

# ***Advanced Electronics and Photonics products*** *for evolving optical network infrastructure*



NTT Electronics Corporation is a leading supplier of cutting-edge electronics and photonics components for optical networks. Based on the advanced technology from NTT R&D, such as digital coherent signal processing, advanced PLC, and photonic semiconductor manufacturing/device technology, we provide unique products with excellent performance enabling customer's competitive product design.

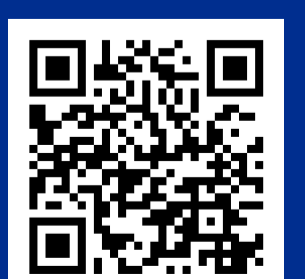
At this brochure, we introduce you

- 1) 100G and higher rate Coherent Digital Signal Processors,
- 2) Advanced Planar Lightwave Circuit (PLC) products (AWG, MCS) for long-haul/metro DCI applications,
- 3) Access and client interface components such as high-output power LD, high sensitive APD and Burst mode TIA for cost effective PON and 5G access networks.

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# 100G-and-beyond Coherent Components

NTT Electronics provides key components for coherent 100G-and-beyond: DSPs ("ExaSPEED" series) with a Software Development Kit (SDK) and Reference Design, and High Bandwidth Coherent Driver Modulator (HB-CDM). These products have a wide range of applications from 100G ultra-long haul telecommunication to 600G data communication for datacenter interconnects.

## ExaSPEED TERA

### 600G High Performance Coherent DSP

Up-to-date 64Gbaud high-performance coherent DSP of 3rd generation 16nm ExaSPEED lineup, providing 3x larger per-lambda capacity and 60% longer reach than ExaSPEED 200.



## ExaSPEED 200

### 200G Low Power Coherent DSP

3rd generation low-power coherent DSP for 100G/200G DP-QPSK/16QAM, suitable for CFP-DCO and CFP2-ACO higher port density linecard applications.



16-nm CMOS coherent DSP solution achieves 0.1W/Gbps ultra low-power consumption.

## ExaSPEED 200s

### 200G Low Power Coherent DSP with mini package

3rd generation low-power coherent DSP for 100G/200G DP-QPSK/16QAM within mini package, suitable for CFP2-DCO applications.

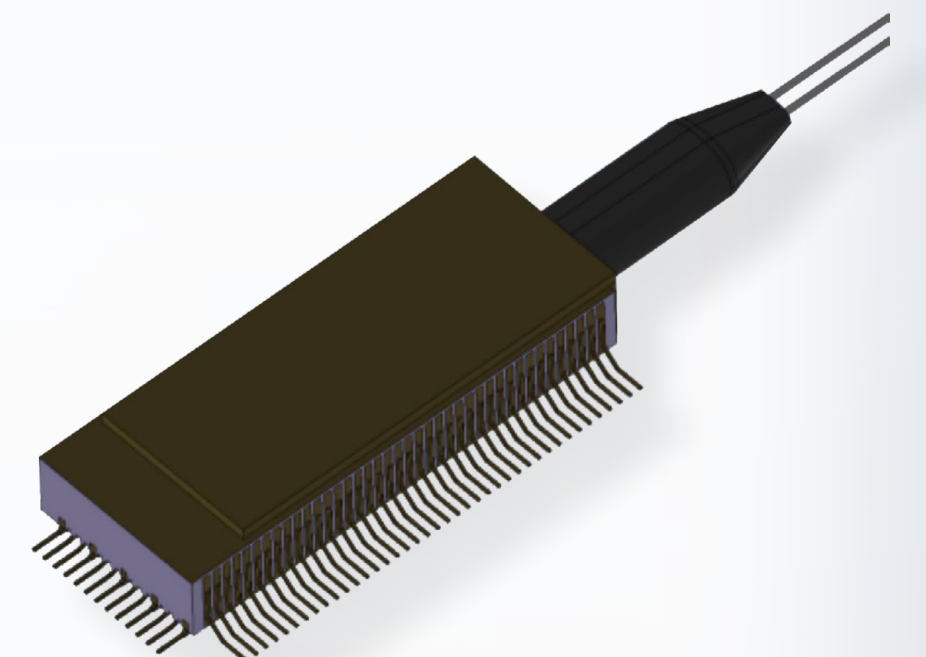


16-nm CMOS coherent DSP solution achieves 0.1W/Gbps ultra low-power consumption.

## High Bandwidth Coherent Driver Modulator

InP-based IQ modulator co-packaged with a quad linear driver supports 400G/600G systems for long-haul and metro applications with a baud rate of 64 Gbaud.

The OIF-standard compliant package is suitable for line cards and CFP/CFP2-DCO transceivers.

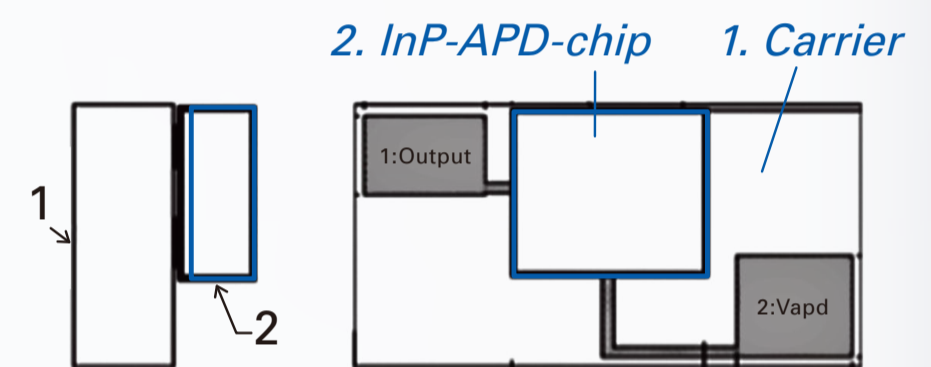


# Access and Client Interface Components

For evolution of access and client network interface, NTT Electronics provides unique access and client interface components, such as high-output power LD, high sensitive APD and burst mode TIA or 5G access and PON networks.

## 25G-based APD (Avalanche Photodiode)

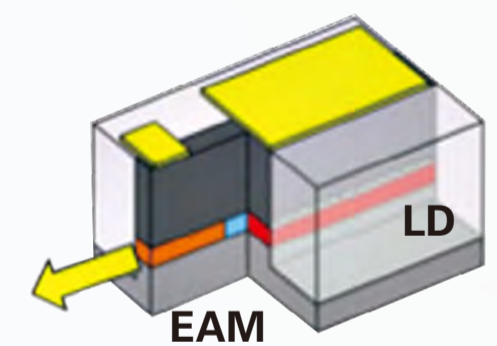
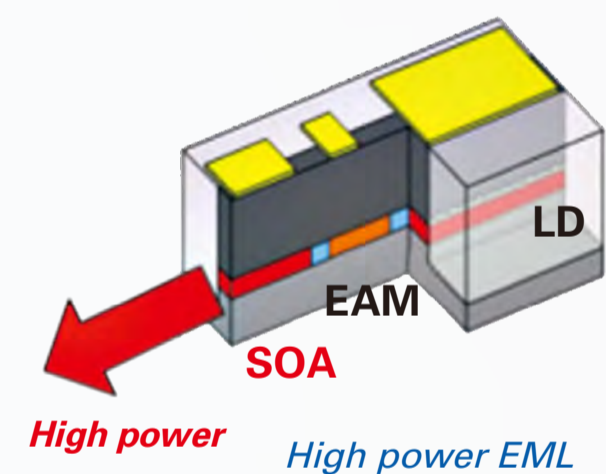
25Gbaud APD offers cost-effective solution with low power consumption and extension of transmission distance beyond 10km reach for MFH/MBH of 5G and Ethernet. It can support transmission distances of nearly 30km without FEC and 40km with FEC. NTT Electronics provides InP-APD chip-on-carrier (CoC) as a component for optical sub-assembly (OSA) for both NRZ and PAM4 application.



Low power consumption is realized by using APD as compared to PIN with optical amplifier.

## High power EML (SOA assisted extended reach EA-DFB Laser)

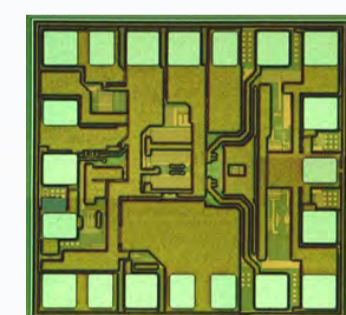
High power EML consist of an EA-DFB Laser monolithically integrated with SOA. The SOA assists output power and extends transmission reach with low power consumption. The 25Gbaud high power EML chip offers output power of +9 dBm (OMA) and it is useful for LAN-WDM and 5G applications. 10G high power EML chip for PON applications is also available. NTT Electronics provides high power EML chip on carrier (CoC) as component of optical sub-assembly (OSA) for both of NRZ and PAM4 operations.



Low power consumption is achieved with SOA integrated EML (about 50% reduction at chip level compared with conventional EML).

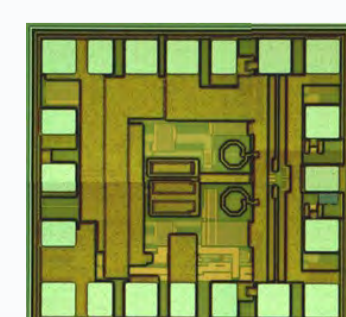
## 10G/1Gbps Burst mode Transimpedance Amplifier (TIA)

10G/1Gbps dual rates Burst mode TIA for the IEEE standard, 10G-EPON



## 10G/2.5G/1Gbps Burst mode Transimpedance Amplifier (TIA)

10G/2.5G/1G multi-rate Burst mode TIA complied to both IEEE and ITU-T standard, XGS-PON, NG-PON2, and 10G-EPON



# Advanced PLC Components

Planar Lightwave Circuit (PLC) devices are widely used in telecom, and also recently in the growing markets of datacenter and mobile networks. NTT Electronics' advanced ultra-high-index PLC technology can realize a high-functionality with compactness for large-scale optical switches and small form-factor optical submodules.

## Ultra-SFF Athermal AWG

Our precise fabrication realizes minimized PLC with ultra-high-index technology. A small form factor AWG module using the PLC realizes 1/5 of footprint compared with MSA-AWG module.



An Athermal AWG with a small form factor contributes to the power-saving and space-saving.



## MxN Multicast Switch

Multicast Switch (MCS) is the solution for CDC-ROADM (color-less, direction-less, and contention-less). NTT Electronics has supplied MCSs with dense integration, compact size and high reliability using PLC technology. We provide MCSs with flexible port count configurations according to network applications.



- Our company may change specifications and the appearance for improvement that are incidental to the product without providing prior notice. At the purchase and the use of the product, please confirm the latest information.
- Please use our products in accordance with the instructions provided in the manual, user's guide or specifications attached.
- Exporting our products or technologies may be subject to the Foreign Exchange and Foreign Trade Law of Japan and export control acts and regulations of other related countries.

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