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MaxLinear Launches Industry's First 400Gbps PAM4 DSP SoC with Integrated Laser Drivers for Cloud Data Center and Enterprise Network Infrastructure

- *Announces availability of MxL935XX family of products, which are a critical enabler of 400Gbps optical interconnects for next-generation cloud and data center networks, supporting up to four data lanes using single-lane 100Gbps optical wavelength technology*

CARLSBAD, Calif.--(BUSINESS WIRE)-- MaxLinear, Inc. (NYSE:MXL), a leading provider of radio frequency (RF), analog and mixed-signal integrated circuits for the connected home, wired and wireless infrastructure, and industrial and multimarket applications, today announced the Telluride family (MxL935XX) of 400Gbps pulse-amplitude-modulation (PAM4) digital signal processing (DSP) systems-on-chip (SoC) solutions addressing the high-speed optical interconnect needs of mega-scale cloud and enterprise data centers.

The MxL935XX Telluride family of devices is the world’s first DSP SoCs with integrated electro-absorption modulated laser (EA-EML) drivers for 400Gbps optical interconnects. The MxL935XX device is the key component for system vendors to be able to develop a 400Gbps optical interconnect module in a compact form factor for intra-datacenter applications with a transmission distance up to 2 Kilometers.

The MxL935XX 16nm CMOS PAM4 DSP SoC consumes an extremely low power of 6.7W, which includes the integrated EA-EML driver power dissipation. The minimal power consumption of the MxL935XX meets the stringent power constraints of 400Gbps optical module form-factors, namely QSFP-DD, OSFP and COBO devices.

MaxLinear’s Telluride family of SoCs are key components in the development of high speed mega-scale data centers based on 400Gbps optical interconnects. MaxLinear is currently sampling the device to optical module vendors who are actively developing 400Gbps solutions that are expected to launch into mass production in the latter half of 2018.

The MxL935XX is a family of highly versatile PAM4 DSP SoCs capable of one, two or four lanes of 100Gbps optical connectivity combined with a flexible 25G NRZ and 50G PAM4 electrical interface supporting multiple generations of switch ASICs. The multi-lane capabilities allow the MxL935XX devices to be used in a wide-range of optical interconnects supporting 100Gbps, 200Gbps, and 400Gps optical fiber data speeds in cloud mega-scale and enterprise data centers.

The integrated laser drivers in the MxL935XX family directly interface with the external optical lasers and eliminate the need for expensive external high-frequency components required for laser driver and modulator bias. The superior integration of system-level functionality in MxL935XX devices enable significant cost reductions even in today's ongoing 100Gbps deployments.

"The exploding data traffic, and the demand for high-speed data have placed an enormous burden on the cloud and enterprise data network infrastructure. This is, in turn, not only compressing the network upgrade cycle, but is also accelerating the need to deploy 400Gbps optical networks inside mega-scale cloud and enterprise data centers," said Dr. Kishore Seendripu, CEO of MaxLinear. "With the recent announcement of the availability of next-generation switch ASICs that support 50Gbps PAM4 I/Os, we believe the growth trajectory for PAM4 DSP-based 400Gbps optical fiber interconnect solutions is at an inflection point. The cost pressure and thermal constraints of 400Gbps networks necessitate the use of new optical interconnects based on single-lane 100Gbps optical wavelength technology.

"Our Telluride MxL935XX 16nm CMOS SoC family, with integrated EA-EML laser drivers, reduced external components, and superior link-margin performance, is perfectly positioned to enable this leapfrogging industry transition. We believe that, currently, the total addressable market for 100Gbps and 400Gbps optical interconnect modules greatly exceeds 10 million units annually, not including the anticipated future rapid growth driven by the exploding internet traffic," concluded Dr. Kishore Seendripu, CEO of MaxLinear.

Technical Details

The first SoCs to be available from the Telluride family are the MxL93542 and MxL93543, which feature several operating modes that can connect to multiple generation of switch ASICs (128x25G NRZ, 256x25G NRZ or 256x50G PAM4) enabling 3.2Tbps, 6.4Tbps or 12.8Tbps front panel capacity per data center rack unit. These different operating modes span a variety of optical module form factors such as QSFP28, SFP-DD, QSFP-DD, OSFP and COBO.

For modes where the MxL93542 and MxL93543 interface with a legacy 25G NRZ switch ASIC, the corresponding forward error correction (FEC) functionality required for PAM4 optics is integrated into the device. Two separate instantiations of the FEC engine are available on-chip to support two distinct lanes of 100Gbps optics.

The integrated laser driver in the MXL93542 delivers greater than 1.8V of single-ended driver output swing necessary for EA-EML lasers. This output swing easily meets the optical modulation amplitude (OMA) specification requirements across the wide operating temperature and bias ranges of all EA-EML lasers. The chip package also includes all the high frequency components required for driver & modulator biasing.

The second version of the SoC, the MxL93543, which delivers 800mV of peak-to-peak differential driver output swing, can be easily paired with an external laser driver implemented in alternate optical technologies such as silicon photonics.

MaxLinear has engineered a very high-performance DSP engine in both the transmit and receive data paths. The resulting superior link-margin enables single-lane 100Gps optical

wavelength technology by mitigating many of the limitations of mass production optical components.

The devices feature a comprehensive digital pre-distortion (DPD) engine in the transmit direction to compensate for laser non-linearity, and to cancel packaging limitations that cause reflections and bandwidth degradation at these extremely high signal frequencies. On the receive path, the DSP includes an auto-adaptive signal enhancement engine, which integrates a continuous time linear equalizer (CTLE), automatic gain control (AGC), a feed forward equalizer (FFE), and a decision feedback equalizer (DFE).

Availability

The MxL93542 and MxL93543 are sampling now to leading optical module manufacturers. More information is available by emailing sales@maxlinear.com.

About MaxLinear, Inc.

MaxLinear, Inc. (NYSE:MXL), a leading provider of radio frequency (RF), analog and mixed-signal integrated circuits for the connected home, wired and wireless infrastructure, and industrial and multimarket applications. MaxLinear is headquartered in Carlsbad, California. For more information, please visit www.maxlinear.com.

Cautionary Note About Forward-Looking Statements

This press release contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. Forward-looking statements include, among others, statements concerning our MxL935XX Telluride devices, the anticipated launch into mass production of 400 Gbps solutions in the latter half of 2018, and the size of the market for 100Gbps and 400Gbps optical interconnect modules as well as statements concerning or implying the performance of MaxLinear's technologies, their potential use cases, and the potential impact of these technologies on our business and future operating results. These forward-looking statements involve known and unknown risks, uncertainties, and other factors that may cause actual results to be materially different from any future results expressed or implied by the forward-looking statements. Forward-looking statements are based on management's current, preliminary expectations. In particular, our assumptions concerning the launch of 400Gbps solutions by optical module vendors and the overall market size and opportunity reflected by 100Gbps and 400Gbps modules could prove incorrect. Additional risks and uncertainties arising from our operations generally and our recently completed acquisitions include intense competition in our industry; our dependence on a limited number of customers for a substantial portion of our revenues; uncertainties concerning how end user markets for our products will develop; potential uncertainties arising from continued consolidation among cable television and satellite operators in our target markets and continued consolidation among competitors within the semiconductor industry generally; our ability to develop and introduce new and enhanced products on a timely basis and achieve market acceptance of those products, particularly as we seek to expand outside of our historic markets; potential decreases in average selling prices for our products; and risks

relating to intellectual property protection and the prevalence of intellectual property litigation in our industry.. In addition to these risks and uncertainties, investors should review the risks and uncertainties contained in our filings with the Securities and Exchange Commission (SEC), including the information under the caption “Risk Factors” in our Annual Report on Form 10-K for the year ended December 31, 2016 and our Quarterly Report on Form 10-Q for the quarter ended September 30, 2017. All forward-looking statements are based on the estimates, projections and assumptions of management as of the date of this press release, and MaxLinear is under no obligation (and expressly disclaims any such obligation) to update or revise any forward-looking statements whether as a result of new information, future events, or otherwise.

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