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## MaxLinear Showcases Industry's First 5nm CMOS 800G PAM4 DSP on TSMC Advanced Process at OFC 2021

- The 800G DSP is part of MaxLinear's new Keystone family of highly integrated, low power 5nm CMOS PAM4 DSPs, that addresses a range of 400G and 800G datacenter applications
- Keystone represents the leading 5nm CMOS radio-frequency and analog mixed-signal system-on-chip products developed in partnership with TSMC, the world's leading semiconductor foundry. It leverages TSMC's 5nm technology for both low-power digital and high-performance analog applications.

CARLSBAD, Calif.--(BUSINESS WIRE)-- [MaxLinear, Inc.](https://www.maxlinear.com) (NYSE: MXL), a leading provider of radio frequency (RF), analog, digital and mixed-signal integrated circuits, announced today that the company will showcase the industry's first 5nm CMOS 800Gbps PAM4 DSP for data center applications at the Optical Fiber Communication Conference and Exhibition (OFC) from June 6 to June 11, 2021. This 800G DSP is part of MaxLinear's new Keystone family of 5nm CMOS PAM4 DSPs available for customers.

This press release features multimedia. View the full release here:  
<https://www.businesswire.com/news/home/20210601005357/en/>



MaxLinear's Keystone Family of PAM4 DSPs deliver the industry's lowest power 400G and 800G solutions (Photo: Business Wire)

Keystone represents MaxLinear's third generation of PAM4 DSPs. It enables small form factors, offers high integration and best-in-class power consumption, and has the flexibility to address multiple optical transceiver use cases and end markets. Keystone DSPs can address both 400G and 800G optical module applications. The

extremely low power consumption and small form factor of Keystone enables both sub-8Watt 400G optical module designs (QSFP112 and QSFP-DD) and sub-15Watt 800G designs

(QSFP-DD800 and OSFP). Similar to MaxLinear's previous generation Telluride PAM4 DSP family (MxL9351x and MxL9354x), the Keystone family (MxL9364x, MxL9368x) also includes a monolithically integrated single-ended driver ideally suited for optical transceiver module implementations using electro-absorption modulated lasers (EMLs). Additionally, it features an optional monolithically integrated high-swing differential driver that can be used for direct drive of silicon photonics (SiPh) based modulators.

"With the exponential growth of data traffic within hyperscale cloud networks, the needed increase in interconnect bandwidth in those networks requires lower-power, higher-density optical modules that support higher lane rates," said Drew Guckenberger, Vice President of Optical Interconnect at MaxLinear. "We are extremely excited to announce the availability of our Keystone family of 5nm CMOS PAM4 DSPs, specifically designed to address these requirements. With our third generation Keystone DSP design, and the power advantages of 5nm CMOS technology, we are directly addressing our customers' critical needs for low power, highly integrated, high performance interconnect solutions in next generation hyperscale cloud networks."

"We're pleased to see the result of our collaboration with MaxLinear, a strategic technology partner of TSMC, in developing and manufacturing its leading PAM4 DSPs on TSMC's 5nm technology to address the rapidly growing cloud datacenter network infrastructure market," said Alex You, Vice President of Business Management, TSMC North America. "The Keystone family of SoCs are amongst the first radio-frequency mixed-signal digital SoCs leveraging TSMC's 5nm CMOS process. The excellent power, seamless integration, and performance benchmarks set by Keystone are a testament to the advanced capabilities of our process technology, and also to MaxLinear's design expertise in the most advanced processes."

## **Technical Details**

Keystone is a family of highly integrated PAM4 DSP SoCs that enable 400G/800G optical interconnects. This is the first generation to provide 106.25Gbps host side electrical I/O to match the line side 106.25Gbps interface rate. This is a crucial capability for next generation 25.6T switch interfaces.

The Keystone family's host side interfaces support 25.78125/25.5625/53.125/106.25Gbps signaling per lane over C2M host channels. The line side interfaces also support the same rates and are targeted for 100G/λ DR, FR, and LR applications. All devices provide extensive DSP functionality, including line-side transmitter digital pre-distortion (DPD), transmit pre-emphasis (TX FIR), receiver feed forward equalization (FFE) and decision feedback equalization (DFE).

The Keystone family (MxL9364x, MxL9368x) includes both standalone DSPs and DSPs with monolithically integrated drivers that offer high-swing differential and single-ended output driver options to address both SiPh and EML direct drive applications. The following channel configurations are available in each case:

- 8x50G to 8x50G
- 8x50G to 4x100G
- 4x100G to 4x100G
- 8x100G to 8x100G

These DSPs offer exceptional performance and signal integrity in a compact (12mm x 12mm) footprint suitable for next generation optical module form-factors such as QSFP-DD800 and OSFP.

The Keystone family will be on display during the virtual OFC Conference from June 06 to June 11, 2021. Contact your local MaxLinear salesperson or email [OFC2021@maxlinear.com](mailto:OFC2021@maxlinear.com) to arrange a virtual or face-to-face meeting and demo session.

For additional information on MaxLinear's data center solutions and the new Keystone DSP family, visit [www.maxlinear.com/mxl93682](http://www.maxlinear.com/mxl93682).

### **About MaxLinear, Inc.**

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

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### **Cautionary Note About Forward-Looking Statements:**

This press release contains "forward-looking" statements within the meaning of federal securities laws. Forward-looking statements include, among others, statements concerning or implying future financial performance, anticipated product performance and functionality of our products or products incorporating our products, and industry trends and growth opportunities affecting MaxLinear, in particular statements relating to MaxLinear's Keystone and Telluride families of PAM4 DSP SoCs, including but not limited to potential market opportunities, partnership with Taiwan Semiconductor Corporation, development, functionality, capability, and the benefits of use of such products. These forward-looking statements involve known and unknown risks, uncertainties, and other factors that may cause actual results to differ materially from any future results expressed or implied by these forward-looking statements. We cannot predict whether or to what extent these new or existing products will affect our future revenues or financial performance. Forward-looking statements are based on management's current, preliminary expectations and are subject to various risks and uncertainties that could cause actual results to differ materially from those described in the forward-looking statements. Forward-looking statements may contain words such as "will be," "will," "expect," "anticipate," "continue," or similar expressions and include the assumptions that underlie such statements. The following factors, among others, could cause actual results to differ materially from those described in the forward-looking statements: intense competition in our industry and product markets; risks relating to the development, testing, and commercial introduction of new products and product functionalities; the ability of our customers to cancel or reduce orders; and uncertainties concerning how end user markets for our products will develop. Other risks potentially affecting our business include risks relating to acquisition integration; our lack of long-term supply contracts and dependence on limited sources of supply; potential decreases in average selling prices for our products; impacts from public health crises such as the Covid-19 pandemic or natural disasters; and the potential for intellectual property litigation, which is prevalent in our industry. In addition to these risks and uncertainties, investors should review

the risks and uncertainties contained in MaxLinear's filings with the United States Securities and Exchange Commission, including risks and uncertainties arising from other factors affecting the business, operating results, and financial condition of MaxLinear, including those set forth in MaxLinear's most recent Annual Report on Form 10-K for the year ended December 31, 2020 and Quarterly Report on Form 10-Q for the quarter ended March 31, 2021, in each case as filed with the Securities and Exchange Commission. All forward-looking statements are qualified in their entirety by this cautionary statement. MaxLinear is providing this information as of the date of this release and does not undertake any obligation to update any forward-looking statements contained in this release as a result of new information, future events, or otherwise.

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