HUBER+SUHNER Radiall Rosenberger

Application Note: NEX10® Connector Series

Meeting the new Connection Challenges of 5G Small Cell Mobile Networks

www.nex10.info

Introduction

The ongoing exponential demand for wireless networks means mobile operators are under constant pressure to increase capacity. Faced with the prohibitive costs of building new sites, the preferable solution is to improve existing ones. This invariably entails working within limited physical space. At the same time, with the addition of more antennas and connections, keeping Passive Intermodulation (PIM) as low as possible is a prerequisite. Fit-for-purpose connectors, fully optimized for these challenging environments, now play an increasingly pivotal role in ensuring the high-performance transmission of Radio Frequency (RF) signals between base stations or remote radio heads and antennas.

There has been significant innovation by the RF connector industry over the past decade. This has resulted in the introduction of several small form factor connector solutions, such as the 4.3-10 and more recently the NEX10®. These have become necessary to support the entire ecosystem of high-performance 4G/LTE – and latterly 5G – wireless connectivity requirements, including macro cell sites, metro cells and Distributed Antenna System (DAS) deployments.

They offer a more efficient solution to the long-standing 7-16 DIN connector launched more than half a century ago as today's and tomorrow's cellular environments depend on high-bandwidth, high density RF connections to provide capacity and low PIM interference.

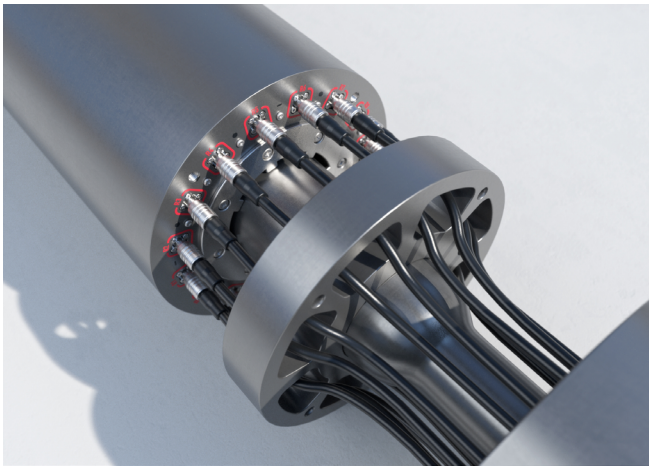
Moving to Small Form Factor Connectors

The newer generations of small footprint connectors have on the one hand typically utilized a radial contact design to improve low coupling torque requirements to facilitate a more comprehensive and reliable contact in confined spaces. At the same time, the separation of their mechanical and electrical planes offers superior PIM characteristics compared to 7-16.

Introduced to the market in 2013, the 4.3-10 connector series has been one of the most well-known examples, offering a similar design to the 7-16 connector, but smaller and up to 40% lighter for accommodating more dense and lighter weight applications. However, by virtue of its small size and the innovative radial contact element, there has always been a susceptibility of the 4.3-10 being subject to mechanical defects. Such as, the male connector not being inserted straight, or where mating is attempted with the wrong connector.

NEX10® – a Natural Evolution

In 2018 and following, the combined efforts and collaboration of three leading RF connector manufacturers —Rosenberger, HUBER+SUHNER and Radiall – the NEX10® connector was officially released for mass production and the first radios with NEX10® became available. The objective was to develop a smaller coaxial connector system capable of meeting most of the existing and future demands of small cell networks for 4G and 5G networks. Since that time, for applications where space is highly constrained, the NEX10® has become increasingly adopted over the larger 4.3-10 or other interfaces.



This is essential with the rollout of 5G and the telecommunications industry's rapid transition towards the small cell approach, where radios and antennas are installed on light poles and street signs rather than high radio towers or roof tops. As a result, the equipment for such installations is becoming ever smaller; therefore, demanding highly compact, high performing coaxial RF connectors. The growing demand for new generation equipment within the market requires a high-performance solution with exceptional benefits and features. 5G is expected to be 100 times faster than 4G LTE and will provide a tenfold increase in broadband connection speeds. To achieve this many more radio heads for deployment in small cell sites will be necessary. This is making reliable, low-cost RF connectivity more mission critical than ever for enabling numerous micro cell applications.

Enhanced Protection

From the lessons learned from 4.3-10, the NEX10® has been evolved as a small and highly robust connector, ideal for applications with limited space.

With an optimized design rather than just a scaled down 4.3-10, the inherent weak points of the 4.3-10 connector family have been fully addressed during the design and development of the NEX10® connector series.

Particular attention was focused on the following areas:

- Provision of a protected slotted outer contact element which cannot get damaged
- Additional protection of slotted contact elements by surrounding it with dielectric
- Jack outer contact with no fragile elements to prevent potential damage if wrong connector inserted

Key Features

The NEX10® offers excellent PIM stability of -166 dBc, high flexibility of coupling mechanism (quick lock and screw), and a ruggedized compact design. With a flange height of just 12.7mm, it is the smallest coax connector system for small cell mobile communication on the market.

- Small size, 12.7 mm flange height
- Screw and push-pull coupling
- -166 dBc PIM, independent of torque
- Robust design for outdoor use
- Operating up to 20 GHz with excellent return loss
- Cable connectors for up to ½" corrugated cables
- Blind mate for panel connection as well as test and measurement applications

Application Examples

The NEX10® interface is extremely versatile and highly suited for applications requiring PIM stability in compact spaces. For example, small cells, low-power base stations, distributed multi-operator/multi-band antenna systems (DAS), Multiple Input Multiple Output (MIMO), and in-building architecture and street furniture.

NEX10® is ideal for making quick and reliable connections in a wide range of limited space applications, from small cell antenna and street furniture in urban environments to base station antennas with a high number of ports. In summary, mobile networks increasingly require RF signal transmission to be implemented where space is highly constrained. Ensuring the lowest possible signal interference is a further challenge in terms of mitigating the additional potential for increased PIM. The NEX10® connector series is already proven in the challenging mobile network application areas mentioned in this application note.

Moreover, it is future proofed for 5G and able to accommodate the associated higher modulation challenges concerned. Now widely available — through the industry NEX10® Consortium and its licensees – mobile operators and Original Equipment Manufacturers (OEMs) can be assured of a worldwide network of suppliers.

Further information: www.NEX10.info

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