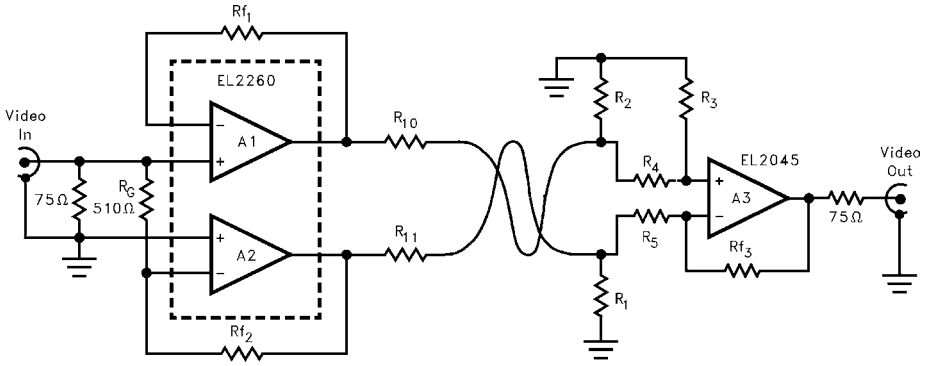
In order to preserve good common mode noise rejection, a differential amplifier comprised of an EL2260, Dual 130MHz Current Feedback Amplifier (CFA) is employed to convert the single-ended video to a differential signal as shown in Figure 1. CFAs require a known feedback resistor to set the bandwidth and slew rate, and the nominal value for the 2260 is 560Ω. The receiver invoked the EL2045, Gain of 2 stable 100MHz operational amplifier hooked for a gain of 2 differential amplifier. A gain of 2 was taken in this stage to make up for the attenuation at the output A1 and A2 by resistors R10, R11, R1, and R2. R10 and R11 were used to isolate the outputs of A1 and A2 from the capacitive reactance of the line. R_G may be varied to achieve unity gain at the video output.

Performance Results

The circuit of Figure 1 provided a 3dB bandwidth in excess of 35MHz at the Video output, 0.1dB gain flatness to over 5MHz. Using a Tektronix 520 NTSC Vector Oscilloscope, the differential gain and phase were under 0.3% and 0.5° respectively. In fact, there was immeasurable difference between driving 100 meters of twisted AWG26 cable and 100 meters of RG59.

Conclusion

A low cost alternative has been presented for distributing composite video signals. In fact, for about $5 plus a handful of 5% resistors, a significant cost savings can be realized using twisted wire in lieu of the traditional coaxial cables.



$R_1 = R_2 = R_{10} = R_{11} = 100\Omega$, ±5%
$Rf_1 = Rf_2 = 560\Omega$, ±5%
$R_4 = R_5 = 220\Omega$, ±5%
$V_{CC} = V_{CC} = 5V$

FIGURE 1.