# Amphenol Active Optics Products

**Customer Presentation** 

## **CUSTOMER PRESENTATION**

**AAOP Introduction** 

## **AMPHENOLAOP OVERVIEW**

### About us

- Founded in 2003 (MergeOptics GmbH)
- Located in Berlin
- Legal entity "FCI Deutschland GmbH"
- ISO 9001 & 14001 certified

### **Product offering**

- On-Board Transceiver up to 56Gpbs
- Optical Engines for Active Optical Cables up to 28Gbps

### Market served

- Commercial datacom (data center, 5G, AI, supercomputer...)
- Industrial (machine vision systems...)
- Military & Aerospace

### Capabilities

- Product Development
- Process Development
- NPI and Manufacturing

### Our team

- 15 years of proven track record in designing and manufacturing optoelectronic products
- Core competencies in RF, optical packaging, optical engine integration, assembly process
- Product, process development and manufacturing hosted at the same location



## **PORTFOLIO HISTORY**



## **PORTFOLIO HISTORY**



## **AMPHENOLAOP CAPABILITIES**





#### **ELECTRONIC DESIGN**

Transceiver & Active Optical Cables PCB design and component integration Connector design for optimal SI

#### **MECHANICAL DESIGN**

Die-casted and machined parts designs Tolerance analysis Simulations (thermal, mechanical stress)

#### **DIE / WIRE BONDING**

High volume / high accuracy die-bonding High-capacity gold wire bonding equipment Development of tooling & processes





PROCES

NUFA

#### **BURN-IN**

VCSEL burn-in process development High-capacity burn-in equipment Pre- and post burn-in VCSEL characterization

#### **OPTICAL DESIGN**

Lens design for parallel optical beams Mechanical designs of plastic molded parts

### **FIRMWARE & TEST**

Firmware design programming Standard compliant or customized FW E/O performance testing capability Characterization over temperatures and voltages

#### **ACTIVE OPTICAL ALIGNMENT**

Customized alignment station development Automated optimal coupling process Alignment algorithms programming



#### **HIGH-SPEED E/O TEST**

Fully automated E/O tester design Measurements from -40°C to 85°C Internal software development



Amphenol Active Optics

## DIFFERENTIATORS

### **PORTFOLIO:**

- LATEST GENERATION DESIGNS:
- HIGH PERFORMANCE
- SAFER SUPPLY CHAIN (RISK OF EOL MINIMIZED)
- **EXTENDED RANGE OF DATA RATES / CHANNELS SUPPORTED:** 
  - SINGLE, 4-CHANNEL AND 12-CHANNEL
  - CHANNELS WORKING INDEPENDENTLY WITH ANY DATA RATE FROM
     1.25GBPS TO 16GBPS , 28GBPS OR EVEN 56GBPS\*
  - FOOTPRINT CAN BE RE-USED OVER SEVERAL GENERATIONS (QEPT PLATFORM)

### **PLUGGABILITY:**

- **OPTICAL PLUGGABILITY: OPTICAL CABLES CAN BE REMOVED**
- EASIER/MORE FLEXIBLE ROUTING
- COST EFFECTIVE REPLACEMENT IN CASE OF FIBER DAMAGE
- NEW: HOT-PLUGGABILITY (QEPT PLATFORM)
- NO NEED TO SHUT DOWN SYSTEM TO INSERT / REMOVE TRANSCEIVERS
- PLUG&PLAY SOLUTION

#### **THERMAL DESIGNS:**

- EFFECTIVE HEAT DISSIPATION
  - HEAT DISSIPATED TOWARDS THE TOP FOR USE OF COOLING PLATE
- NO CONSTRAINTS IN CUSTOMER BOARD DESIGN (NO DISSIPATION INSIDE THE BOARD)
- **EFFECTIVE MECHANICAL DESIGNS:**
- DIE-CASTED HOUSINGS
- SUPPORT CUSTOMIZED HEAT-SINK DESIGNS

## DIFFERENTIATORS

#### **PORTFOLIO:**

- LATEST GENERATION DESIGNS:
- HIGH PERFORMANCE
- SAFER SUPPLY CHAIN (RISK OF EOL MINIMIZED)
- **EXTENDED RANGE OF DATA RATES / CHANNELS SUPPORTED:**
- SINGLE, 4-CHANNEL AND 12-CHANNEL
- CHANNELS WORKING INDEPENDENTLY WITH ANY DATA RATE FROM 1.25GBPS TO 16GBPS , 28GBPS OR EVEN 56GBPS\*
- FOOTPRINT CAN BE RE-USED OVER SEVERAL GENERATIONS (QEPT PLATFORM)

### **PLUGGABILITY:**

- OPTICAL PLUGGABILITY: OPTICAL CABLES CAN BE REMOVED
- EASIER/MORE FLEXIBLE ROUTING
- COST EFFECTIVE REPLACEMENT IN CASE OF FIBER DAMAGE
- NEW: HOT-PLUGGABILITY (QEPT PLATFORM)
- NO NEED TO SHUT DOWN SYSTEM TO INSERT / REMOVE TRANSCEIVERS
- PLUG&PLAY SOLUTION

### **THERMAL DESIGNS:**

- EFFECTIVE HEAT DISSIPATION
- HEAT DISSIPATED TOWARDS THE TOP FOR USE OF COOLING PLATE
- NO CONSTRAINTS IN CUSTOMER BOARD DESIGN (NO DISSIPATION INSIDE THE BOARD)
- EFFECTIVE MECHANICAL DESIGNS:
- DIE-CASTED HOUSINGS
- SUPPORT CUSTOMIZED HEAT-SINK DESIGNS

## DIFFERENTIATORS

#### **PORTFOLIO:**

- LATEST GENERATION DESIGNS:
- HIGH PERFORMANCE
- SAFER SUPPLY CHAIN (RISK OF EOL MINIMIZED)
- **EXTENDED RANGE OF DATA RATES / CHANNELS SUPPORTED:**
- SINGLE, 4-CHANNEL AND 12-CHANNEL
- CHANNELS WORKING INDEPENDENTLY WITH ANY DATA RATE FROM 1.25GBPS TO 16GBPS , 28GBPS OR EVEN 56GBPS\*
- FOOTPRINT CAN BE RE-USED OVER SEVERAL GENERATIONS (QEPT PLATFORM)

### **PLUGGABILITY:**

- **OPTICAL PLUGGABILITY: OPTICAL CABLES CAN BE REMOVED**
- EASIER/MORE FLEXIBLE ROUTING
- COST EFFECTIVE REPLACEMENT IN CASE OF FIBER DAMAGE
- NEW: HOT-PLUGGABILITY (QEPT PLATFORM)
- NO NEED TO SHUT DOWN SYSTEM TO INSERT / REMOVE TRANSCEIVERS
- PLUG&PLAY SOLUTION

### **THERMAL DESIGNS:**

- EFFECTIVE HEAT DISSIPATION
  - HEAT DISSIPATED TOWARDS THE TOP FOR USE OF COOLING PLATE
- NO CONSTRAINTS IN CUSTOMER BOARD DESIGN (NO DISSIPATION INSIDE THE BOARD)
- EFFECTIVE MECHANICAL DESIGNS:
- DIE-CASTED HOUSINGS
- SUPPORT CUSTOMIZED HEAT-SINK DESIGNS

## **CUSTOMER PRESENTATION**

**Product Portfolio** 

## **LEAP® ON-BOARD TRANSCEIVER**

### **KEY FEATURES**

12-channel duplex transceiver 1 to 25Gbps per channel (300Gbps aggregate data rate) 0°C to 70°C operating case temperature Standard MT-24 ferrule compatible LGA mount (compatible with Amphenol LGA/BGA socket)

PERFORMANCE	FEATURES	MECHANICAL INFO
12 CHANNELS	INTEGRATED CDR	VARIOUS HEAT SINK VERSIONS
25GBPS	TX EQUALIZER RX AMP. & DE-EMP.	PLUGGABLE MT-24 FERRULE
BER < 10 <sup>-12</sup>	DIGITAL MONITORING	SOCKET MOUNTED
0°C TO 70°C	INTERNAL PRBS9 PPG & ED	
P <sub>TYP.</sub> = 6.0W		



## **RUGGEDIZED ON-BOARD TRANSCEIVER**

### **KEY FEATURES**

12-channel duplex transceiver 1 to 16Gbps per channel (192Gbps aggregate data rate) -40°C to 85°C operating case temperature Standard MT-24 ferrule compatible LGA mount (compatible with Amphenol LGA/BGA socket)





## **SCFF COMMERCIAL VERSION**

## **KEY FEATURES**

single-channel duplex transceiver 1.25 to 28Gbps per channel\* 0°C to 70°C operating case temperature Standard duplex LC-connector 12-pin solderable proprietary connector

PERFORMANCE	FEATURES	MECHANICAL INFO
1 CHANNEL	INTEGRATED CDR	DIE-CASTED HOUSING
28GBPS	TX EQUALIZER RX AMP. & DE-EMP.	STANDARD DUPLEX LC
BER < 10 <sup>-12</sup>	DIGITAL MONITORING	SOLDERABLE CONNECTOR
0°C TO 70°C		
P <sub>MAX.</sub> < 0.8W		
	Am	phenol Active Optics

## **SCFF RUGGEDIZED VERSION**

## **KEY FEATURES**

single-channel duplex transceiver 1.25 to 28Gbps per channel\* -40°C to 85°C operating case temperature Standard duplex LC-connector 12-pin solderable proprietary connector

PERFORMANCE	FEATURES	MECHANICAL INFO
1 CHANNEL	INTEGRATED CDR	DIE-CASTED HOUSING
28GBPS	TX EQUALIZER RX AMP. & DE-EMP.	STANDARD DUPLEX LC
BER < 10 <sup>-12</sup>	DIGITAL MONITORING	SOLDERABLE CONNECTOR
-40°C TO 85°C		
P <sub>MAX.</sub> < 1.1W		
	Δm	ohenol Active Optics

## **QEPT100G NRZ**

### **KEY FEATURES**

4-channel duplex transceiver\* 1.25 to 28Gbps per channel -40°C to 85°C operating case temperature Pluggable MT-12F ferrule Hot-pluggable mezzanine mounted

PERFORMANCE	FEATURES	MECHANICAL INFO
4 CHANNELS*	INTEGRATED CDR	FLAT TOP OR HEAT SINK VERSIONS
28GBPS	TX EQUALIZER RX AMP. & DE-EMP.	STANDARD MT-12 FERRULE
BER < 10 <sup>-12</sup>	DIGITAL MONITORING	MEZZANINE CONNECTOR
-40°C TO 85°C		
P <sub>TYP.</sub> = 1.6W		
		- La sua - L. Astivo Option



\* Other versions in development (8-TX and 8-RX)

Amphenol Active Opti Produ

## **QEPT200G PAM4**

**COMING SOON** 

## **KEY FEATURES**

4-channel duplex transceiver\* 25Gbps NRZ and 56Gbps PAM4 per channel 0°C to 70°C operating case temperature Pluggable MT-12F ferrule Hot-pluggable mezzanine mounted

PERFORMANCE	FEATURES	MECHANICAL INFO
4 CHANNELS*	INTEGRATED CDR	FLAT TOP OR HEAT SINK VERSIONS
56GBPS PAM4	TX EQUALIZER RX AMP. & DE-EMP.	STANDARD MT-12 FERRULE
BER < 2.4 ⋅ 10 <sup>-4</sup>	DIGITAL MONITORING	MEZZANINE CONNECTOR
0°C TO 70°C	INTERNAL PRBS13Q PPG & ED	
P <sub>TVP</sub> = 3.0W		

## **CUSTOMER PRESENTATION**

**Customer Support** 

## **EVALUATION KITS**



### **PRODUCT DESCRIPTION**

Evaluation board including high-speed electrical I/O Functional transceiver USB to i<sup>2</sup>c adapter Graphical User Interface software to access customer registers

Fiber Optics cable assemblies and RF cables available in option

### **AVAILABLE VERSIONS**

LEAP® OBT 300G	RUGGEDIZED OBT
SCFF COMMERCIAL VERSION	QEPT100G NRZ
SCFF RUGGEDIZED VERSION	QEPT200G PAM4*

Amphenol Active Optics

## **DESIGN-IN SUPPORT**

### **OFFERING:**

- PRODUCT DOCUMENTATION INCL. APPLICATION NOTES
- CUSTOMER DESIGN REVIEW
- REFERENCE DESIGN BASED ON EVALUATION BOARDS
- ENGINEERING TEAM EASILY REACHABLE
- THERMAL SIMULATION SUPPORT

### "CUSTOMER ORIENTED" DESIGNS:

- CUSTOMER-FRIENDLY FUNCTIONALITIES IMPLEMENTED EARLY ON IN DESIGN PHASE
- CUSTOMIZED HEAT-SINK DESIGNS
- FIELD FW UPGRADE, BIT ERROR RATE GENERATION OR TEST INCLUDED IN SOME TRANSCEIVERS



# **CUSTOMER PRESENTATION**

Fiber Optics End-to-End Solutions

## AHES FO END-TO-END SOLUTIONS RECTANGULAR INTERCONNECTS



## **AHES FO END-TO-END SOLUTIONS** CIRCULAR INTERCONNECTS



## AHES FO END-TO-END SOLUTIONS CIRCULAR INTERCONNECTS

TV + 29504/4 & /5 38 999 shell ceramic optical termini 29504 (butt joint)



38 999 LUX-BEAM 38999 + Optical termini Luxbeam #16 EN4869 Expanded beam termini



ARINC 801 38 999 shell, ARINC 801 insert ceramic optical termini 1,25mm (butt joint)



TVOP 38 999 shell Ceramic optical termini 2,5mm(butt joint)



## AHES FO END-TO-END SOLUTIONS SCFF-BASED EXAMPLES

NGCON M64266 38 999 Shell LC Field SCFF Double LuxBeam 8 Daughter card

## **VITA INTEGRATION**



*RF* & OPTICS INTEGRATED INTO VITA
VITA 67 contain RF and Fiber hybrid for first time *Amphenol collaborative demo kit*

Support for 3 (2 x 24) fiber channels and 19 RF
 Current draft in VITA 66.5 limits MT locations

## **AHES FO END-TO-END SOLUTIONS** HARSH ENVIRONMENT FO CABLING SOLUTIONS

THDM to MTP 24 Channels crossover







MT Ferrule 48Channels Termination capabilities MT38999 to M29504/04 Short Fanout assembly





MT38999 to FC connector Loop back (2 channels) + right angle back shell

## **AHES FO END-TO-END SOLUTIONS** OPTICAL FLEX PLANES

### **PRODUCT SPECIFICATION:**

- Ideal for high density applications
- Can be designed for routing around Board Level components
- Improves Airflow for cooling vs Traditional cable approach
- Temp Range -55 to +95C
- Flame resistant substrate



# Amphenol Active Optics Products

## ALEXANDRE LASSALLE

General Manager & Head of RD a.lassalle@amphenol-aop.com +49 171 308 08 78

## **ARTHUR SANTANA**

Sales and Business Development Manager <u>a.santana@amphenol-aop.com</u> +49 152 900 144 60

www.amphenol-aop.com

Amphenol Active Optics