

# MDI option for 4x25G copper



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Photo courtesy of TE Connectivity

# MDI considerations for 100GBase-CR4



- **Backwards compatible (100GBase-CR4 to 40Gbase-CR4)**
- **Common MDI for Copper and (at least) short reach optical**

# MDI for 40GBase-CR4 and SR4



- QSFP+ was referenced as possible MDI for 40GBase-CR4. (Clause 85.11.1.1)
- QSFP+ is currently being used by other groups for 4x10G applications (InfiniBand<sup>SM</sup>, Fibre Channel etc)

# QSFP+ options today

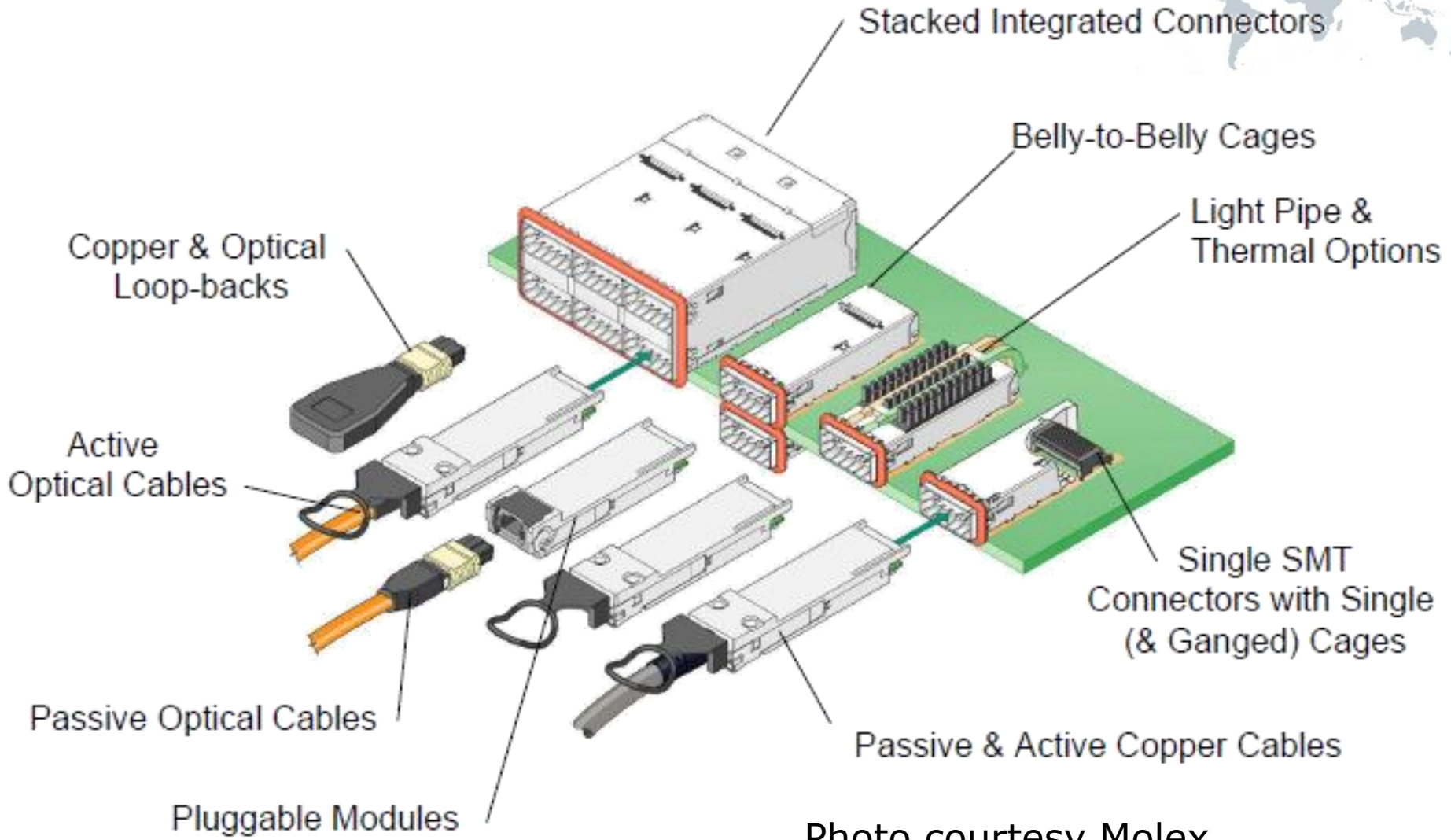
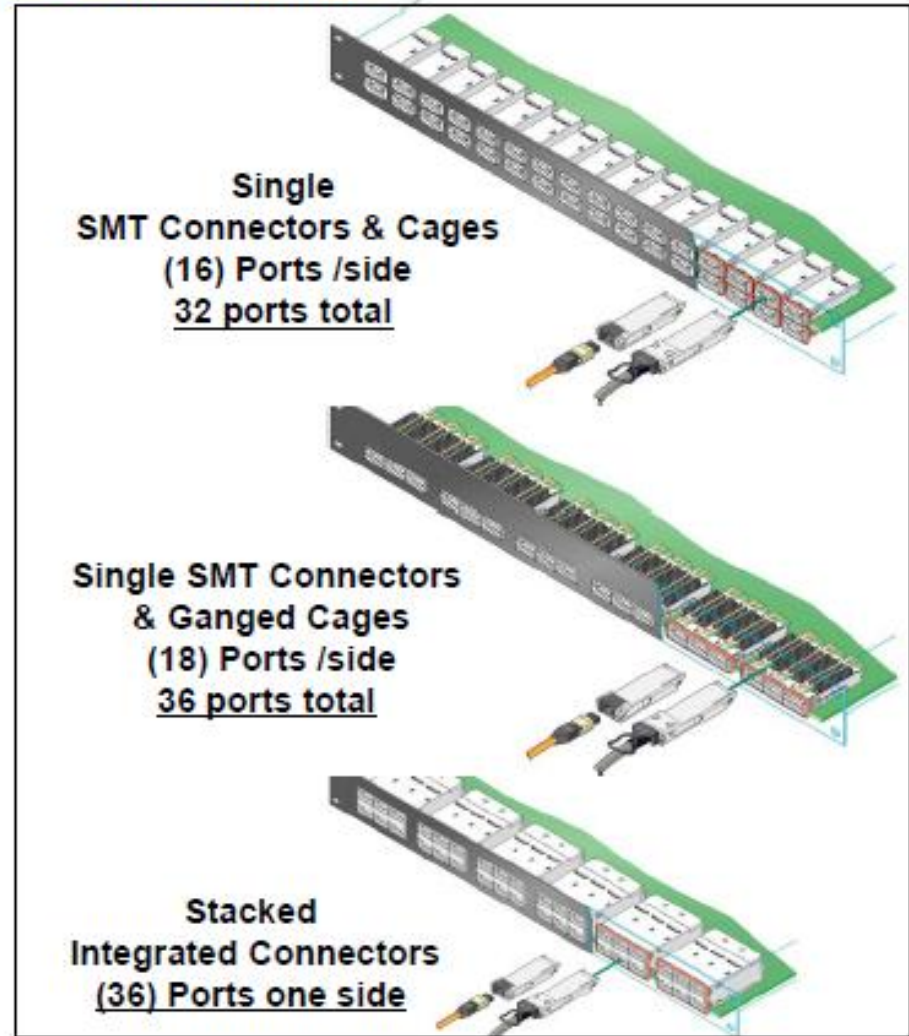
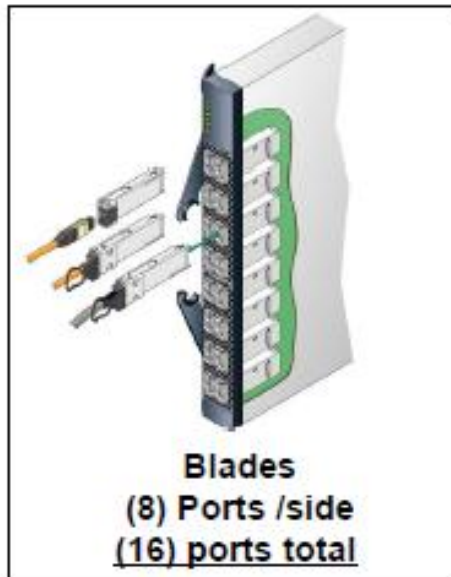
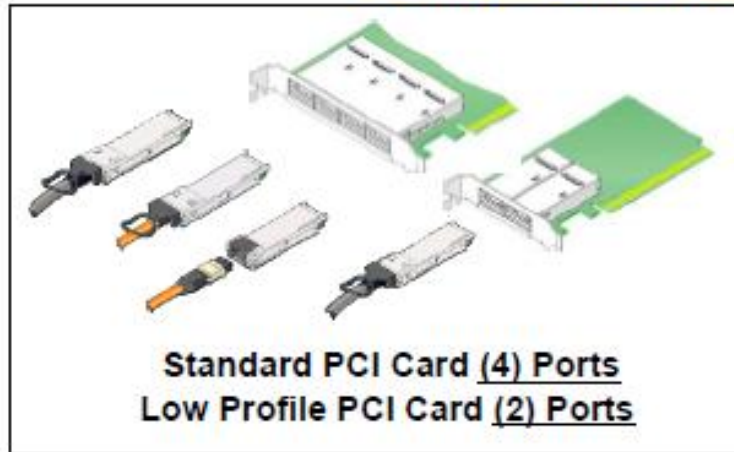


Photo courtesy Molex

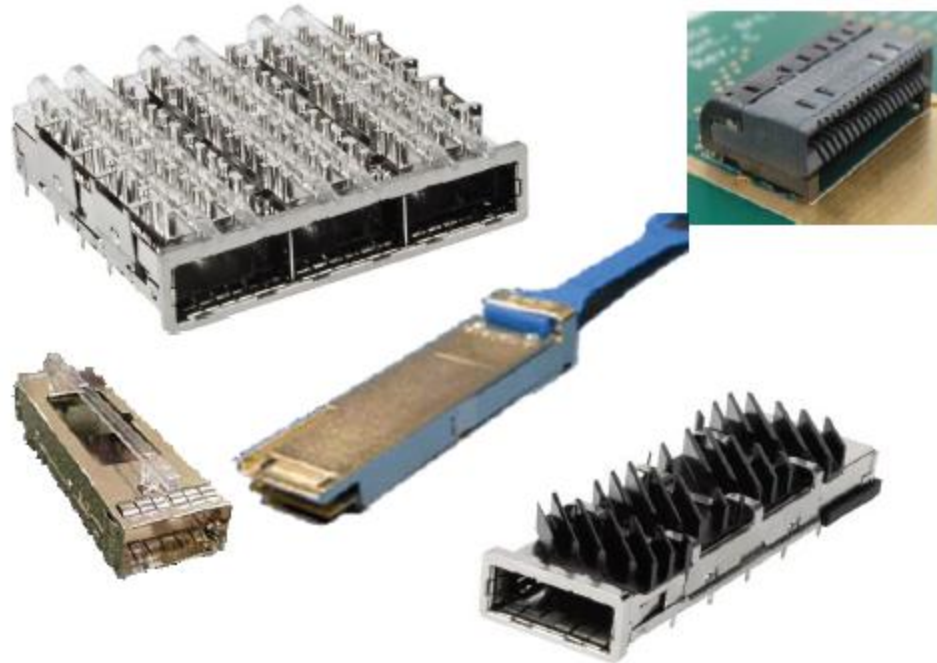
# QSFP+ options today



Supports both Copper & Optical Solutions



# QSFP+ cages, connector, plug



Photos courtesy Amphenol

# What is needed for 100GBase-CR4 MDI?



- **Good signal integrity**
  - Low insertion loss
  - Low crosstalk
  - Good differential return loss
- **Support for direct attach low loss copper cable**
  - 24 AWG twinax cable?
- **Support for active cables?**

# What might be needed by 4x25G optical solutions?



- **Good signal integrity**
  - Low insertion loss
  - Low crosstalk
  - Good differential return loss
- **Support for separable module**
  - Multi-mode and Single mode?
- **Support for active cables?**
- **Good thermals**
  - 5-6W?



# QSFP25 differential return loss

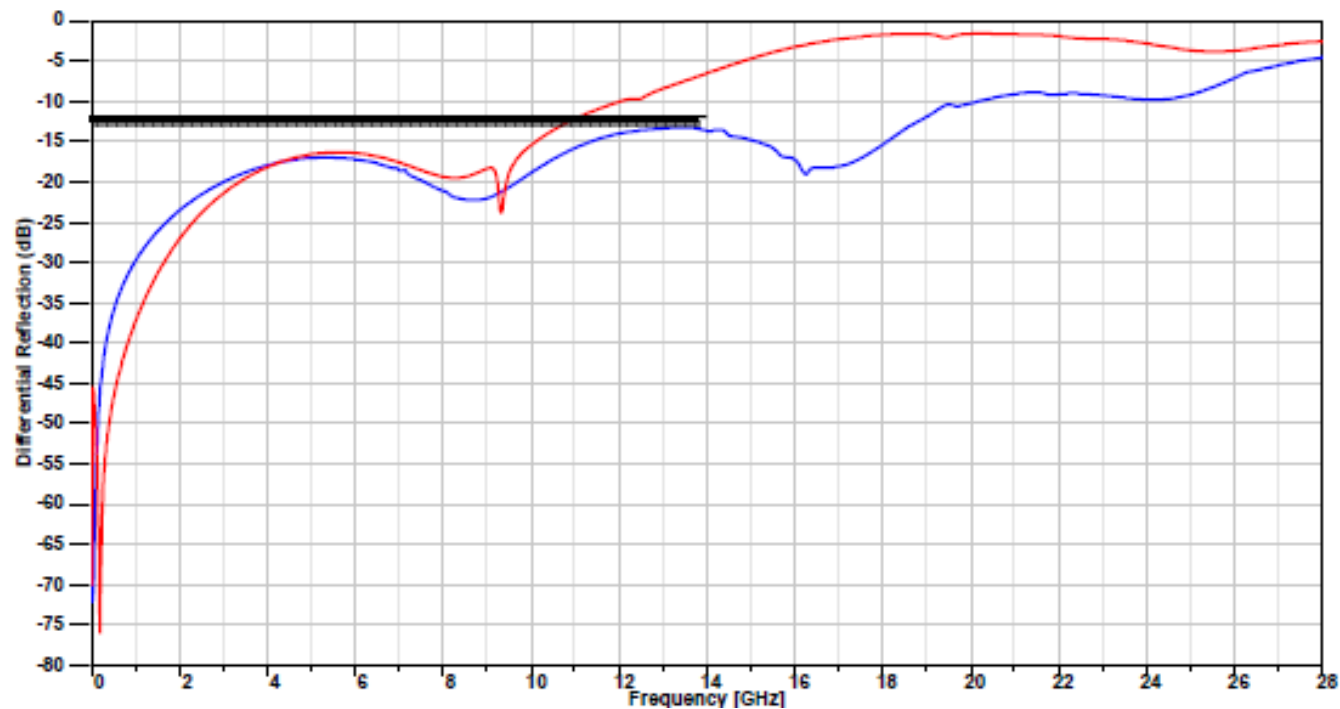
**BLACK = Spec Limit, -12dB up to 14GHz**

**Red = existing QSFP+**

**Blue = zQSFP+**

Max Reflection -12dB	7GHz	14GHz
QSFP+	-17	-7
zQSFP+	-18	-14

SDD11



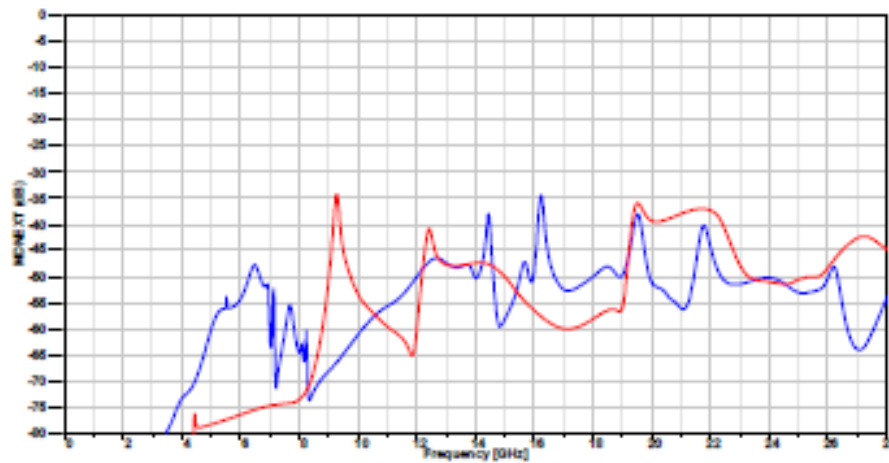
# QSFP25 crosstalk



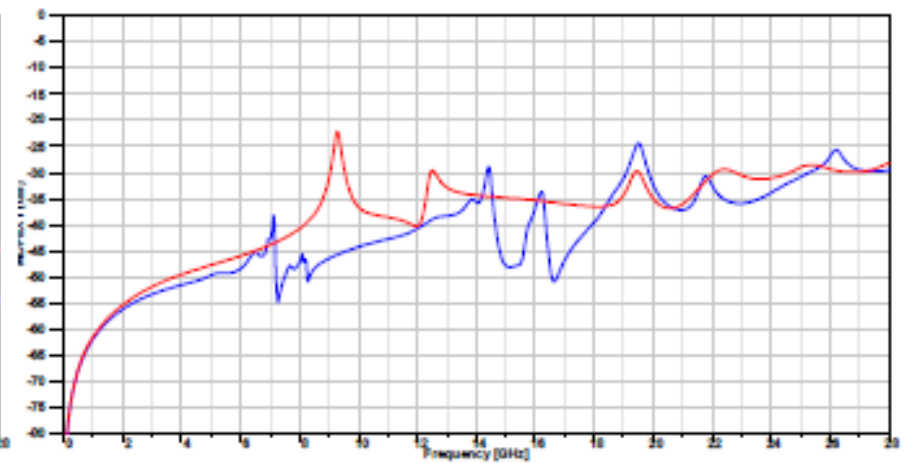
Red = existing QSFP+

Blue = zQSFP+

MDNEXT



MDFEXT



# QSFP25 insertion loss

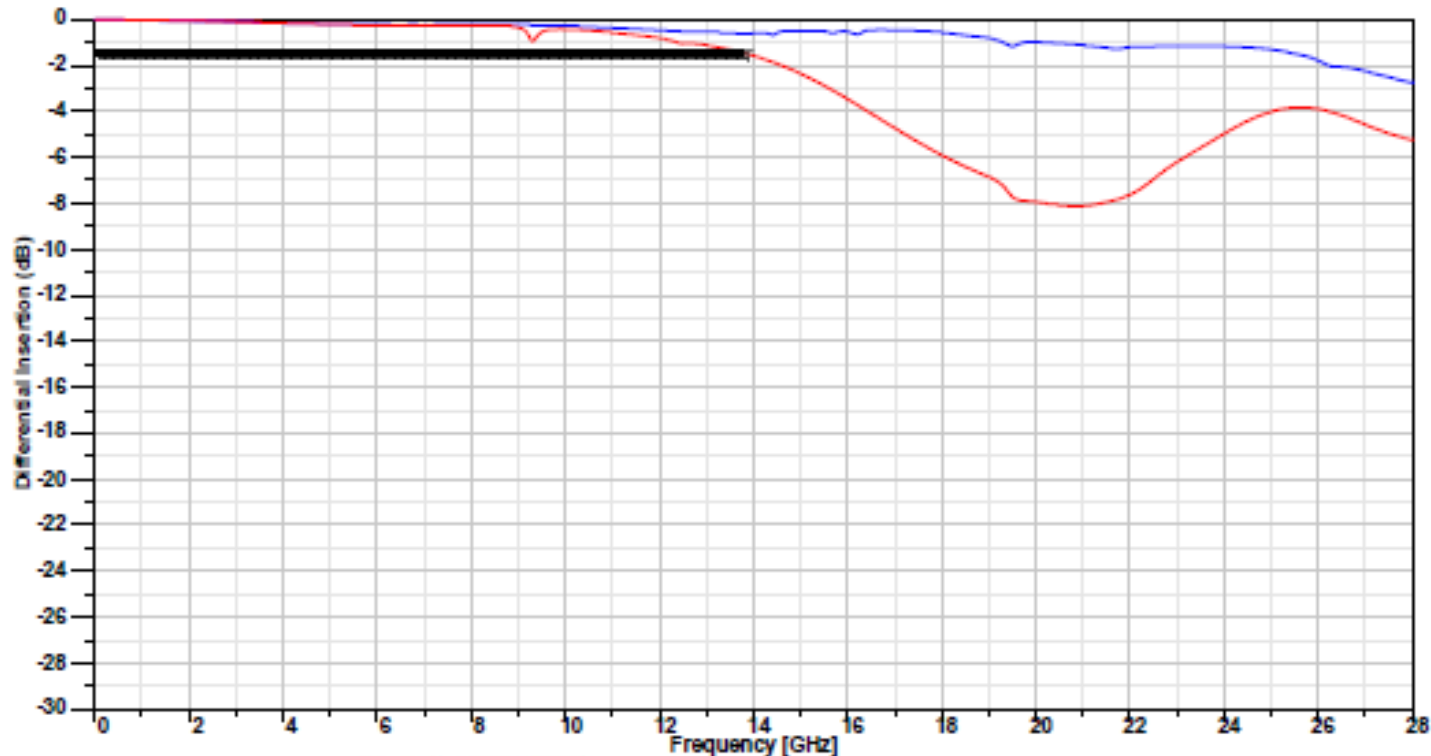
BLACK = Spec limit, maximum of -1.4dB @14GHz

Red = existing QSFP+

Blue = zQSFP+



Max Insertion -1.4dB	7GHz	14GHz
QSFP+	-0.3	-1.6
zQSFP+	-0.3	-0.8



# Thermal improvements for QSFP25

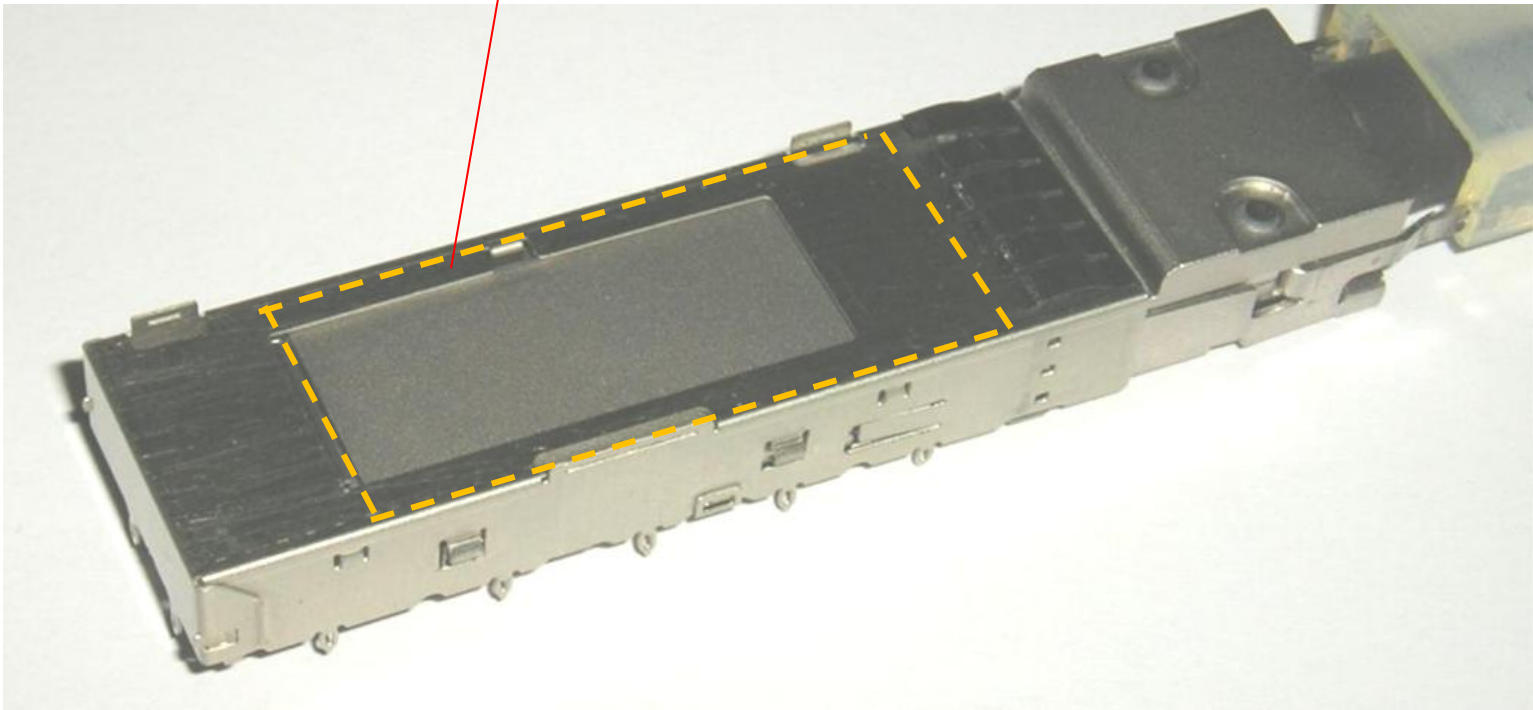


- Larger heatsink contact area for improved thermals
- 'Fixed fin' heat sinks provide lower thermal impedance

# New 25G QSFP+ SFF Specification to be submitted which will enable larger thermal contact area



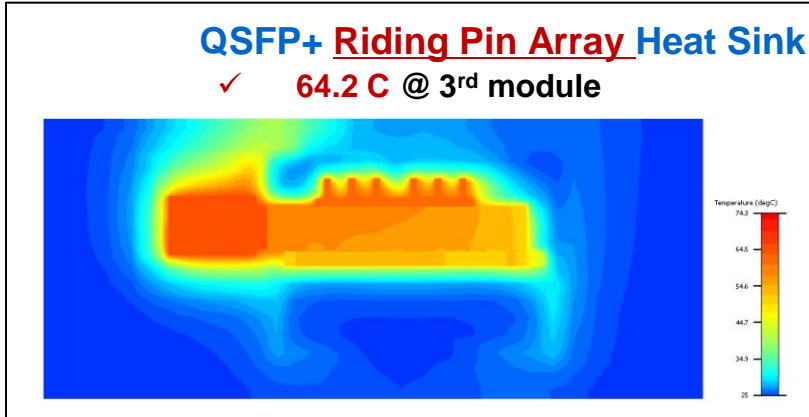
Gain additional surface area for the thermal interface/contact area



# QSFP+ / zQSFP+ Thermal Simulations



Popular solution **today**



## Parameters

1x4 Cages

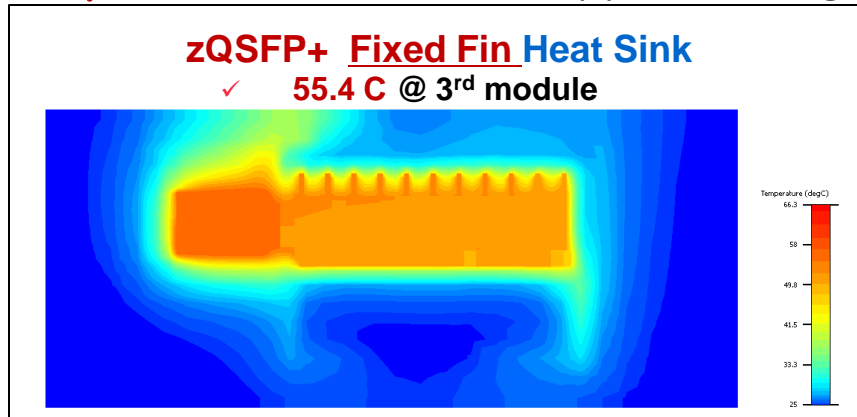
Typical Heat Sink Designs  
(not optimized)

Flow = 1 m/s at inlet

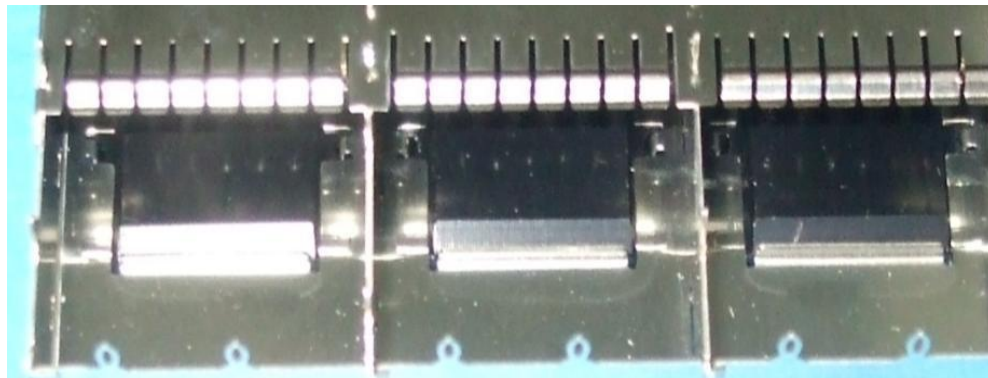
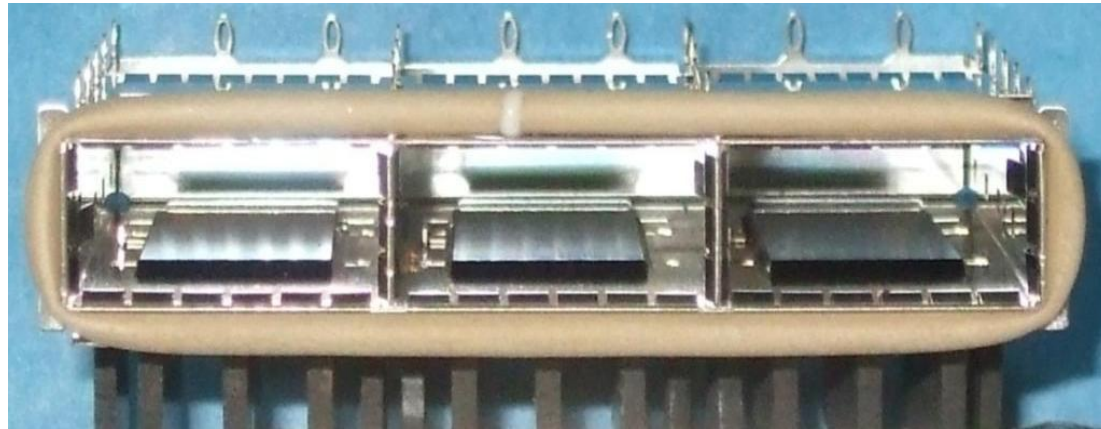
Module Power = 2W

Height = 1 RU

**Proposed Enhancement** - approx 10 degree gain



# Current QSFP+ thermal contact area definition - based on the original QSFP MSA design



# 100GBase-CR4 MDI summary

- QSFP could provide backwards compatibility to 40GBase-CR4 and 40GBase-SR4 variants
- QSFP25 provides excellent signal integrity for 25G signals
- QSFP25 provides improved thermals required for 100GBase-SR4 variants

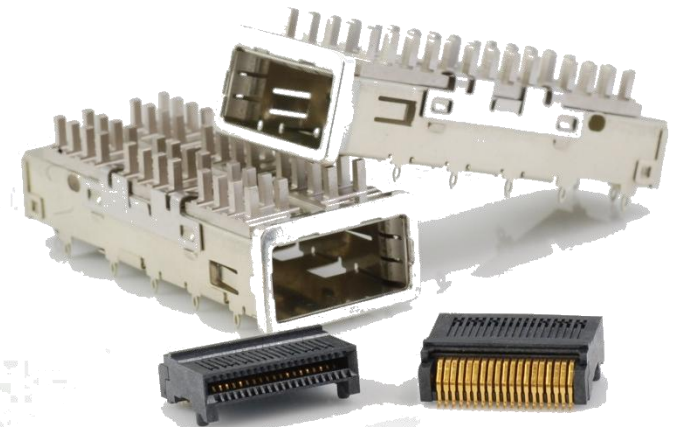


Photo courtesy of TE Connectivity