# Optoelectronic Solutions

**PRODUCT SELECTION GUIDE**

MACOM®

*Partners from RF to Light*

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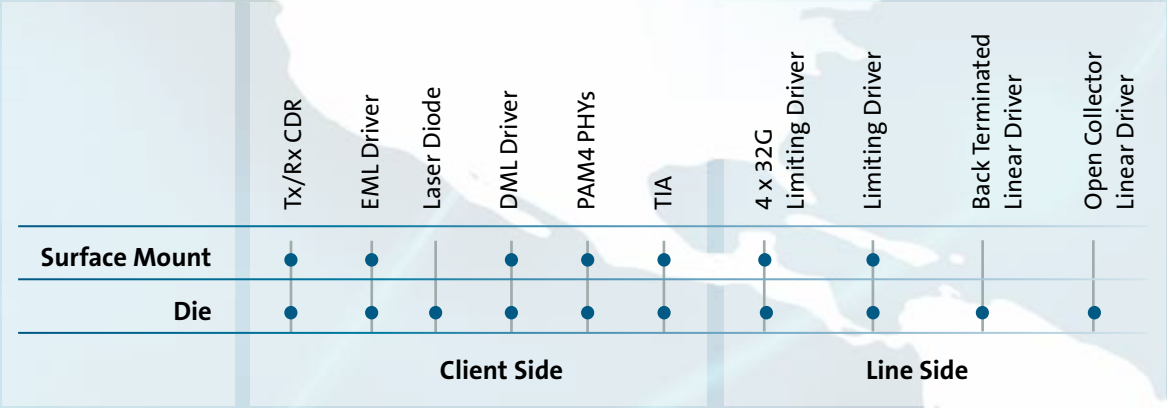
## Products and Technology to Meet the High Bandwidth and Low Latency Requirements of Cloud Data Centers and 5G Optical Networks

MACOM supports a large portfolio of electronic and lightwave components, lasers, and photodiodes for optical communications in a wide range of applications. These span from long haul core networks to Cloud Data Center to FTTx access, to wireless infrastructure.

The portfolio addresses the high performance analog interfaces between electrical and optical domains, providing solutions to meet the demanding size, power and signal integrity requirements of today's high speed networks — which are expanding to meet the continuously growing demand for data capacity. These products include high performance modulator drivers, transimpedance amplifiers, clock/data recovery circuits, APD and PIN photodiodes, FP and DFB lasers, Silicon Photonics, and PAM4 PHYs. Each of these product families includes variants specifically tailored for the unique needs of data centers, enterprise networks, and telecom optical systems operating up to 800 Gbps and beyond.

For FTTx, MACOM has the broadest portfolio of lasers, laser drivers, limiting amplifiers, photodiodes, and TIAs covering systems from GPON, EPON, XG-PON, and NG-PON.



# Enabling Bandwidth Density in Optical Networks

## MACOM PRODUCTS

- > CDRs
- > Gearbox
- > Lasers
- > Limiting Amplifiers
- > Silicon Photonics Components
- > MACsec
- > Modulator Drivers
- > OTN: Framer and Mapper
- > PAM4 PHY
- > Photodiodes
- > Physical Media Devices (PMDs)
- > TIAs

## MACOM TECHNOLOGIES

- > SiPh
- > InP
- > GaAs
- > CMOS
- > SiGe

## MACOM MARKETS


FTTx/PON

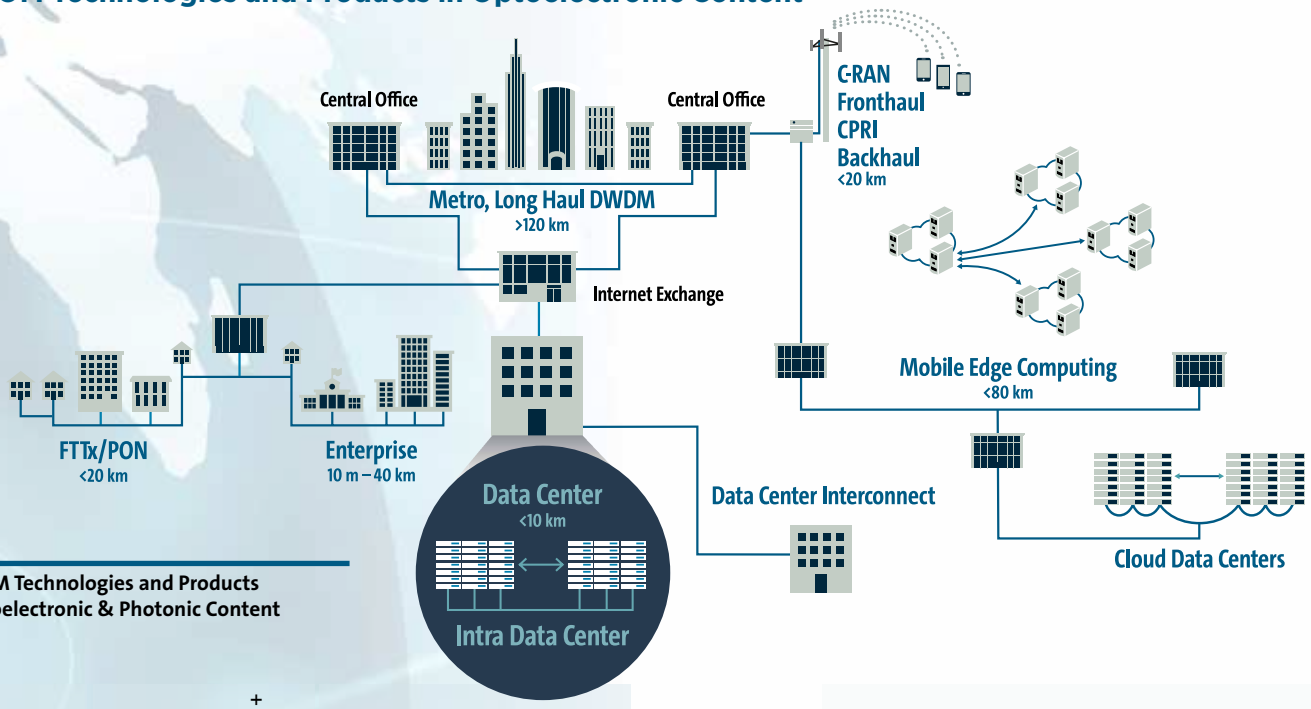

Wireless Fronthaul/ Backhaul


Cloud Data Center

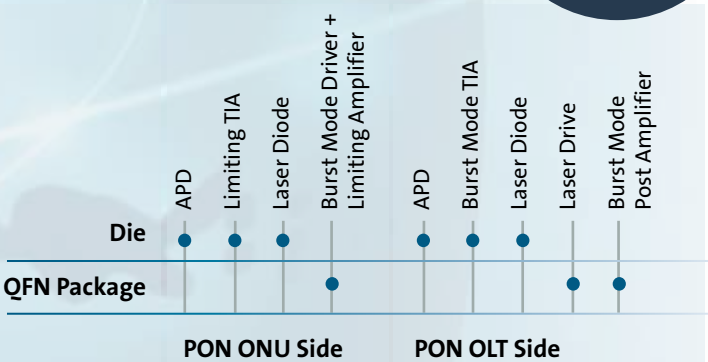

Metro

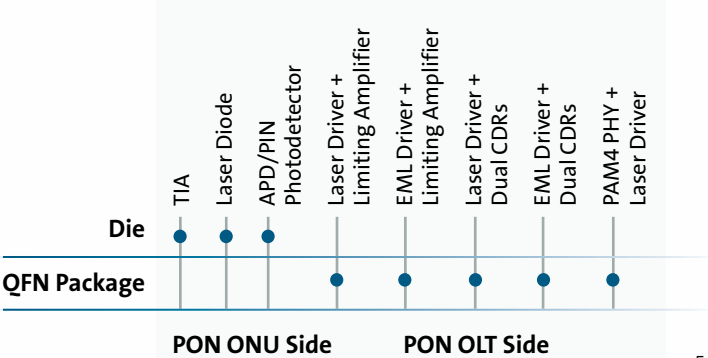

Long Haul

## MACOM Technologies and Products in Optoelectronic Content




MACOM Technologies and Products in Optoelectronic & Photonic Content



## Innovative Design Solutions to Solve Complex Challenges

### Indium Phosphide (InP)

MACOM has assumed a key position in the market as a premier supplier of both photonic devices such as lasers, APD and PIN photodetectors, and optoelectronics products such as high speed modulator drivers, based on InP technology. *Key applications include laser diodes for silicon photonics, data centers, mobile backhaul, access networks and metro markets, and modulator drivers for high capacity, coherent systems in metro and data center interconnect applications.*

### CMOS

MACOM utilizes CMOS technology for design in a range of applications from wireless infrastructure basestations to aerospace and defense, and complex Ethernet PHY devices. CMOS allows for the seamless integration of high-speed data transmission and complex digital functionality. Ethernet devices used in optical networking include DSP PHYs as well as IEEE 802.1AE MACsec, which solves the security issues of Ethernet networks by providing confidentiality, authenticity and integrity of data. *Typical CMOS products and applications include PAM4 PHYs, MACsec, mobile phone chipsets, cellular basestations/wireless infrastructure, satellite radio, GPS and DAB, 2.4 GHz and 5.0 GHz WLAN, VSAT, CATV and broadband, commercial and military radar, and multi-market applications.*

### Silicon Germanium (SiGe)

Building upon a long history in designing integrated circuits and subsystems for radar and mmW markets, MACOM leads the way in applying SiGe BiCMOS technology to both commercial and military needs. SiGe is a high value, differentiating technology which we will continue to leverage in the company's core product segments. *Key applications include high-speed optical network transceivers, basestations, wired broadband communications, high speed crosspoint switches, and global positioning systems.*

### Gallium Arsenide (GaAs)

For over three decades, MACOM has been the world leader in the advancement of GaAs technology, producing state-of-the-art, high performance discrete devices, control components, mixed signal processing and converters, driver amplifiers, CATV amplifiers, LNAs and power amplifiers as single purpose and multi-function MMICs. *Key applications include wireless backhaul, industrial, scientific and medical, global positioning system, CATV and wired broadband, aerospace and defense, and satellite communications.*

## MACOM Evaluation Modules (EVMs) and Reference Design Kits Enhance New Product Development, Reduce Costs and Optimize Time-to-Market

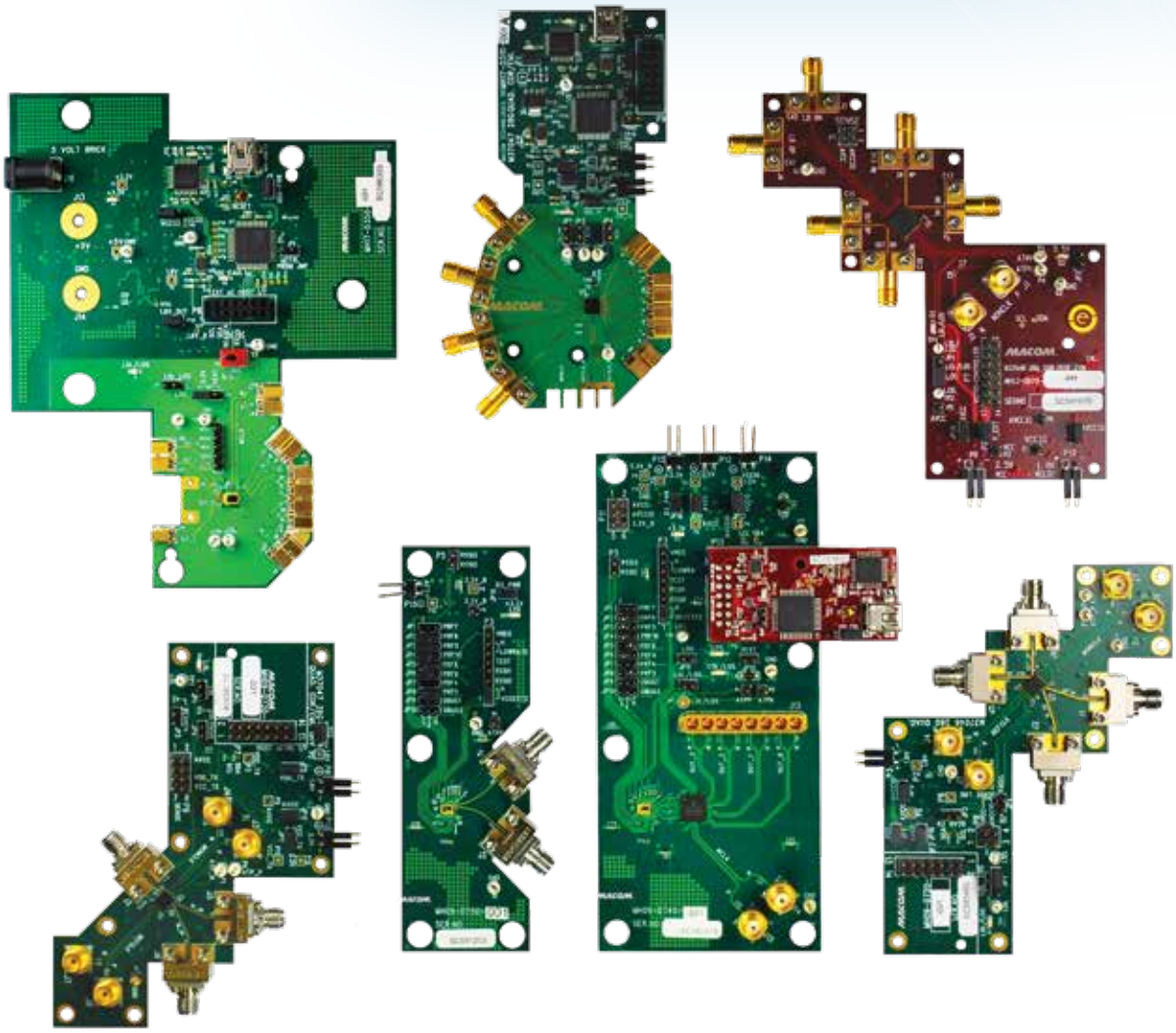
In addition to the support of our world-class application team, MACOM offers a number of custom reference design kits, Evaluation Modules (EVMs) and design guides which enhance the development of new products, reduce costs and optimize time-to-market.

MACOM EVMs provide customers with a vehicle to test product features, measure product performance, and help design the product into their application. From backplanes to line cards and optical modules, MACOM reference design kits and EVMs are built to ease the evaluation of our latest solutions into the application environments of our customers and partners.

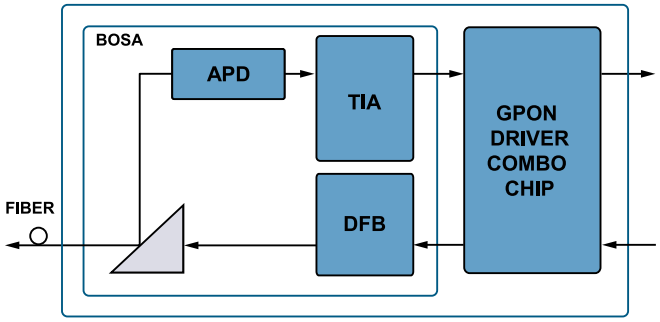
We package these offerings with our extensive GUI support as well. In addition to the EVM and the required software and user guide, schematics of circuit boards and modules, and supporting documents are provided.

From low-speed solutions to those operating at 100G and above, MACOM offers hardware expertise and design support to enable innovative, next-generation optical products in a wide variety of markets.

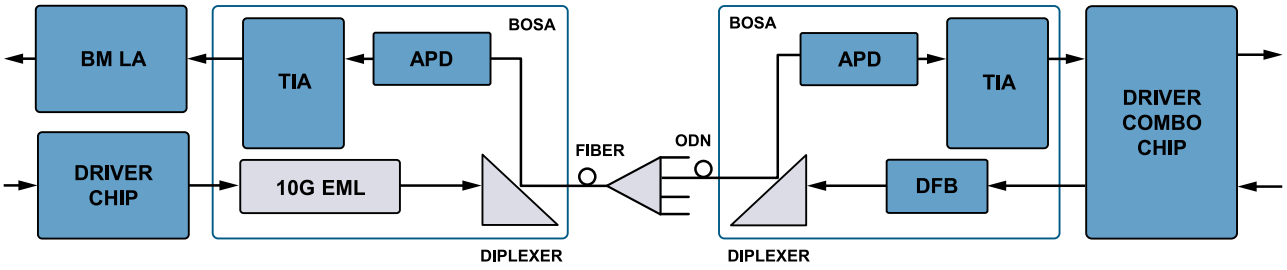
Contact the MACOM sales team (**sales.info@macom.com**) to learn more.



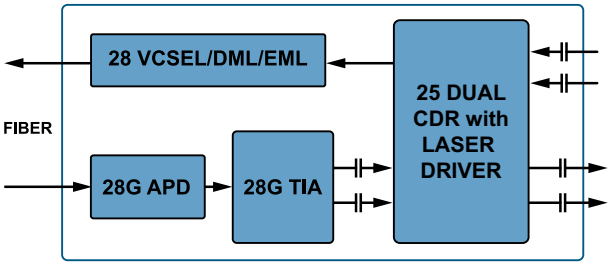
## GPON ONU BOSA-on-Board A



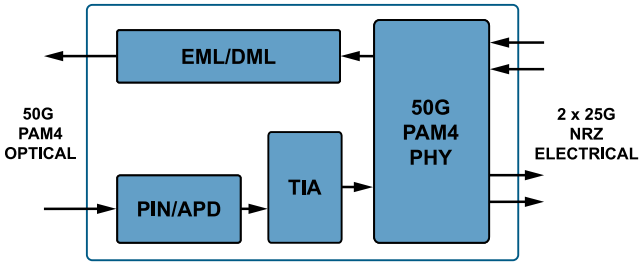

## PON ONU/OLT B



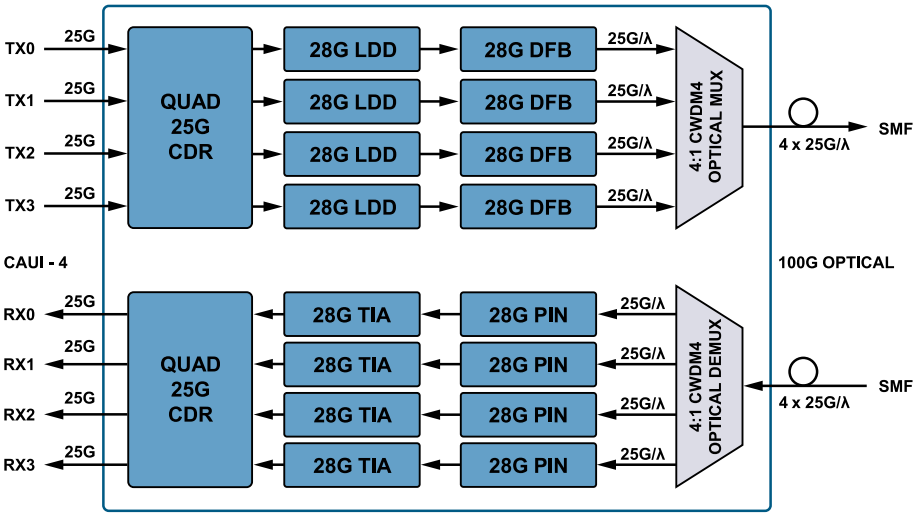

## 25G Chipset: SFP28 SR/LR/ER C



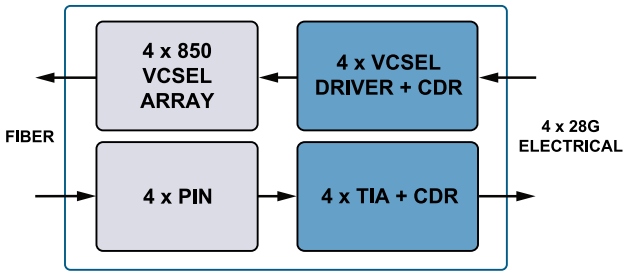

## 50 Gbps PAM4 FR/LR/ER E



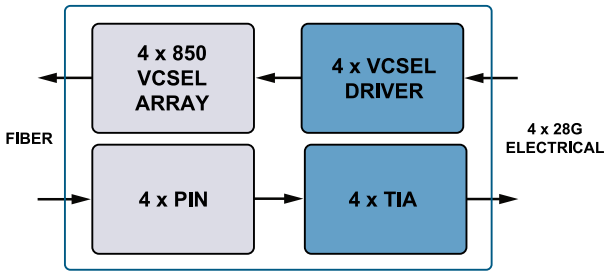

## 100G Chipset: CWDM4 Solution D



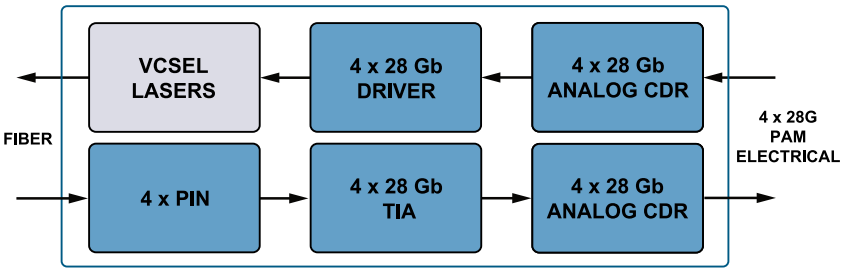
## 100G SR4 VCSEL Chipsets F



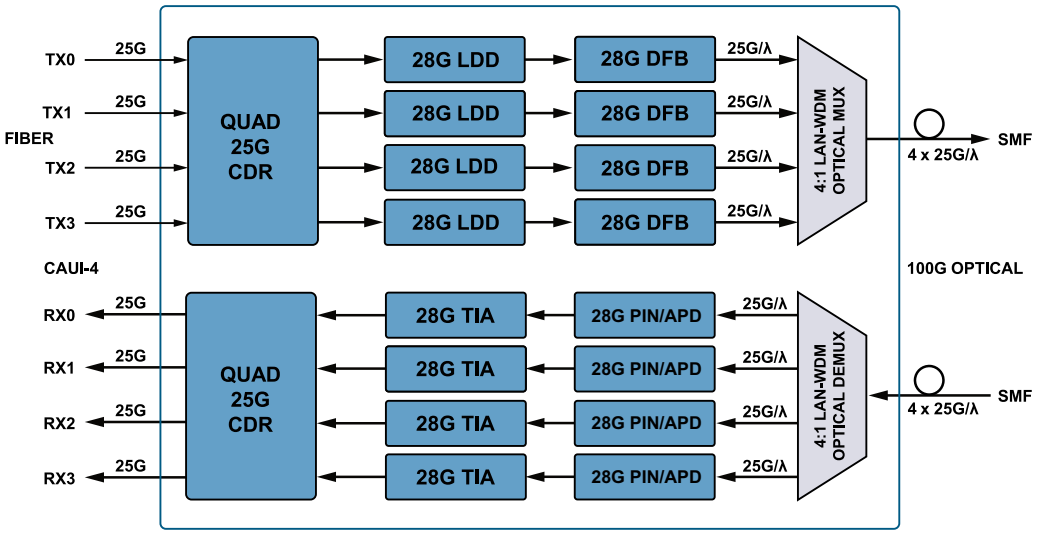

## 100G SR4 VCSEL Chipsets G



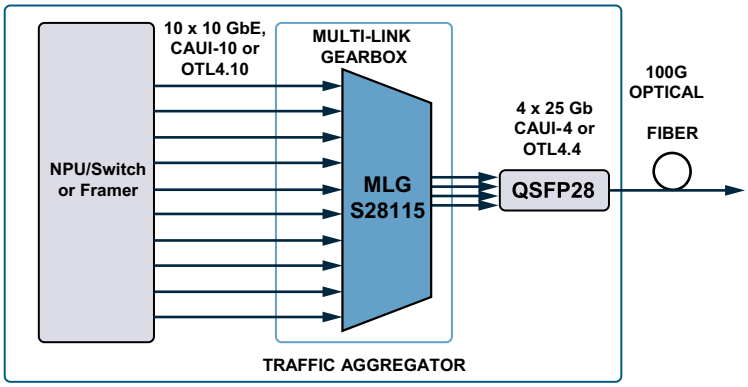

## 200/400G SR4 VCSEL Chipset H



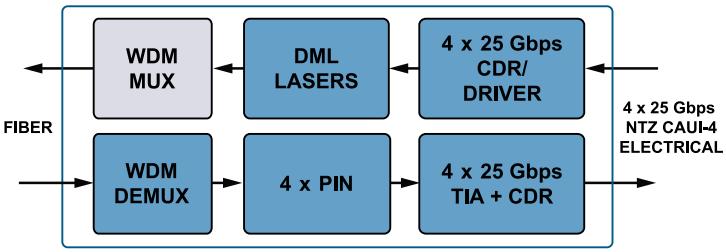

## 100G BASE-LR 4/ER 4 (QSFP28) I



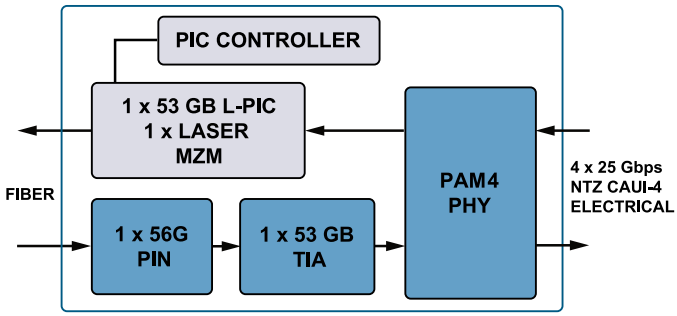

## Gearbox Traffic Aggregator – 10 x 10G to 4 x 25G Q



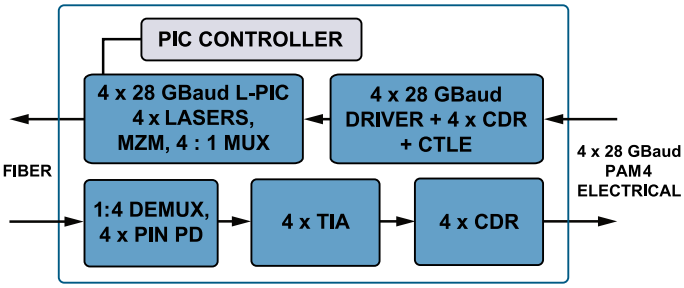
## 100G Gbps CWDM4 DML-Based Chipset (J)




## 100G Single Lambda (K)

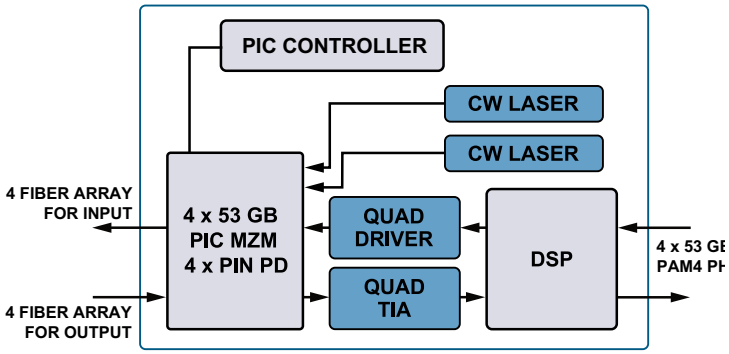



## 200 Gbps SMF Chipset (M)

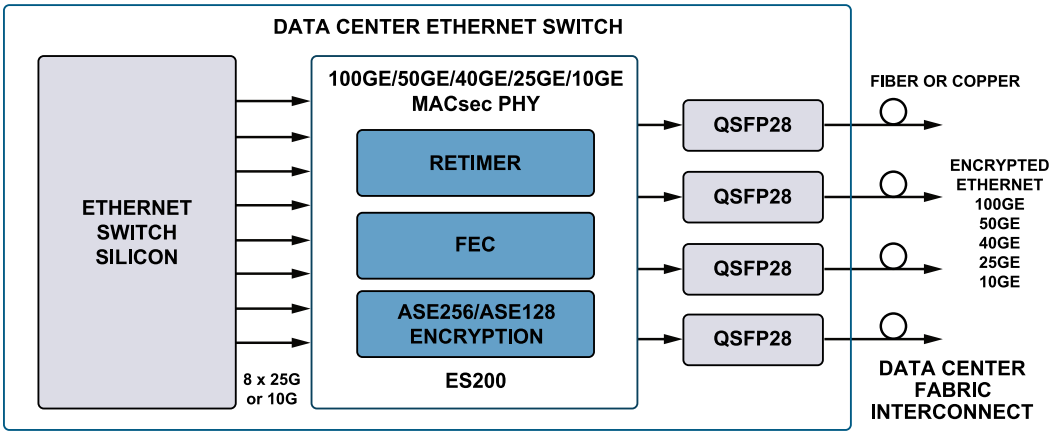



Silicon Photonic 100GBASE-DR/FR Compliant (Single 53 GBaud PAM4 Data Lane)
Chipset Provides Automated PIC Calibration and Monitoring and Build in Self Test (BiST)

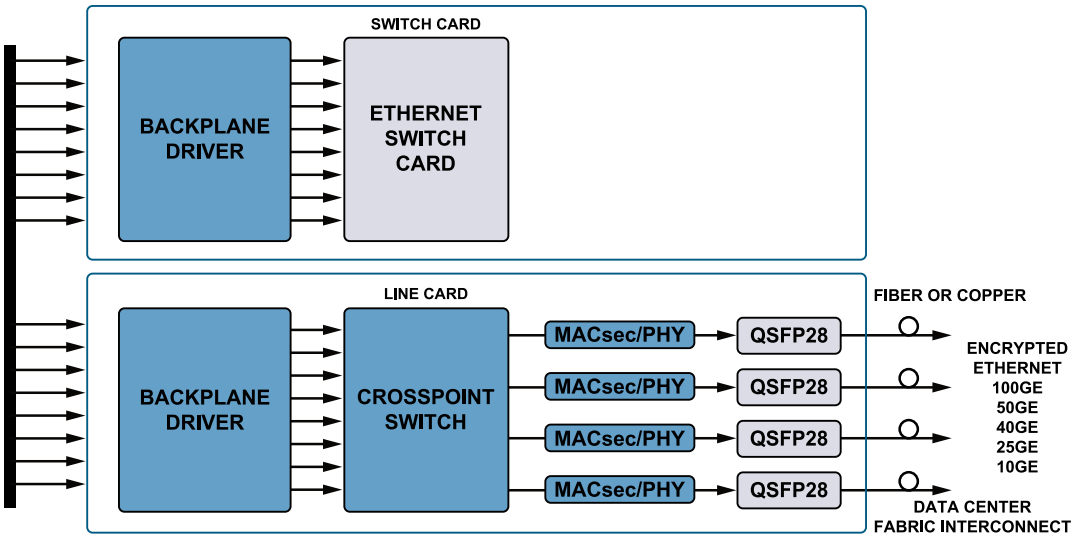
## 400G BASE-DR4 (L)



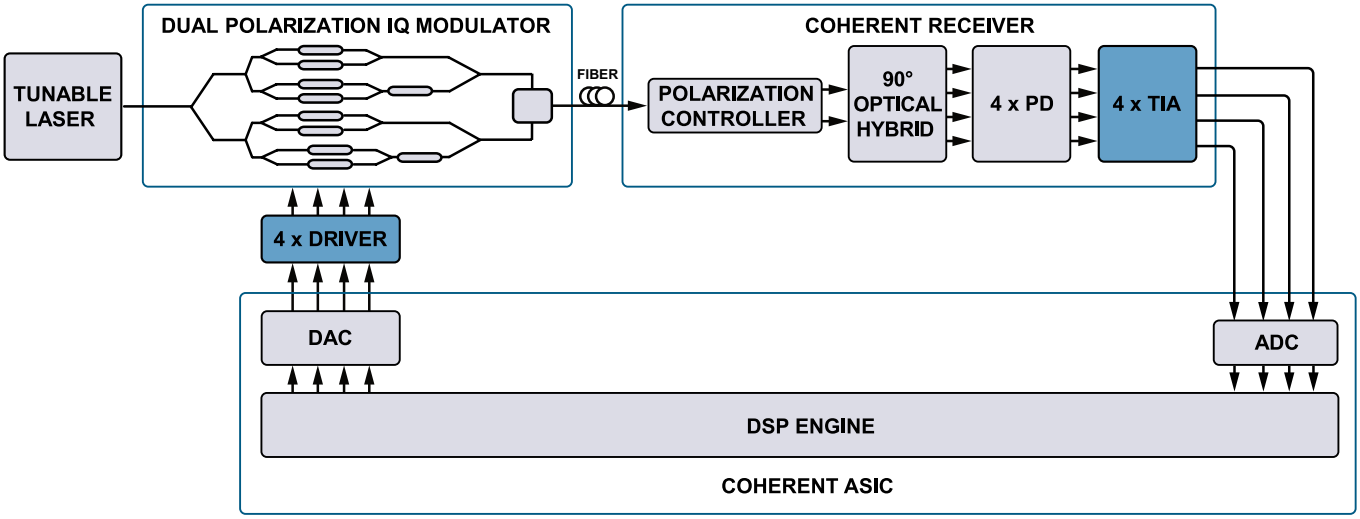

## Data Center Switch Interconnect Security Solution (N)



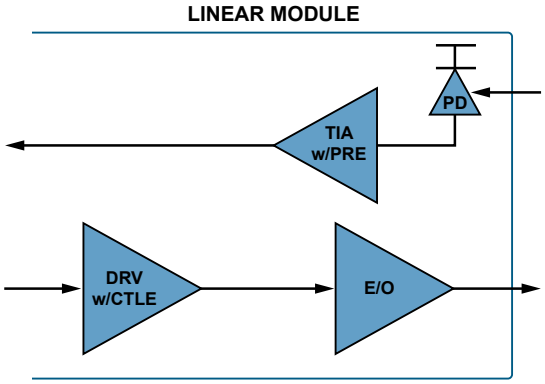
## Backplane Drivers (O)




## 100G – 800G Long Haul/Metro/DCI Application Solution (P)




## MACOM PURE DRIVE™ Linear Architecture (R)



## Lasers and Modulator Drivers

| Part Number | Description | Block Diagram Key* | Max Data Rate (Gbps) | Supply Voltage (V) | Power Consumption (W) | Channels (#) | Max Output Mod Current (mA) | Max Output Bias Current (mA) | Package Type and Size |
|---|---|---|---|---|---|---|---|---|---|
| **M02097** | 500 Mbps, 3.3/5 V LED Driver/Limiting Amp | **A** | 0.5 | 3.3, 5 | 0.12 | 1 | 120 | 10 | QFN |
| **M02095** | 1.25 Gbps, 3.3/5 V Laser Driver/Limiting Amp | **A** | 1.25 | 3.3, 5 | 0.31 | 1 | 85 | 100 | QFN, 5 mm |
| **M02090** | 2.5 Gbps, 3.3 V Burst Mode Laser Driver/ Limiting Amp | **A** | 2.5 | 3.3 | 0.48 | 1 | 100 | 80 | QFN, 5 mm |
| **M02098** | Burst Mode Laser Driver/Limiting Amp | **A** | 2.67 | 3.3 | 0.28 | 1 | 100 | 80 | QFN, 5 mm |
| **M02077** | 3.1 Gbps Laser Driver/Limiting Amp | **A** | 3.1 | 3.3 | 0.20 | 1 | 100 | 100 | QFN, 4 mm |
| **M02099** | Burst Mode Laser Driver/Limiting Amp + DDMI Controller and APD DC – DC Controller | **A** | 3.1 | 3.3 | 0.22 | 1 | 100 | 100 | QFN, 4 mm |
| **M02100** | Burst Mode Laser Driver/Limiting Amp + DDMI Controller and APD DC – DC Controller & Amp, EEPROM | **A** | 3.1 | 3.3 | 0.22 | 1 | 100 | 100 | QFN, 4 mm |
| **MALD-02101** | 3.1 Gbps Low Power Dual Closed Loop Burst Mode Laser Driver with Integrated Limiting Amp | **A** | 3.1 | 3.3 | 0.23 | 1 | 100 | 100 | QFN, 4 mm |
| **MALD-02103C** | 3.1 Gbps Low Power Dual Closed Loop Burst Mode Laser Driver with Integrated Limiting Amp | **A** | 3.1 | 3.3 | 0.27 | 1 | 100 | 100 | QFN, 4 mm |
| **M02061** | 4.3 Gbps, 3.3 or 5 V Laser Driver | **A** | 4.3 | 3.3, 5 | 0.11 | 1 | 100 | 100 | QFN |
| **M02096** | 4.3 Gbps, 3.3/5 V Laser Driver/Limiting Amp | **A** | 4.3 | 3.3, 5 | 0.22 | 1 | 85 | 100 | QFN, 5 mm |
| **M02172** | 11.3 Gbps EML Driver | **—** | 11.3 | 3.3 | 0.28 | 1 | 2.5 (V) | 180 | QFN, 5 mm |
| **MALD-02184A** | Tx CDR + Modulator Driver with Dual-Output Burst Mode Limiting Amp | **B** | 11.3 | 3.3 | 0.66 | 1 | — | — | QFN, 5 mm |
| **MALD-02186A** | Tx CDR + Modulator Driver and Dual-Output Burst Mode Limiting Amplifier with DC – DC Controller and Diagnostics | **B** | 11.3 | 3.3 | 0.66 | 1 | — | — | QFN, 5 mm |
| **M02193** | 12.5 Gbps Low Power Laser Driver and Limiting Amp with DC – DC Controller and EEPROM with Digital Diagnostics | **—** | 12.5 | 3.3 | 0.31 | 1 | 100 | 100 | QFN, 4.5 mm |
| **M02180** | Burst Mode Laser Driver/Limiting Amp + Rx CDR + DDMI Controller and APD DC – DC Controller & Amp; EEPROM | **B** | 12.5 | 3.3 | 0.4 | 1 | 100 | 100 | QFN, 4.5 mm |
| **MALD-02181** | 12.5G Burst Mode Laser and LIA + DC – DC Controller, EEPROM and DDMI Controller | **B** | 12.5 | 3.3 | 0.33 | 1 | 100 | 100 | QFN, 4.5 mm |
| **MALD-02182** | 12.5G Burst Mode Laser and LIA + DC – DC Controller and DDMI Controller | **B** | 12.5 | 3.3 | 0.33 | 1 | 100 | 100 | QFN, 4.5 mm |
| **MALD-02183** | 12.5G Burst Mode Laser and LIA + DC – DC Controller and DDMI Controller | **B** | 12.5 | 3.3 | 0.33 | 1 | 100 | 100 | QFN, 4 mm |
| **MALD-02194** | 12.5G Laser and LIA +DDMI Controller | **—** | 12.5 | 3.3 | 0.33 | 1 | 100 | 100 | QFN, 4.5 mm |
| **MALD-37030** | 26 Gbps Multi-Rate Laser Driver with LIA/CDR | **C** | 26.5 | 3.3 | CONTACT MACOM | 1 | 76 | 100 | CONTACT MACOM |
| **MAOM-37032** | Dual 28 Gbps CDR with Integrated EML Driver | **C** | 26.5 | 1.8, 3.3 | CONTACT MACOM | 1 | | CONTACT MACOM | |
| **MALD-37345B** | Quad 28G VCSEL Driver with Input Equalizer | **F, G** | 28 | 1.8, 3.3 | 0.5 | 4 | 12.8 | 15 | DIE, 2 x 3 mm |
| **MALD-38435** | Quad 53G VCSEL Driver with Input Equalizer | **H** | 28 | 1.8, 3.3 | 0.5 | 4 | 12.8 | 15 | DIE, 2 x 3 mm |
| **MALD-37045** | Four Channel 25G/28G CDR with Integrated VCSEL Driver | **F** | 28 | 1.8, 3.3 | 0.7 | 4 | — | — | DIE, 3 x 2 mm |
| **MALD-37145** | Four Channel 25G/28G CDR with Integrated VCSEL Driver | **F** | 28 | 1.8, 3.3 | 0.7 | 4 | — | — | DIE, 3 x 2 mm |
| **MALD-38045** | Quad 28 GBaud PAM4/NRZ VCSEL Driver with Integrated CDR | **F** | 28 | 1.8, 3.3 | 1.1 | 4 | — | — | DIE, 4 x 2 mm |
| **MALD-37845** | Four Channel Transmit and Four Channel Receive 25G/28G CDR with Integrated VCSEL Drivers and TIAs | **F** | 28.1 | 1.8, 3.3 | 1.5 | 4 Tx & 4 Rx | — | — | DIE, 3.4 x 4 mm |
| **MALD-37031** | 28 Gbps Multi-Rate Laser Driver with LIA/CDR | **C** | 28.1 | 3.3 | CONTACT MACOM | 1 | 76 | 100 | CONTACT MACOM |

*Refer to Block Diagrams on pages 8 – 11


Detailed specifications can be found quickly on our website at **macom.com** by typing the part number into the search box. All specifications are subject to change.

## Lasers and Modulator Drivers (continued)

| Part Number | Description | Block Diagram Key* | Max Data Rate (Gbps) | Supply Voltage (V) | Power Consumption (W) | Channels (#) | Max Output Mod Current (mA) | Max Output Bias Current (mA) | Package Type and Size |
|---|---|---|---|---|---|---|---|---|---|
| MALD-37035 | 26 Gbps Multi-Rate Burst Mode Laser Driver with Limiting Amplifier, Dual CDR, PMIC and DDMI | B | 26 | 3.3 | 0.693 | 1 | 76 | 100 | 5 x 6 mm LGA |

## Lasers and Modulator Drivers: Client Side

| Part Number | Description | Block Diagram Key* | Max Data Rate (Gbps) | Channels (#) | Max Output Voltage (V) | Min Input Voltage (mVpp) | Supply Voltage (V) | RF I/O Interface | Power Dissipation (W) | Package Type and Size (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| MAOM-002301-DIE | Single Channel 28 Gbps Direct, Modulated Laser Driver IC, Die | C, D, I | 28 | 1 | — | 500 | 3 | Differential/ Single-Ended | 0.255 | DIE |
| MAOM-002322-DIE | Single Channel 28 Gbps Direct Modulated Laser Driver IC, Die | D, E, I | 28 | 1 | — | 600 | 3.3 | Differential/ Single-Ended | 0.25/ch | DIE |
| MAOM-002326 | Single Channel 28 Gbps Direct Modulated Laser Driver IC | D, E, I | 28 | 1 | — | 800 | 3.3 | Differential/ Differential | 0.33/ch | LGA, 4 x 4 x 1.33 |
| MAOM-003119 | Single Channel 28 GBaud Linear EML Driver | — | 28 | 1 | 2 | 500 | 3.3 | Differential/ Single-Ended | 0.46/ch | SMD, 4 x 6 x 0.98 |
| MAOM-002304-DIE | Quad Channel 28 Gbps Direct Modulated Laser Driver IC, Die | D, I | 28 | 4 | — | 500 | 3 | Differential/ Single-Ended | 0.255/ch | DIE |
| MAOM-002422-DIE | Quad Channel 28 Gbps Direct Modulated Laser Driver IC, Die | D, E, I | 28 | 4 | — | 600 | 3.3 | Differential/ Single-Ended | 0.25/ch | DIE |
| MAOM-005321 | Single Channel 56 GBaud Linear EML Driver | | 53/56 | 1 | 1.8 | 1000 (max) | 3 | Differential/ Single-Ended | 0.4/ch | LGA, 3 x 5 x 1.1 |
| MAOM-005421 | Quad Channel 56 GBaud Linear EML Driver | L | 53/56 | 4 | 1.8 | 1000 (max) | 3 | Differential/ Single-Ended | 0.4/ch | SMD, 7 x 7.2 x 0.73 |
| MAOM-005324 | Single Channel 56 GBaud Linear DML/SiPh Driver | — | 53/56 | 1 | 1000 (max) | 3.6 | 3 | Differential/ Differential | 0.4/ch | LGA, 3 x 5 x 1.1 |
| MAOM-005424 | Quad Channel 56 GBaud Linear DML/SiPh Driver | L | 53/56 | 4 | 3.6 | 1000 (max) | 3 | Differential/ Differential | 0.4/ch | SMD, 5 x 7 x 1.11 |
| MAOM-005320-DIE | Single Channel 56 Gbps Direct Modulated Laser Driver IC, Die | D, E, I | 56 | 1 | — | 600 | 3.3 | Differential/ Single-Ended | 0.25/ch | DIE |
| MAOM-005420-DIE | Quad Channel 56 Gbps Direct Modulated Laser Driver IC, Die | D, E, I | 56 | 4 | — | 600 | 3.3 | Differential/ Single-Ended | 0.25/ch | DIE |
| MAOM-005413 | Quad Channel 56 GBaud Linear EML Driver | L | 56 | 4 | 1.8 | 1000 (max) | 3.3 | Differential/ Single-Ended | 0.4/ch | SMD, 6 x 6.3 x 0.915 |
| MAOM-005408-DIE | Quad Channel 56 GBaud Linear SiPh Driver, Die | R | 56 | 4 | 3 | 800 (max) | 3.3 | Differential/ Differential | 0.35/ch | DIE/ Flip Chip |
| MAOM-05408L-DIE | Quad Channel 56 GBaud Linear SiPh Driver, Die | R | 56 | 4 | 3 | 800 (max) | 3.3 | Differential/ Differential | 0.35/ch | DIE/ Flip Chip |
| MAOM-005429 | Quad Channel 56 GBaud Linear SiPh Driver, Die | L | 56 | 4 | 4 | 800 (max) | 3.3 | Differential/ Differential | 0.6/ch | DIE/ Flip Chip |
| MAOM-005808 | Eight Channel 56 Gbaud Linear SiPh Driver, 500 µm Channel Pitch, Die | — | 56 | 8 | 3 | 800 (max) | 3.3 | Differential/ Differential | 0.35/ch | DIE |
| MAOM-005818 | Eight Channel 56 Gbaud Linear SiPh Driver, 625 µm Channel Pitch, Die | — | 56 | 8 | 3 | 800 (max) | 3.3 | Differential/ Differential | 0.35/ch | DIE |
| MAOM-011112 | Single Channel 112 Gbaud Linear EML Driver, Die | — | 112 | 1 | 1.2 | 1000 (max) | 3 | Differential/ Single-Ended | 0.4/ch | Flip Chip |
| MALD-39076 | Quad 53 GB Equalizer + EML/ SiP Driver | R | 53 Gbaud | 4 | 3 | 250 | 3.3 | Differential/ Differential | 0.38/ch | DIE 4.12 x 2.12 |
| MALD-39077 | Quad 53 GB Equalizer + EML/ SiP Driver with Integrated AC Coupling and HF BiasT | R | 53 Gbaud | 4 | 3 | 250 | 3.3 | Differential/ Differential | 0.38/ch | LGA, 6.9 x 6.0 |
| MAOM-010404 | Quad Channel 112 GBaud Linear SiPh Driver, Die | — | 112 | 4 | 3.3 | 800 (max) | 4 | Differential/ Differential | 0.54/ch | DIE/ Flip Chip |
| MALD-38482 | Quad 26 GBaud PAM4/NRZ VCSEL Driver | N/A | 112 | 4 | — | — | 3.3 | — | 800 | DIE |

*Refer to Block Diagrams on pages 8 – 11

## Lasers and Modulator Drivers: Client Side (continued)

| Part Number | Description | Block Diagram Key* | Max Data Rate (Gbps) | Channels (#) | Max Output Voltage (V) | Min Input Voltage (mVpp) | Supply Voltage (V) | RF I/O Interface | Power Dissipation (W) | Package Type and Size (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| **MALD-39435** | Quad 53 GBaud PAM4/NRZ VCSEL Driver | **N/A** | 112 | 4 | — | — | 3.3 | — | 800 | DIE |
| **MALD-39437** | Quad 53 GBaud PAM4/NRZ VCSEL Driver | **N/A** | 112 | 4 | — | — | 3.3 | — | 800 | DIE |
| **MAOM-010408** | Quad Channel 112 GBaud Linear SiPh Driver, Die | **—** | 112 | 4 | 3.3 | 800 (max) | 3 | Differential/ Differential | 0.36/ch | DIE/ Flip Chip |

## Lasers and Modulator Drivers: Metro/Line Side

| Part Number | Description | Block Diagram Key* | Max Baud Rate (Baud) | Max Output Voltage (V) | Min Input Voltage (mVpp) | Channels (#) | Supply Voltage (V) | RF I/O Interface | Power Dissipation (W) | Package Type and Size (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| **MAOM-003408** | Quad Channel 32 GBaud Limiting Modulator Driver, Die | **—** | 32 | 2.7 | 800 (max) | 4 | 3.3 | Differential/ Differential | 0.17/ch | DIE |
| **MAOM-03417L** | Quad Channel Low Power Linear Modulator Driver | **P** | 32 | 3.3 | 700 (max) | 4 | 3.3 | Differential/ Single-ended | 0.6/ch | SMD, 9.1 x 14 x 2.29 |
| **MAOM-003409** | Quad Channel 32 GBaud Limiting Modulator Driver, Die | **—** | 32 | 3.5 | 800 (max) | 4 | 3.3 | Differential/ Differential | 0.2/ch | DIE |
| **MAOM-03409B** | 32 GBaud Linear Differential Modulator Driver IC | **P** | 32 | 4 | 300 (max) | 4 | 3.6/4.5 | Differential/ Differential | 0.75/ch | SMD, 9.1 x 14 x 2.29 |
| **MAOM-03409D** | 32 GBaud Linear Differential Modulator Driver IC | **P** | 32 | 4 | 700 (max) | 4 | 3.6/4.5 | Differential/ Single-Ended | 0.75/ch | SMD, 9.1 x 14 x 2.29 |
| **MAOM-03417B** | Quad Channel 32 GBaud Linear Modulator Driver | **P** | 32 | 4.5 | 500 (max) | 4 | 3.3/5 | Differential/ Single-ended | 1.15/ch | SMD, 9.1 x 14 x 2.85 |
| **MAOM-003417** | Quad Channel 32 GBaud Linear Modulator Driver | **P** | 32 | 4.5 | 700 (max) | 4 | 3.3/5 | Differential/ Single-Ended | 1.13/ch | SMD, 9.1 x 14 x 2.29 |
| **MAOM-003407** | Quad Channel 32 GBaud Limiting MZ Modulator Driver | **P** | 32 | 6 | 300 (max) | 4 | 6.5 | Differential/ Single-ended | 1.6/ch | SMD, 13 x 19 x 2.46 |
| **MAOM-003405** | Quad Channel 32 GBaud Limiting MZ Modulator Driver | **P** | 32 | 7 | 300/600 (max) | 4 | 6.5 | Differential/ Single-ended | 0.95/ch @ 5 Vout | SMD, 13 x 19 x 2.46 |
| **MAOM-002105** | 32 GBaud Limiting MZ Modulator Driver | **P** | 32 | 8 | 350 | 1 | 6 | Single-Ended/ Single-Ended | 1.8 | SMD, 14.4 x 7 x 2.3 |
| **MAOM-006408** | Quad Channel 64 GBaud Linear Modulator Driver, Die | **P** | 64 | 3 | 800 (max) | 4 | 3.3 | Differential/ Differential | 0.4/ch | DIE |
| **MAOM-006409** | Quad Channel 64 GBaud Linear Open Collector Modulator Driver, Die | **P** | 64 | 4 | 800 (max) | 4 | 3.3 | Differential/ Differential | 0.65/ch | DIE |
| **MAOM-006416** | Quad Channel 64 GBaud MZ Modulator Driver | **P** | 64 | 4.5 | 1100 (max) | 4 | 3.3/5 | Differential/ Single-ended | 1.1/ch | SMD, 14 x 9.1 x 2.85 |
| **MAOM-006418** | Quad Channel 64 GBaud Linear Modulator Driver | **P** | 64 | 4.5 | 1100 (max) | 4 | 3.3/5 | Differential/ Single-ended | 1.1/ch | SMD, 14 x 9.1 x 2.85 |
| **MAOM-009408** | Quad Channel 96 GBaud Linear Open Collector Modulator Driver, Die | **P** | 96 | 3 | 800 (max) | 4 | 3.3 | Differential/ Differential | 0.54/ch | DIE |
| **MAOM-009409** | Quad Channel 96 GBaud Linear Modulator Driver, Die | **P** | 96 | 4 | 800 (max) | 4 | 3.3 | Differential/ Differential | 1.0/ch | DIE |
| **MAOM-012404** | Quad Channel 128 GBaud Linear Terminated Modulator Driver, Die | **P** | 128 | 2 | 800 (max) | 4 | 3.3 | Differential/ Single-Ended | 0.75/ch | DIE |
| **MAOM-012408** | Quad Channel 128 GBaud Linear Open Collector Modulator Driver, Die | **P** | 128 | 2.8 | 800 (max) | 4 | 3.3 | Differential/ Differential | 0.6/ch | DIE/ Flip Chip |
| **MAOM-012409** | Quad Channel 128 GBaud Linear Open Collector Modulator Driver, Die | **P** | 128 | 4 | 800 (max) | 4 | 3.3 | Differential/ Differential | 0.6/ch | Flip Chip |

*Refer to Block Diagrams on pages 8 – 11


Detailed specifications can be found quickly on our website at **macom.com** by typing the part number into the search box. All specifications are subject to change.

## Transimpedance Amplifiers (TIAs)

| Part Number | Data Rate (Gbps) | Diff Gain (dB) | Input Over Load (mApp) | On Chip AGC | Current (mA) | Power Supply (V) | Package |
|---|---|---|---|---|---|---|---|
| CGY2102UH/C2 | 2.5 | 76 | 2.5 | Yes | 45 | +3.3 | DIE |
| CGY2110UH/C1/S2 | 10 | 72 | 2.0 | Yes | 70 | +5.0 | DIE |
| CGY2116UH/C1 | 10.7 | 74 | 2.5 | Yes | 83 | +5.0 | DIE |
| CGY2144UH/C2 | 43 | 49 | 3.5 | No | 100 | +5.0 | DIE |

## Transimpedance Amplifiers (TIAs): Coherent

| Part Number | Description | Block Diagram Key* | Max Baud Rate (Baud) | Differential Transimpedance Gain (kΩ) | Small Signal Bandwidth (GHz) | Input Overload Current (mA) | Input Referred Noise (IRN, RMS nA) (nA) | Output Swing Voltage (mV) | Power Dissipation (W) | Supply Voltage (V) |
|---|---|---|---|---|---|---|---|---|---|---|
| MATA-006806 | 64 GBaud Dual Channel Linear TIA for 400G and 600G Coherent Receivers | P | 64 | 2 | 45 | 3 | 16 | 700 | 0.315/ch | 3.3 |
| MATA-006406 | 64 GBaud Quad Channel Linear TIA for 400G and 600G Coherent Receivers | P | 64 | 6 | 45 | 3 | 16 | 700 | 0.33/ch | 3.3 |
| MATA-009406 | 96 GBaud Quad Channel Linear TIA for 400G, 600G, and 800G Coherent Receivers | P | 96 | 6 | 60 | 4 | 18 | 700 | 0.400/ch | 3.3 |
| MATA-012803 | 128 GBaud Dual Channel Linear TIA for 800G Coherent Receivers | P | 128 | 2.5 | 80 | 3 | 20 | 500 | 0.45/ch | 3.3 |
| MATA-012403 | 128 GBaud Quad Channel Linear TIA for 800G Coherent Receivers | P | 128 | 2.5 | 80 | 3 | 20 | 500 | 0.45/ch | 3.3 |

## Transimpedance Amplifiers (TIAs): Client Side

| Part Number | Description | Block Diagram Key* | Max Data Rate (Gbps) | Differential Transimpedance Gain (kΩ) | Small Signal Bandwidth (GHz) | Input Overload Current (mA) | Input Referred Noise (IRN, RMS nA) (nA) | Output Swing Voltage (mV) | Power Consumption (W) |
|---|---|---|---|---|---|---|---|---|---|
| M02007 | Low-Noise TIA with AGC | — | 0.2 | 62 | 0.14 | 2.8 | 8 | 300 | — |
| M02006 | 155 Mbps AGC Prep-Amp | — | 0.2 | 260 | 0.1 | 2.2 | 8 | 300 | 275 |
| M02038 | 1.3 Gbps Burst Mode CMOS TIA B 1.2 | B | 1.2 | 8.5 | 0.85 | 4 | 350 | 275 | 0.082 |
| M02016 | 1.25 Gbps AGC Pre-Amp | — | 1.3 | 24 | 14 | 130 | 140 | 0.096 | 3.3 |
| M02036 | 2.5 Gbps Burst Mode G PON OLT TIA | B | 1.3 | 3.8 | 0.8 | 2.5 | 170 | — | — |
| M02035 | Burst Mode OLT TIA | B | 2.5 | 3.6 | 1.7 | 1.5 | 250 | — | 0.15 |
| M02015 | 2.5 Gbps AGC Pre-Amp | — | 2.5 | 9 | 1.4 | 4 | 290 | 140 | 0.07 |
| M02025 | 100 Mbps to 3.125 Gbps Multi-Rate CMOS TIA with AGC | — | 3.2 | 20 | 1.45 | 4 | 120 | 50 | 0.096 |
| M02020 | 4 Gbps CMOS TIA with AGC | — | 4.3 | 3.6 | 3.4 | 4 | 550 | 140 | 0.14 |
| MATA-02135 | 6/8/10/11.3 Gbps TIA with AGC | B | 10 | 3.5 | 9 | 3 | 750 | 230 | — |
| MATA-02240 | 2.5G/10G Gbps AGC TIA for PON ONU | B | 10 | 5 | 7 | 1.6 | 7.5 | 260 | 0.145 |
| MATA-02240 | 2.5G/10G Gbps AGC TIA for PON ONU | B | 10 | 5 | 7 | 1.6 | 7.5 | 260 | 0.1 |
| MATA-02239 | 2.5G/10G Gbps Burst Mode TIA with Rate Select | B | 10 | 5 | 7 | 1.6 | 8.5 | 260 | — |
| MATA-02239 | 2.5G/10G Gbps Burst Mode TIA with Rate Select | B | 10 | 5 | 7 | 1.6 | 8.5 | 260 | 0.1 |
| M03002 | 28 Gbps TIA | C, D, G, I | 28 | 2.9 | 22 | 3.5 | CONTACT MACOM | | |
| MATA-03003 | 28 Gbps Quad Channel | C, D, G, I | 28 | 3.8 | 21 | 4 | CONTACT MACOM | | |
| MATA-03006 | 28G Single Channel TIA for APD | I | 28 | 3.8 | 21 | 4 | CONTACT MACOM | | |
| MATA-03013 | 28 Gbps Quad Channel TIA | C, D, G, I | 28 | 3.8 | 21 | 4 | 1400 | — | — |
| MATA-03106 | 28G Quad Channel TIA for APD | I | 28 | 3.8 | 21 | 4 | 1400 | CONTACT MACOM | |
| MATA-39136 | Quad Linear 53 GBaud PAM4 TIA | N/A | 112 | 5000 | 37 | — | 2 | — | 800 |
| MATA-40734 | Quad Linear 212 Gbps PAM4 TIA | N/A | 227 | 3100 | 50 | — | 2.4 | — | 1200 |

*Refer to Block Diagrams on pages 8 – 11

## Transimpedance Amplifiers (TIAs): Client Side (continued)

| Part Number | Description | Block Diagram Key* | Max Available Bandwidth (nA) | Channels (#) | Wirebond or Flip Chip (µm) | Pad Spacing | PIN or APD | Max Gain (dB/Ω) | Noise at Gain (µA RMS) | Supply Current (mA @ 2.9 V 3.3 V) |
|---|---|---|---|---|---|---|---|---|---|---|
| **MATA-03809** | 26 to 28 Gbaud Linear TIA 53 to 56 Gbps PAM4 | **E, K** | ~19 | 1 | Wirebond | N/A | PIN & APD | ~4500 | 1.5 | 71 |
| **MATA-38019** | Quad 26 to 28 GBaud Linear TIA 53 Gbps to 56 Gbps | **E, K** | ~19 | 1 | Wirebond | 750 | PIN | ~4500 | 1.59 | 265 |
| **MATA-03819** | Quad 26 to 56 GBaud Linear TIA 53 to 112 Gbps PAM4, Wirebond, PIN PD | **H, M** | ~30 | 4 | Wirebond | 750 | PIN | ~4500 | 1.5 | 265 |
| **MATA-03820** | Quad 26 to 56 GBaud Linear TIA 53 to 112 Gbps PAM4, Flip Chip, PIN PD | **H, M** | ~30 | 4 | Flip Chip | 750 | PIN | ~4500 | 1.5 | 265 |
| **MATA-03919** | Quad 26 to 56 GBaud Linear TIA 53 to 112 Gbps PAM4, Wirebond, APD | **H, M** | ~30 | 4 | Wirebond | 750 | APD | ~4500 | 1.5 | 265 |
| **MATA-03920** | Quad 26 to 56 GBaud Linear TIA 53 to 112 Gbps PAM4, Flip Chip, APD | **H, M** | ~30 | 4 | Flip Chip | 750 | APD | ~4500 | 1.5 | 265 |
| **MATA-38134** | Quad Linear 26/53 GBaud PAM4/ NRZ TIA, 500 µm | **H, M** | ~30 | 4 | Wirebond | 500 | PIN | ~4500 | 1.5 | 265 |
| **MATA-38434** | Quad Linear 26 GBaud PAM4 TIA, 250 µm | **H** | ~30 | 4 | Wirebond | 250 | PIN | ~4500 | 1.5 | 265 |
| **MATA-38834** | Octal 26 to 56 GBaud Linear TIA, 500 µm, Wirebond | **—** | ~30 | 8 | Wirebond | 520 | PIN | ~4500 | 1.5 | 265 |
| **MATA-38836** | Octal 26 to 56 GBaud Linear TIA, 500 µm, Flip Chip | **—** | ~30 | 8 | Flip Chip | 520 | PIN | ~4500 | 1.5 | 265 |
| **MATA-05819** | Linear 53 GBaud PAM4 TIA | **E, K** | ~35 | 1 | Wirebond | N/A | PIN & APD | ~4500 | 1.5 | 71 |
| **MATA-03821** | Bandwidth/Gain Optimized | **H, M** | ~40 | 4 | Wirebond | 750 | PIN | ~5400 | 1.59 | 274 |
| **MATA-03822** | Bandwidth/Gain Optimized | **H, M** | ~40 | 4 | Flip Chip | 750 | PIN | ~5400 | 1.59 | 274 |
| **MATA-05817** | Bandwidth/Gain Optimized | **K** | ~45 | 1 | Wirebond | N/A | PIN & APD | ~5400 | 1.59 | 73 |
| **MATA-05827** | Bandwidth/Gain Optimized | **K** | ~45 | 1 | Flip Chip | N/A | PIN & APD | ~5400 | 1.59 | 73 |

| Part Number | Number of Channels | Wirebond/Flip Chip | Max Bandwidth (GHz) | Pin Polarity | Pad Spacing (µm) | PIN or APD | Max Gain (Ω) | Noise µA (RMS) |
|---|---|---|---|---|---|---|---|---|
| **MATA-39434** | 4 x 56 GB | Wirebond | ~30 | Standard | 250 | PIN | ~4,000 | ~1.84 |
| **MATA-40736** | 4 x 113 GB | Flip-Chip | 45 | Standard | 750 | PIN | ~3,500 | <2.25 |
| **MATA-39534** | 4 x 56 GB | Wirebond | ~35 | Reversed | 250 | PIN | ~4,800 | ~2.00 |
| **MATA-39134** | 4 x 56 GB | Wirebond | ~37 | Standard | 500 | PIN | ~4,800 | ~2.00 |
| MATA-39138 | 4 x 56 GB | Wirebond | ~37 | Reversed | 500 | PIN | ~4,800 | ~2.00 |

## Clock & Data Recovery

| Part Number | Description | Block Diagram Key* | Max Data Rate (Gbps) | Supply Voltage (V) | Power Consumption (W) | Channels (#) | Package Type and Size |
|---|---|---|---|---|---|---|---|
| **M21012** | 42 Mbps to 3.2 Gbps Quad Multi-Rate CDR | **—** | 3.2 | 1.8 – 3.3 | 0.47 | 4 x 4 | QFN, 10 mm 72-pin |
| **MAOM-38053** | 28 Gbps Quad Channel Transimpedance Amplifier (TIA) | **—** | 28 | 3.3 | — | 4 | DIE |
| **MASC-37028** | Multi-Rate, Dual 28 Gbps CDR with Integrated Laser Driver | **—** | 26.5 | 1.8, 3.3 | — | 2 | LGA, 5 mm |
| **MATA-37244** | Four Channel 25G/28G CDR with Integrated TIA/Limiting Amplifier | **—** | 28 | 1.8, 3.3 | — | 4 | DIE, 2 x 3 mm |
| **MATA-37644** | Multi-Rate 28G CDR with TIA/LA Integrated | **—** | 28 | 1.8 | 0.26 | 1 | DIE, 2.3 x 1.4 mm |
| **M37046** | Quad 24G/26G TIA/LA with Integrated CDR | **D, I** | 28 | 1.8 | 0.4 | 4 | CSP, 4 x 4.5 mm |
| **MASC-37048** | Four Channel 25G/28G CDR | **—** | 28 | 1.8 | 0.4 | 4 | CSP, 4 x 4.5 mm |
| **MALD-37645** | Multi-Rate 28G VCSEL Driver/CDR with Input Equalizer | **F, G** | 28 | 1.8 | 0.26 | 1 | DIE, 2.3 x 1.4 mm |
| **M37049** | Four Channel 25G/28G CDR with Integrated Input Equalizer | **F** | 28 | 1.8 | 0.4 | 4 | CSP, 4 x 4.5 mm |
| **MALD-38435** | Quad 53G VCSEL Driver with Input Equalizer | **D, F, I** | 28 | 1.8, 3.3 | 0.5 | 4 | DIE, 2 x 3 mm |
| **MATA-37144** | Four Channel 25G/28G CDR with Integrated VCSEL Driver | **D, F, I** | 28 | — | 0.7 | 4 | DIE, 2 x 3 mm |

*Refer to Block Diagrams on pages 8 – 11


Detailed specifications can be found quickly on our website at **macom.com** by typing the part number into the search box. All specifications are subject to change.

## Clock & Data Recovery (continued)

| Part Number | Description | Block Diagram Key* | Max Data Rate (Gbps) | Supply Voltage (V) | Power Consumption (W) | Channels (#) | Package Type and Size |
|---|---|---|---|---|---|---|---|
| MALD-37045 | Four Channel 25G/28G CDR with Integrated VCSEL Driver | D, F, I | 28 | 1.8, 3.3 | 0.7 | 4 | DIE, 3 x 2 mm |
| MALD-37545 | Four Channel 25G/28G CDR with Integrated VCSEL Driver for SAS 4.0 for Max Data Rate 22.5 | — | 28 | 1.8, 3.3 | 0.7 | 4 | DIE, 3 x 2 mm |
| MALD-37445 | Quad 25G/26G CDR/VCSEL Driver with Input Equalizer | F, G | 28 | 1.8, 3.3 | 0.7 | 4 | DIE, 3 x 2 mm |
| MAOM-037057 | Quad 25G/28G CDR with Integrated Equalization and Amplifier, EML Driver | I | 28 | 1.8 | 1.1 | 4 | SMT, 5.6 x 9.6 mm |
| MAOM-37051A | Quad 25G/28G CDR with Integrated Equalization and EML Driver | F, G | 28 | 1.8 | 1.1 | 4 | SMT, 7 x 11 mm |
| MALD-38045 | Quad 28 GBaud PAM4/NRZ VCSEL Driver with Integrated CDR | F | 28 | 1.8, 3.3 | 1.1 | 4 | DIE, 4 x 2 mm |
| M37047 | Four Channel 25G/28G CDR with Integrated EML Driver | F | 28 | 1.8, 3.3 | 1.2 | 4 | CSP, 4 x 4.5 mm |
| MALD-37059 | Four Channel 25G/28G CDR with Integrated DML Driver | D, F, I | 28 | 1.8, 3.3 | 1.8 | 4 | BGA, 5.5 x 6.5 mm |
| MASC-37029 | Multi-Rate, Dual 28 Gbps CDR with Integrated Laser Driver | — | 28.1 | 1.8, 3.3 | — | 2 | LGA, 5 mm |
| MALD-37845 | Four Channel Transmit and Four Channel Receive 25G/28G CDR with Integrated VCSEL Drivers and TIAs | — | 28.1 | 1.8, 3.3 | 1.5 | 4 Tx & 4 Rx | DIE, 3.4 x 4 mm |
| MASC-38040 | Quad 4 x 28 GBaud PAM4 (56 Gbit) Receiver CDR | — | 56 | 1.8 | 0.4 | 4 | QFN, 5.2 mm |
| MATA-37044 | Four Channel 25G/ 28G CDR with integrated TIA | — | 28 | 1.8, 3.3 | — | 4 | DIE, 3 x 2 mm |
| MATA-37044 | Four Channel 25G/28G CDR with Integrated TIA | — | 28 | 1.8, 3.3 | — | 4 | DIE 3 x 2 mm |
| MATA-37244 | Four Channel 25G/28G CDR with Integrated TIA/Limiting Amplifier | — | 28 | 1.8, 3.3 | — | 4 | DIE 2 x 3 mm |
| MATA-37442 | Quad 24G/26G TIA/LA with Integrated CDR | — | 26 | 1.8, 3.3 | — | 4 | DIE 3 x 2 mm |
| MATA-37444 | Quad 24G/26G TIA/LA with Integrated CDR | — | 26 | 1.8, 3.3 | — | 4 | DIE 3 x 2 mm |
| MATA-37644 | Multi-Rate 28G CDR with TIA/LA Integrated | — | 28 | 1.8 | 0.26 | 1 | DIE 2.3 x 1.4 mm |
| MATA-38044 | Quad 28 GBaud Linear TIA with Integrated CDR | — | 28 | 1.8, 3.3 | 1.5 | 4 | DIE 4 x 2 mm |

## Post Amplifiers

| Part Number | Description | Block Diagram Key* | Max Data Rate (Gbps) | Supply Voltage (V) | Power Consumption (W) | Channels (#) | Input Sensitivity (mVpp)(mV) | Output Swing Voltage (V) | Package Type and Size |
|---|---|---|---|---|---|---|---|---|---|
| M02142 | 11.3 Gbps Limiting Amp | A | 11.3 | 3.3 | 0.191 | 1 | 3 | 680 | QFN, 3 mm |

## LED/Laser Drivers for Display

| Part Number | Description | Max Current (A) | Current Per Channel (A) | Channels (#) | Programmable Internal PWM Generator (Y/N) | Input Integrated PMIC (Y/N) | Automatic Power Control (Y/N) | Electronic Laser Despeckle (Y/N) |
|---|---|---|---|---|---|---|---|---|
| M08980 | LED Driver and PMIC and Stepper Motor Driver for TI DLP® Displays | 1.2 | 1.2 | 3 | No | Yes | No | No |
| M09000 | LED Driver and PMIC for TI DLP® Displays in QFN Package | 1.2 | 1.2 | 3 | No | Yes | No | No |
| M09001 | LED Driver and PMIC for TI DLP® Displays | 1.2 | 1.2 | 3 | No | Yes | No | No |
| M08889 | High-Performance 2A RGB LED/Laser Driver with Integrated Buck-Boost Converter for LCD/LCoS/TI DLP® Projection Displays | 2 | 2 | 3 | Yes | Yes | Yes | No |
| M08886 | High-Performance RGB LED/Laser Driver with Despeckle Technology for LCD/LCoS/TI DLP® Projection Displays | 4 | 2 | 3 | Yes | No | Yes | Yes |
| M08888 | High-Performance 2A RGB LED/Laser Driver for LCD/LCoS/TI DLP® Projection Displays | 6 | 2 | 3 | Yes | No | Yes | No |
| M08890 | Three Channel 2A LED/Laser Driver for Panel Based Projectors | 6 | 2 | 3 | Yes | No | No | No |
| M08898 | Four Channel 2A LED/Laser Driver for Panel Based Projectors | 8 | 2 | 4 | Yes | No | No | No |

*Refer to Block Diagrams on pages 8 – 11

## 25G Fabry-Perot Lasers

| Part Number | Description and Applications | Block Diagram Key* | Max Data Rate (Gbps) | Wavelength (nm) | Temp Options (°C) | Package Type and Size (µm) |
|---|---|---|---|---|---|---|
| **MAOD-131F25IL1T0** | 1310 nm FP Laser, Die on Tape, 25 Gbps **Applications:** 5G Fronthaul LR-Lite | **C** | 25 | 1310 | -40 to 95 | DIE, 250 x 250 x 100 |

## 2.5G Distributed Feedback Lasers

| Part Number | Description and Applications | Block Diagram Key* | Max Data Rate (Gbps) | Wavelength (nm) | Temp Options (°C) | Package Type and Size (µm) |
|---|---|---|---|---|---|---|
| **131D-02E-VCT11-50x** | Laser, 2.5G DFB NFF, Small Size, Chip on Tape, Die **Applications:** PON, Access, Optical Ethernet, SDH | **—** | 2.5 | 1310 | -20 to 85 | DIE, 265 x 250 x 100 |

## 10G/16G Distributed Feedback Lasers

| Part Number | Description and Applications | Block Diagram Key* | Max Data Rate (Gbps) | Wavelength (nm) | Temp Options (°C) | Package Type and Size (µm) |
|---|---|---|---|---|---|---|
| **MAOD-127D10I-LCT5** | 10G DFB Edge Emitting Laser for XGS-PON, 1270 nm **Applications:** XGS-PON | **B** | 10 | 1270 | -40 to 95 | DIE, 200 x 250 x 100 |
| **MAOD-1xxD10I-LCT2** | 10G DFB Edge-Emitting Lasers for 4G BiDi, 1310 nm **Applications:** Wireless 4G | **Q** | 10 | 1271, 1291, 1311, 1331 | -40 to 95 | DIE, 200 x 250 x 100 |
| **MAOD-1xxD10G-LCT2** | 10G DFB Edge-Emitting Lasers for 40GBASE-CWDM4 **Applications:** Data Center, 40G | **Q** | 10 | 1271, 1291, 1311, 1331 | 0 to 85 | DIE, 200 x 250 x 100 |
| **MAOD-1xxD16I-LCT2** | 16G DFB Edge-Emitting Lasers for 4G BiDi, 1310 nm **Applications:** Wireless 4G | **Q** | 16 | 1271, 1311, 1331 | -40 to 95 | DIE, 200 x 250 x 100 |

## 25G/50G Distributed Feedback Lasers

| Part Number | Description and Applications | Block Diagram Key* | Max Data Rate (Gbps) | Wavelength (nm) | Temp Options (°C) | Package Type and Size (µm) |
|---|---|---|---|---|---|---|
| **MAOD-1xxD50X-LCT8** | 50G DFB Edge-Emitting Lasers for 5G BiDi, CWDM6 **Applications:** Wireless 5G FH CWDM6 | **E** | 10 | 1271, 1291, 1311, 1331, 1351, 1371 | -40 to 95 | DIE, 200 x 250 x 100 |
| **MAOD-1xxD25G-LCT2** | Laser, 25G DFB, 1271, 1291, 1311, 1331, 1351, 1371, Die **Applications:** 5G Fronthaul CWDM6, 100G CWDM4 | **—** | 25 | 1271, 1291, 1311, 1331, 1351, 1371 | -5 to 85 | DIE, 200 x 250 x 100 |
| **MAOD-xxxD25B-LCT0** | Laser, 25G DFB, Die **Applications:** 5G Fronthaul MWDM12 | **—** | 25 | 1267.5, 1274.5, 1287.5, 1294.5, 1307.5, 1314.5, 1327.5, 1334.5, 1347.5, 1354.5, 1367.5, 1374.5 | 50 | DIE, 200 x 250 x 100 |
| **MAOD-xxxD25B-LCT1** | Laser, 25G DFB, Die **Applications:** 5G Fronthaul LWDM12 | **—** | 25 | 1290 — 1320 | 50 | DIE, 200 x 250 x 100 |
| **MAOD-xxxD25B-LCT7** | Laser, 25G DFB, 1295, 1300, 1305, 1309, Chip on Tape, Die **Applications:** Data Center, 100GBase-LR4 | **C, I** | 25 | 1295, 1300, 1305, 1309 | 50 | DIE, 200 x 250 x 100 |

## Photodiodes: APD

| Part Number | Description and Applications | Block Diagram Key* | Model | Bandwidth (GHz) | Wavelength (nm) | Responsivity (A/W) | Sensitivity (dBm) | Capacitance (fF) | Package Type |
|---|---|---|---|---|---|---|---|---|---|
| **32445-01** | 10G APD, Backside Illuminated, Integrated Lens Option Standard and Enhanced Sensitivity, Die and Chip on Carrier Options **Applications:** 10G PON OLT/ONU | **B** | APD10B/CoC | 12 | 1250 – 1650 | 0.8 | -31 | 95 | CoC |
| **32447-02** | | | APD10B-ES/Lens | 11 | 1250 – 1650 | 13 | -32.5 | 90 | DIE |
| **32445-02** | | | APD10B-ES/CoC | 11 | 1250 – 1650 | 13 | -32.5 | 90 | CoC |
| **32448-02** | | | APD10B-ES/Lens/CoC | 11 | 1250 – 1650 | 13 | -32.5 | 90 | CoC |
| **MARP-FSAPD10A** | 10G APD, Frontside Illuminated **Applications:** 10G PON OLT/ONU | **B** | FSAPD10A | 10 | 1250 – 1650 | 0.8 | -30 | 190 | DIE |
| **MARP-FSAPD10B** | | | FSAPD10B | 10 | 1250 – 1650 | 13 | -32 | 170 | DIE |
| **MARP-BA56-011LD** | 56G APD, Backside Illuminated, Integrated Lens, and Carrier Options **Applications:** 50G-PON, 100G/200G/400G Data Center | **K** | BA56 | 30 | 1250-1650 | 4.2 | -16 | 30 | DIE |
| **MARP-BA56-011LC1** | | | BA56/LC1 | 30 | 1250-1650 | 4.2 | -16 | 30 | CoC |
| **MARP-BA56-011LC2** | | | BA56/LC2 | 30 | 1250-1650 | 4.2 | -16 | 30 | CoC |

*Refer to Block Diagrams on pages 8 – 11


Detailed specifications can be found quickly on our website at **macom.com** by typing the part number into the search box. All specifications are subject to change.

## Photodiodes: APD

| Part Number | Description and Applications | Block Diagram Key* | Model | Bandwidth (GHz) | Wavelength (nm) | Responsivity (A/W) | Sensitivity (dBm) | Capacitance (fF) | Package Type |
|---|---|---|---|---|---|---|---|---|---|
| **32391-03** | 25G APD, Backside Illuminated, Integrated Lens Option Die and Carrier Options **Applications:** 5G Fronthaul/ Midhaul/Backhaul, 25G PONOLT/ONU, 200G/400G/800G Data Center | **C, E, I** | APD28A | 20 | 1250 – 1650 | 0.8 | -22 | 50 | DIE |
| **32411-03** | | | APD28A/CoC | 20 | 1250 – 1650 | 0.8 | -22 | 50 | CoC |
| **32411-04** | | | APD28A/CoC2 | 20 | 1250 – 1650 | 0.8 | -22 | 50 | CoC |
| **32392-03** | | | APD28A/Lens | 20 | 1250 – 1650 | 0.8 | -22 | 50 | DIE |
| **32412-03** | | | APD28A/Lens/CoC | 20 | 1250 – 1650 | 0.8 | -22 | 50 | CoC |
| **32412-04** | | | APD28A/Lens/CoC2 | 20 | 1250 – 1650 | 0.8 | -22 | 50 | CoC |
| **32411-07** | | | APD28A/QCoC | 20 | 1250 – 1650 | 0.8 | -22 | 50 | CoC |
| **32411-08** | | | APD28A/QCoC2 | 20 | 1250 – 1650 | 0.8 | -22 | 50 | CoC |
| **32411-05** | | | APD28A/Lens/QCoC | 20 | 1250 – 1650 | 0.8 | -22 | 50 | CoC |
| **32411-06** | | | APD28A/Lens/QCoc2 | 20 | 1250 – 1650 | 0.8 | -22 | 50 | CoC |
| **32444-01** | | **B** | APD10B | 12 | 1250 – 1650 | 0.8 | -31 | 95 | Die |
| **32444-02** | | **B** | APD10B/Lens | 12 | 1250 – 1650 | 0.8 | -31 | 95 | Die |
| **32447-01** | | **B** | APD10B/ES/Lens | 11 | 1250 – 1650 | 13 | -32.5 | 90 | Die |
| **32448-01** | | **B** | APD10B/CoC | 12 | 1250 – 1650 | 0.8 | -31 | 95 | CoC |

## Photodiodes: PIN

| Part Number | Description and Applications | Block Diagram Key* | Model | Bandwidth (GHz) | Wavelength (nm) | Responsivity (A/W) | Sensitivity (dBm) | Capacitance (fF) | Package Type |
|---|---|---|---|---|---|---|---|---|---|
| **32437-01** | 56G PIN, Backside Illuminated, Die and Carrier Options **Applications:** 100G PAM4, 200G/400G/800G Data Center | **E, K, M** | BSP56B/16/Lens | 35 | 1200 – 1650 | 0.85 | — | 50 | DIE |
| **32439-01** | | | BSP56B/16/Lens/CoC | 35 | 1200 – 1650 | 0.85 | — | 50 | CoC |
| **32439-06** | | | BSP56B/16/Lens/CoC2 | 35 | 1200 – 1650 | 0.85 | — | 50 | CoC |
| **MARP-FP28-011D-P** | 28G Frontside Illuminated PIN **Applications:** 5G Fronthaul, 100/200G Data Center, PAM4 | **D, E, I, J, K, M** | FP28 | 25 | 1200 – 1650 | 0.85 | — | — | DIE |
| **MARP-FP28-024D-P** | | | FP28 1x4x250 | 25 | 1200 – 1650 | 0.85 | — | — | DIE |
| **MARP-FP56-011D-P** | 28G Frontside Illuminated PIN **Applications:** 100/400G Data Center, PAM4 | **E, K, M** | FP56 | 35 | 1200 – 1650 | 0.6 | — | — | DIE |
| **MARP-FP56-014D-P** | | | FP56 1 x4 x 500 | 35 | 1200 – 1650 | 0.6 | — | — | DIE |
| **MARP-FP56-024D-P** | | | FP56 1 x 4 x 750 | 35 | 1200 – 1650 | 0.6 | — | — | DIE |
| **MARP-FP56-018D-P** | | | FP56 1 x 8 x 250 | 35 | 1200 – 1650 | 0.6 | — | — | DIE |
| **MARP-FMP100-011D-P** | 100 Gbps Frontside Illuminated PIN Photodiode, usable at 850 nm **Applications:** Multimode Datacom, 400G SR4, PAM4 | **H** | FMP100 | 30 | 840 – 950 | 0.65 | — | — | DIE |
| **MARP-FMP100-012D-P** | | | FMP100 1 x 2 x 250 | 30 | 840 – 950 | 0.65 | — | — | DIE |
| **MARP-FMP100-014D-P** | | — | FMP100 1 x 24 x 250 | 30 | 840 – 950 | 0.65 | — | — | DIE |
| **MARP-BP112-011D-P** | 112 Gbaud/200 Gbps Backside Illuminated PIN **Appllications:** PAM4, 200G, 800G and 1.2T Ethernet | — | BP112 | 55 | 1200 – 1650 | 0.65 | — | — | DIE |
| **MARP-BP112-012D-P** | | — | BP112 Type 2 | 55 | 1200 – 1650 | 0.65 | — | — | DIE |

*Refer to Block Diagrams on pages 8 – 11

## OTN: Framer/Mapper/FEC

| Part Number | Description | Block Diagram Key* | Max Data Rate (Gbps) | Switch Matrix Size I/O Matrix | Supply Voltage (V) | Channels (#) | Embedded CDR (Y/N) | Embedded SerDes (Y/N) | Package Type and Size |
|---|---|---|---|---|---|---|---|---|---|
| S10123 | 10G OTN Framer/Mapper/FEC | — | 11.3 | 1 x 1 | 2.5, 1.8, 1.2 | 1 | Yes | Yes | FCBGA, 19 mm 324-pin |
| S10124 | 10G OTN Framer/Mapper/FEC | — | 11.3 | 1 x 2 | 2.5, 1.8, 1.2 | 1 | Yes | Yes | FCBGA, 25 mm 576-pin |
| S10126 | 10G OTN Framer/Mapper/FEC | — | 11.3 | 1 x 1 | 2.5, 1.8, 1.2 | 1 | Yes | Yes | FCBGA, 19 mm 324-pin |
| S20101 | PQ20T: 2 x 10G OTN Framer/Mapper/FEC | — | 11.3 | 2 x 2 | 2.5, 1.2, 0.9 | 4 | Yes | Yes | FCBGA, 35 mm 1155-pin |
| S40101 | PQ40T: 4 x 10G/40G OTN Framer/ Mapper/FEC | — | 11.3 | 4 x 4 | 2.5, 1.2, 0.9 | 4 | Yes | Yes | FCBGA, 35 mm 1155-pin |
| S50101 | PQ50T: 6 x 10G/40G OTN Framer/ Mapper/FEC | — | 11.3 | 6 x 6 | 2.5, 1.2, 0.9 | 6 | Yes | Yes | FCBGA, 35 mm 1155-pin |
| S60101 | PQ60E: 6 x 10G/40G OTN Framer/ Mapper/FEC | — | 11.3 | 6 x 6 | 2.5, 1.2, 0.9 | 6 | Yes | Yes | FCBGA, 35 mm 1155-pin |
| S12312 | 24 x 10G/40G/100G OTN & MACsec | O | 11.2 | 24 x 24 | 1.8, 1.5, 1.2, 0.9 | 24 | Yes | Yes | FCBGA, 42.5 mm 1680-pin |
| S12412 | 24 x 10G/40G/100G OTN & MACsec | O | 28 | 24 x 24 | 1.8, 1.5, 1.2, 0.9 | 24 | Yes | Yes | FCBGA, 42.5 mm 1680-pin |
| S12311 | 12 x 10G/40G/100G OTN & MACsec | O | 11.2 | 12 x 12 | 1.8, 1.5, 1.2, 0.9 | 12 | Yes | Yes | FCBGA, 29 mm 783-pin |
| S12411 | 12 x 10G/40G/100G OTN & MACsec | O | 28 | 12 x 12 | 1.8, 1.5, 1.2, 0.9 | 12 | Yes | Yes | FCBGA, 29 mm 783-pin |

## Ethernet MACsec PHY

| Part Number | Description | Block Diagram Key* | Max Data Rate (Gbps) | Switch Matrix Size I/O Matrix | Supply Voltage (V) | Channels (#) | Embedded CDR (Y/N) | Embedded SerDes (Y/N) | Package Type and Size |
|---|---|---|---|---|---|---|---|---|---|
| S12611 | 12 x 10G/40G/100G MACsec | N, O | 27.96 | 12 x 12 | 1.8, 1.5, 1.2, 0.9 | 12 | Yes | Yes | FCBGA, 29 mm 783-pin |
| S12612 | 12 x 10G/40G/100G OTN & MACSsec | | 27.96 | 24 x 24 | 1.8, 1.5, 1.2, 0.9 | 24 | Yes | Yes | FCBGA, 42.5 mm 1680-pin |
| S20020 | Dual 100G/50G/40G/50G/25G/10G MACsec PHY | | 26.56 | 8 x 8 | 1.8, 0.9 | 8 | Yes | Yes | HFCBGA, 17 mm 256-pin |

## Ethernet PHY

| Part Number | Description | Block Diagram Key* | Max Data Rate (Gbps) | Switch Matrix Size I/O Matrix | Supply Voltage (V) | Channels (#) | Embedded CDR (Y/N) | Embedded SerDes (Y/N) | Package Type and Size |
|---|---|---|---|---|---|---|---|---|---|
| QT2025 | 10GE Serial to XAUI PHY for 10GBASE-LRM, LR, SR, 10GBASE-KR (SFP+ and Serial Backplane) | — | 10.52 | 1 x 1 | 1.8, 1.2 | 1 | Yes | Yes | PBGA, 13 mm 144-pin |
| QT2225 | Dual 10GE Serial to XAUI PHY for 10GBASE-LRM, LR, SR, 10GBASE-KR (SFP+ and Serial Backplane) | — | 10.52 | 2 x 2 | 1.8, 1.2 | 2 | Yes | Yes | BGA, 23 mm 484-pin |
| S28115 | 100 Gbps Multi-Link Gearbox (MLG) Supporting 10 x 10 GE | Q | 28.0 | 10 x 10 | 2.5, 1.2, 0.9 | 10 | Yes | Yes | HFCBGA, 19 mm 324-pin |
| MATP-05025 | PRISM-50: 2 x 25G NRZ to 1 x 26 GBaud PAM4 PHY with Integrated Laser Driver | E | 53.125 | 1 x 1 | 1.8, 1.0, 0.75 | 1 | Yes | Yes | HFCBGA, 10 mm 177-pin |
| MATP-05026 | PRISM-50: 2 x 24/26G NRZ to 1 x 26 GBaud PAM4 PHY with Integrated Laser Driver | E | 53.125 | 1 x 1 | 1.8, 1.0, 0.75 | 1 | Yes | Yes | 9 mm x 6.4 mm 99-pin |
| MATP-10025 | PRISM: 4 x 25G NRZ to 1 x 53 GBaud PAM4 PHY with FEC and Integrated Laser Driver | K | 106.25 | 1 x 1 | 1.8, 1.0, 0.75 | 1 | Yes | Yes | HFCBGA, 10 mm 177-pin |

## Embedded Processors

| Part Number | Description | Clock Frequency (GHz) | DDR3 + ECC | 10/100/100 Ethernet | Typical Power (W) | USB 2.0 with PHY | Package Type and Size (mm) |
|---|---|---|---|---|---|---|---|
| APM86391 | Single Core Power™ Processor | 600 MHz – 1 | 32b | 2 GbE: 2 RGMII | Single Core 4.09 W @ 1 GHz | 3 | FC-PBGA, 27 x 27 |
| APM86392 | Dual Core Power™ Processor | 600 MHz – 1 | 32b | 2 GbE: 2 RGMII | Dual Core 5 W @ 1 GHz | 3 | FC-PBGA, 27 x 27 |
| APM86491 | Single Core Power™ Processor | 800 MHz – 1 | 16b/32b | 2 GbE: 2 RGMII | 3.65 W @ 1 GHz | 2 (USB 3.0) | WB-PBGA, 19 x 19 |
| APM86290 | Dual Core Power™ Processor | 800 MHz – 1.2 | 64b/32b | 2 GbE: 2 RGMII | Dual Core 7.06 W @ 1 GHz | 3 | FC-PBGA, 27 x 27 |

*Refer to Block Diagrams on pages 8 – 11


Detailed specifications can be found quickly on our website at **macom.com** by typing the part number into the search box. All specifications are subject to change.

## High Speed Optical Receiver Modules

| Part Number | Description | Type | Bandwidth (GHz) | Wavelength (nm) | Sensitivity (dBm) | Responsivity (A/W) | Gain (V/W) |
|---|---|---|---|---|---|---|---|
| **11153-02** | AT-10SFA/17LP/AC/MM/FC | APD Photoreceiver | 8.9 | 1250 – 1650 | -26 | 0.7 | 1870 |
| **MARP-AT12C-01** | AT-12C/5MMLC/8FPC | APD Photoreceiver | 9.5 | 1250 – 1650 | -28.5 | 0.8 | 28000 |
| **11233-01** | AT-10SFH/17LP/AC/MM/FC | APD Photoreceiver | 10.5 | 1250 – 1650 | -28.5 | 0.7 | 12000 |
| **11132-03** | PT-15SFA/17LP/AC/LC | IR Photoreceiver | 12.2 | 1200 – 1650 | -16.5 | 0.75 | 650 |
| **11012-05P** | DG-15ir-FC | IR Instrument | 20 | 950 – 1650 | — | 0.6 | — |
| **11069-02** | P-18A/3K/Z50/FC | IR Photodetector | 20 | 1200 – 1650 | — | 0.9 | — |
| **MARP-PT28G-01** | PT-28G/10DGPPO/AC/FC | XR Photoreceiver | 25 – 35 | 850 – 1575 | — | 0.55 | 75 – 2400 |
| **MARP-PT28E-02** | PT-28E/V2/12XLMD/AC/FC | IR Photoreceiver | 25 – 35 | 1200 – 1650 | — | 0.73 | 110 – 3000 |
| **11204-01** | DGM-32xr-FC | XR Photodetector | 28 | 800 – 1600 | — | 0.77 | — |
| **11204-05** | DGM-32xr-DMD | XR Photodetector | 28 | 800 – 1600 | — | 0.77 | — |
| **11204-06** | DGM-32xr-SC | XR Photodetector | 28 | 800 – 1600 | — | 0.77 | — |
| **11206-01** | DG-32xr-FC | XR Instrument | 28 | 800 – 1600 | — | 0.77 | — |
| **11112-04** | P-40HPA/8V/Z50/AC/SC | IR Photodetector | 40 | 1200 – 1650 | — | 0.65 | — |
| **11113-04** | P-40HPA/8V/Z50/DC/SC | IR Photodetector | 40 | 1200 – 1650 | — | 0.65 | — |
| **11113-05** | P-40HPA/8V/Z50/DC/FC | IR Photodetector | 40 | 1200 – 1650 | — | 0.65 | — |
| **11174-04** | PT-40G/8LDGPPO/AC/LC/B1 | IR Photoreceiver | 40 | 1200 – 1650 | -10.5 | 0.65 | 1300 |
| **11057-02** | D-8ir-FC | IR Instrument | 50 | 950 – 1650 | — | 0.7 | — |
| **11088-05** | P-50A/8V/Z50/DC/FC | IR Photodetector | 50 | 1200 – 1650 | — | 0.5 | — |
| **11238-01** | P-50C/8V/Z50/DC/FC | IR Photodetector | 50 | 1200 – 1650 | — | 0.75 | — |
| **11243-01** | PT-50A/8V/DC/FC | IR Photoreceiver | 50 | 1200 – 1650 | — | 0.56 | 100 |
| **11241-01P** | P-70A/8V/Z50/FC | IR Photodetector | 70 | 1200 – 1650 | — | 0.5 | — |
| **MPR0020** | Microwave Photonics Receiver | Receiver | 26 | 1300-1600 | — | 0.9 | — |
| **APRR530** | Microwave Photonics Receiver | Receiver | 32 | 1300-1600 | — | — | 40 |
| **MARP-PT28E-03** | PT-28E/V2/12XLMD/PK/AC/FC | IR Photoreceiver | 25-35 | 1200-1650 | — | 0.73 | 110-3000 |
| **MARP-PT28E-06** | PT-28E/V2/8XLMD/PK/AC/FC | IR Photoreceiver | 25-35 | 1200-1650 | — | 0.73 | 110-3000 |
| **MARP-PT28E-06CB** | Control Ass'y, PT-28E/ V2/8XLMD/PK/AC/FC | IR Photoreceiver | 25-35 | 1200-1650 | — | 0.73 | 110-3000 |
| **MARP-AT12C-03** | AT-12C/5MMFP | APD Photoreceiver | 9.5 | 1250-1650 | -28.5 | 0.8 | 28000 |
| **MARP-PT12G-01** | PT-12G/8SMA/FC | XR Photoreceiver | 14 | 750-1650 | NA | 0.55 | 215 |
| **MARP-PT12G-02** | PT-12G/PK/8SMA/FC | XR Photoreceiver | 14 | 750-1650 | NA | 0.55 | 215 |
| **11174-05** | PT-40G/8XLMD/AC/LC | IR Photoreceiver | 40 | 1200-1650 | -10.5 | 0.65 | 1300 |
| **11174-06** | PT-40G/8XLMD/AC/FC/B1 | IR Photoreceiver | 40 | 1200-1650 | -10.5 | 0.65 | 1300 |
| **11174-07** | PT-40G/8XLMD/AC/FC | IR Photoreceiver | 40 | 1200-1650 | -10.5 | 0.65 | 1300 |
| **11212-01P** | D-32xr-FC Instrument Photodetector | XR Instrument | 28 | 800-1600 | NA | 0.48 | NA |
| **11215-01P** | AT-2.5SFB/17LP/AC/MM/FC | APD Photoreceiver | 1.7 | 1250-1650 | -33 | 0.7 | 14000 |

# OPTOELECTRONIC SOLUTIONS

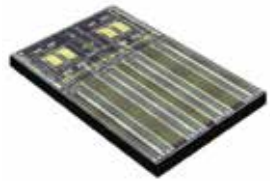
## Photonics

Die

Detectors Lasers

TO-CAN TO56, TO46

L-PIC Silicon Photonic Die



OTN Framer/Mapper/FEC

Ethernet MACsec PHY

Ethernet PHY

## Optoelectronics

4 x 4.5 mm CSP
3 mm QFN
4 mm QFN
5 mm QFN
10 mm 72-pin QFN

Surface Mount Devices (SMD)

Modules

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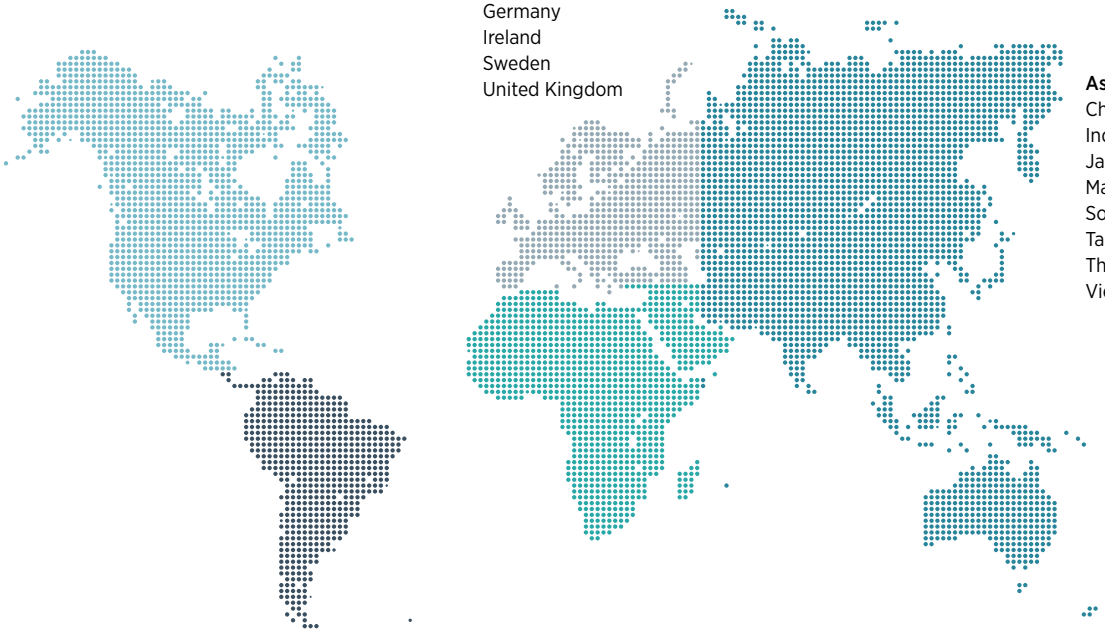

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