

ABSTRACT

Design of a 3.3 V Analog Video Line Driver with
Controlled Output Impedance. (May 2003)

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The internet revolution has led to the demand for high speed, low cost solutions for providing high bandwidth to the consumers. Cable and DSL systems address these requirements through sophisticated analog and digital signal processing schemes. A key element of the analog front end of such systems is the line driver which interfaces with the transmission medium such as co-axial cable or twisted pair.

The line driver is an amplifier that provides the necessary output current to drive the low impedance of the line. The main requirements for design are high output swing, high linearity, matched impedance to the line and power efficiency. These requirements are addressed by a class AB amplifier whose output impedance can be controlled through circuit parameters. The property of this topology is that when the gain is unity, the output resistance of the driver is matched to the line resistance.

The gain is made unity for varying line conditions through a tuning loop consisting of peak-to-peak detectors and differential difference amplifier. The design is fabricated in 0.5 μ AMI CMOS process technology. For line variations from 65 Ω to 135 Ω , the gain is unity with an error of 3% and the impedance matching error is 20% at the worst-case. The linearity is better than 50dB for a 1.2 V peak-to-peak signal over the signal bandwidth from 100 Hz to 5 MHz and the line resistance range from 65 to 135 Ω .