General Description

The MxL93543 is a highly integrated PAM4 DSP SoC that enables 400Gb/s optical interconnects using 100Gb/s over a single optical wavelength 100G/λ.

The device has a high-speed electrical interface with eight transmit (Tx) and receive (Rx) input/output (I/O) that connect electrically through a module connector to the host ASIC. The device also has a high-speed optical side interface that has four Tx and Rx that connect through the optical components to the optical fibers.

The electrical interface supports 56Gb/s PAM4 signaling over an electrical channel with 13dB channel loss, including the host connector.

The optics interface supports 112Gb/s PAM4 signaling to enable 500m DR4, 2km FR4 use cases.

The device supports DSP functions including Tx digital pre-distortion (DPD), transmit pre-emphasis (TX FIR), receive feed forward equalization (FFE) and decision feedback equalization (DFE) required for 56 Gbaud optics.

The MxL93543, in a 12mm × 12mm package, has a differential driver output for optic transmitter device. It offers exceptional signal integrity for 56 Gbaud signals in a compact footprint suitable for next generation optical module form-factors such as QSFP-DD and OSFP.

Features

- 400Gb/s capacity that enables 400G DR4 and FR4 requirements
- 400G to 100G break-out mode
- Tx equalization includes pre-emphasis, digital pre-distortion, and reflection cancellation
- Rx equalization includes CTLE, multi-tap FFE and DFE, and reflection cancellation
- Integrated crystal oscillator eliminates the need for a costly reference clock source
- Digital I/O compatibility with the host processor. This removes the need for level shifters and saves valuable module board space
- Small package size to enable the QSFP-DD space requirements
- BER monitoring
- SNR reporting for each receiver on both electrical and optical interfaces
- Diagnostic loop-backs and test pattern generation and checking
- SPI and I2C slave interface to communicate to module MCU
- SPI master for flash memory interface
- SPI and I2C master interface for TIA direct control (the I2C master enables control of the MxL9154 TIA for optimal performance)
- Embedded CPU for real-time control
- Squelch function when loss of signal (LOS) or loss of lock (LOL) is detected

Applications

- QSFP-DD optical modules
- SFP optical modules

Supported Standards

- OIF-CEI-56G-VSR
- IEEE Std P802.3bs
Block Diagram

Figure 1: MxL93543 Functional Block Diagram

Ordering Information

<table>
<thead>
<tr>
<th>Marketing Part Number</th>
<th>Ordering Part Number</th>
<th>Package</th>
<th>Shipping</th>
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<tbody>
<tr>
<td>MxL93543</td>
<td>MxL93543-AP-T</td>
<td>400G DSP without EA-EML driver, DC-coupled differential driver.</td>
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