CLC001, CLC012, CLC016

3.3V Cable Driver And Equalizer Drive Mega-Bits @ Many Meters

Literature Number: SNLA151
Transmitting data over long distances is necessary in a wide range of applications. These include telecom and video electrical interfaces running at data rates of up to 400 Mbps over appreciable distances. Long-haul data transmission is easily accomplished with existing devices. The new CLC001 cable driver, CLC012 cable equalizer, and CLC016 data retiming PLL form a robust serial digital interface that transmits megabits of data over hundreds of meters. Figure 1 shows a typical SDI application.

The 3.3V Cable Driver

The CLC001 is a 3.3V cable driver ideal for high-speed data transmission over long distances. It drives 75 Ω transmission lines (Belden 8281 or equivalent) at data rates up to 622 Mbps. Its versatile input stage allows for a wide range of input levels, including direct LVDS and LVPECL connections. Rise and fall times are typically 400 ps. Its two complementary outputs may be used single-ended or differentially and are adjustable from 800 mVp-p to 1.0 Vp-p.

The Cable Equalizer is the most important element in serial digital interfaces. The cable equalizer has the task of recovering the signal from a seemingly worthless waveform [See Figure 2(b)] and restoring it to its proper voltage levels. The CLC012 adaptive cable equalizer does just that. It automatically compensates for attenuation in cable corresponding to up to 300 meters of Belden 8281 coaxial cable or 120 meters of Category 5 UTP. The CLC012 approximates the reciprocal of the cable loss characteristic and supplies 40 dB of gain at 200 MHz. Jitter performance is 180 psp-p for 270 Mbps data that has passed through 200 meters of Belden 8281 cable. A Loss of Signal output and an output mute function are also provided.

The Data Retimer cleans up jitter.

The CLC016 data retimer re-establishes proper bit widths and their correct relationship to the serial clock edges, in addition to extracting a clock from the signal. Auto-rate select circuitry allows the CLC016 to recognize up to four data rates between 40 and 400 Mbps and transmitting data over long distances is necessary in a wide range of applications. These include telecom and video electrical interfaces running at data rates of up to 400 Mbps over appreciable distances. Long-haul data transmission is easily accomplished with existing devices. The new CLC001 cable driver, CLC012 cable equalizer, and CLC016 data retiming PLL form a robust serial digital interface that transmits megabits of data over hundreds of meters. Figure 1 shows a typical SDI application.

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A usable signal can be recovered by the CLC012 after up to 300 meters of cable. The signal is recovered and the data is retimed by the CLC012 and CLC016, respectively. The resultant signal is buffered by another CLC001 to drive the line to the scope and is shown in Figure 2(c). As can be seen from these waveforms, the CLC012 and CLC016 are very effective at restoring data after hundreds of meters of cable. SDI Interface devices can be used for a wide variety of digital video, datacom, and telecom applications.

<table>
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<tr>
<th>Part Number</th>
<th>Description</th>
<th>Data Rate</th>
<th>Jitter (ps)</th>
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<tbody>
<tr>
<td>CLC001</td>
<td>3.3V Cable Driver with Adjustable Outputs</td>
<td>DC to 622 Mbps</td>
<td>25</td>
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<tr>
<td>CLC005</td>
<td>ITU Cable Driver with Adjustable Outputs</td>
<td>DC to 400 Mbps</td>
<td>25</td>
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<td>CLC006</td>
<td>Cable Driver with Adjustable Outputs</td>
<td>DC to 400 Mbps</td>
<td>25</td>
</tr>
<tr>
<td>CLC007</td>
<td>Cable Driver with Dual Complementary Outputs</td>
<td>DC to 400 Mbps</td>
<td>25</td>
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<tr>
<td>CLC012</td>
<td>Adaptive Cable Equalizer (ITU)</td>
<td>40 to 650 Mbps</td>
<td>180</td>
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<tr>
<td>CLC014</td>
<td>Adaptive Cable Equalizer (SDV)</td>
<td>40 to 650 Mbps</td>
<td>180</td>
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<td>CLC016</td>
<td>Data Retiming PLL with Auto Rate Selection</td>
<td>40 to 400 Mbps</td>
<td>130</td>
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<tr>
<td>CLC018</td>
<td>8X8 Digital Crosspoint Switch</td>
<td>DC to 1.485 Gbps</td>
<td>50</td>
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Figure 2. Eye Diagrams at (a) Driver Output, (b) Equalizer Input, and (c) Retimer Output
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