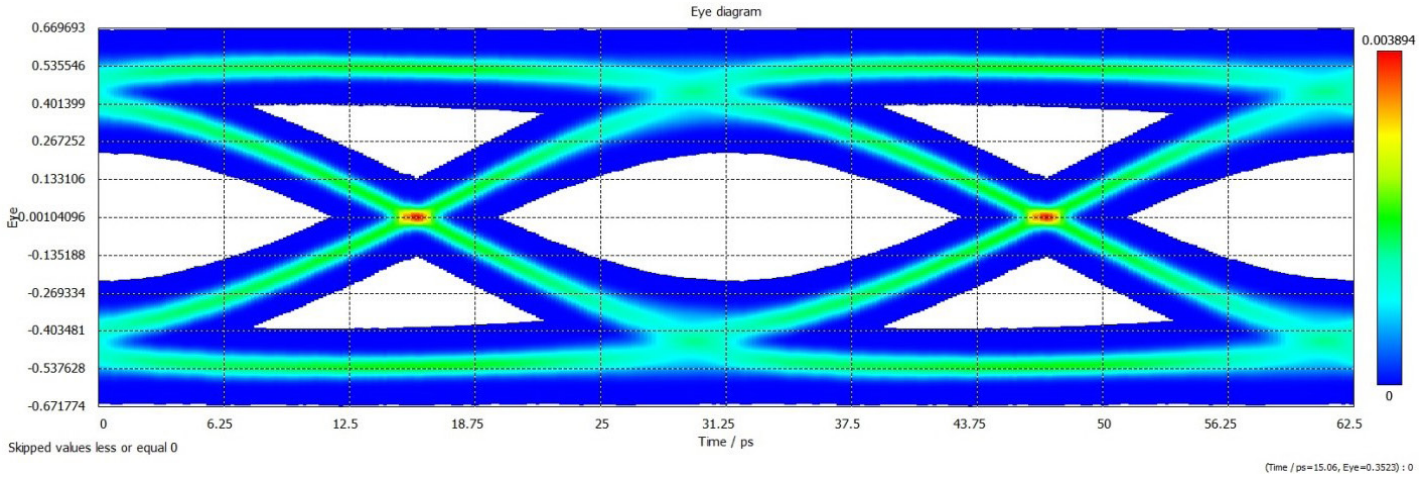
Introduction

The changes in technology where R-VPX connectors are used has rapidly evolved in recent years, specifically driving a demand for higher data rates from copper contact based connectors, which have typically resided in the 10 & 16 Gbps speed realm. The fastest connector in the market to date is performing to 25 Gbps, but the market demands even faster speeds. This is where Amphenol's new EVO2 R-VPX connector is designed to dominate; as the first and only 32 Gbps+ VITA 46.30 connector available.

Speed

32 Gbps data transfer speed achieved with EVO2! (Eye diagram at 32 Gbps below)



Design and Construction

Amphenol Corporation is uniquely integrated to be able to provide collaborative design results, which R-VPX EVO2 development required. The expertise for this project was the same team that developed R-VPX and R-VPX EVO1, a blend of Amphenol design teams from AAO in Sidney, NY and Amphenol TCS in Nashua, NH. This team designed R-VPX EVO2 by borrowing proven characteristics from our R-VPX and R-VPX EVO1 series connectors, using high performance dielectric PCB material, reducing the surface area of the contacts in both connectors, and tirelessly tuning and testing the trace geometries for signal integrity to match impedance goals. The latter changes also reduce crosstalk between pairs. The addition of the organizer reduced the impedance in the gap at the mounting interface between the backplane connector and the backplane PCB. These changes enable the speed performance improvement in this new connector series while meeting all of the requirements of the VITA 46.30 specification and maintaining all backwards intermateability. The new design resulted in three noticeable visual differences for end users:

1. The R-VPX EVO2 compliant eye size on the module (daughter card) connection region is smaller as compared to R-VPX connectors. **(See Figure 1)**
2. The R-VPX EVO2 compliant eye is smaller on the backplane connector compared to both R-VPX and R-VPX EVO1 connectors. **(See Figure 2)**

3. The R-VPX EVO2 backplane connector adds an organizer to the compliant PCB tail connection region. (This organizer remains on the interface and poses no additional steps to the customer during the installation of the connector. **(See Figure 2)**

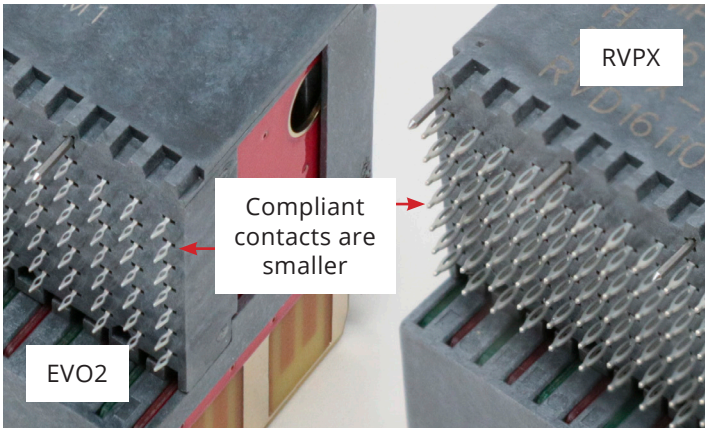


Figure 1 - Daughtercards

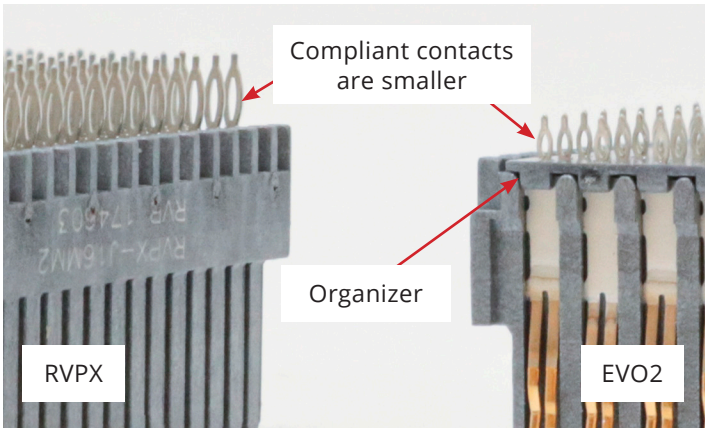


Figure 2 - Backplanes

The VITA Ecosystem

R-VPX EVO2 is a VITA 46 compliant connector system. The R-VPX EVO2 connectors, like previous R-VPX and R-VPX EVO1 versions, are fully intermateable with the aforementioned connectors. (as well as RT2, RT2-R, & RT3 from TE) Intermountability is described below:

	R-VPX Backplane	R-VPX EVO1 Backplane	R-VPX EVO2 Backplane	R-VPX Module	R-VPX EVO1 Module	R-VPX EVO2 Module	RT2/RT2R	RT3
R-VPX Backplane	✓	✓					✓	
R-VPX EVO1 Backplane	✓	✓					✓	
R-VPX EVO2 Backplane			✓					✓
R-VPX Module				✓			✓	
R-VPX EVO1 Module					✓	✓		✓
R-VPX EVO2 Module					✓	✓		✓

Amphenol has mechanically tested RT3 to ensure intermatability/intermountability with R-VPX EVO2 DC/BP and R-VPX EVO1 DC and RT2-R for intermatability/intermountability with R-VPX DC/BP.

EVO2 Connector Verification

Amphenol Aerospace's R-VPX EVO2 connector passed connector qualification per the VITA 46 and Telecordia GR-1217-CORE test specifications. Testing was conducted by a combination of Contech Research of Rumford, RI and by Amphenol TCS test lab in Nashua, NH. Amphenol Aerospace R-VPX EVO2 and TE's RT3 connectors were intermated through relevant tests in both the VITA 46 and Telecordia GR-1217-CORE testing. Tests performed included, but were not limited to the list below. Test reports can be provided upon request.

- LLCR
- Durability
- Temp Life
- Mechanical Shock
- Thermal Aging
- Mate/Unmate
- Dust
- Random Vibration

Conclusion

Amphenol Aerospace's R-VPX EVO2 connectors are the fastest VITA 46.30 connectors in the world, achieving data rates in excess of 32 Gbps while meeting the specification requirements. R-VPX EVO2 connectors will enable the embedded market to meet and exceed the demanding requirements of today's protocols including 25G Ethernet (100GBASE-KR4) and PCIE Gen 5 (32G).