

Recent Updates in Connector and Cable Technology

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Interconnections are an integral part of all electronic circuits and systems. Their importance requires us to periodically stop and evaluate new developments in this part of our technology. Whether for RF, microwave, optical, or high speed digital applications, there is always progress to report. Here are notes on some of the recent trends in connectors and cables.

High Speed Digital Interconnections

In recent months, the cable and connector industry has announced many new products that incorporate advances in signal integrity performance, mechanical design and installation or assembly. This reflects recent trends for increased digital content in electronic equipment, as well as higher clock speeds.

Tyco Electronics recently announced their new Z-PACK TinMan connector as a cost-effective solution for high-performance backplane interconnect systems to 12.5 Gb/s. The connector has successfully demonstrated 10 gigabit data streams performance across the backplane compliant to 10Gbase-KR electrical requirements. Ground contacts positioned within each pin header column, combined with unique contact lead frame arrangements and a receptacle side ground shield, enable the connector to achieve low crosstalk and high through-put performance levels.

FCI has developed their AirMax VS[®] 3-pair backplane connector system that meets the mid-plane connector interface requirements defined in the recently-announced Storage Bridge Bay (SBB), Version 2.0 specification. AirMax VS system uses edge-coupling technology and an air dielectric between adjacent conductors to deliver high signal density with low insertion loss and low crosstalk, all without the use of costly and space-consuming metal shields. The connector system will handle differential signals to 12.5 Gb/s.

Other companies have developed high-speed connectors for board-to-board and backplane applications. Design variations include EMI filtered connectors, various pin spacings and interconnect densities, along with header and pin configurations for standard digital bus interfaces.

High-speed digital device testing has also gotten significant attention from connector manufacturers, supporting an increasing number of devices, packages and pin densities.

Samtec has recently introduced its new Spirit[™] Connectorless Test Probe (SCTP Series) for high speed serial protocol testing. These probes employ 100-ohm differential pair signal routing, with a patent-pending replaceable compression contact array system on the DUT end. Samtec's high speed Q Strip[®] connectors are used on the instrument end. For increased reliability and longevity, the probe features a spring-loaded shroud to protect the compression contact tips from damage, while the replaceable contact array extends the life of the probe indefinitely. This connectorless system provides for non-intrusive testing from 1.25 Gbps to 5.2 Gbps and is compatible with the Intel[®] specific PCI Express[®] footprint.

Aries Electronics has announced that its entire line of high-frequency center probe test sockets (photo below) can now be used with devices requiring pitches as low as 0.40 mm. The sockets are used in applications such as CSP, MicroBGA, DSP, LGA, SRAM, DRAM and Flash devices with speeds from 1 GHz to more than 10 GHz. The 4-point spring probe crown ensures "scrub" on solder ball oxides for reliable contact mating, and the pointed probe works with LGAs, MLF's and other socket types.



Aries Electronics' test sockets support device testing applications up to 10 GHz.

RF and Microwave Connectors

Recent trends in RF and microwave connectors have focused on refinements for reliable installation. For example, San-tron's new e-SMA connector features an extended ferrule for greater reliability, solder-free captivating center conductor contact, and a solder-damming positive cable stop. SV Microwave's line of SMP bullet connectors cover high frequencies of to DC to 40 GHz. The bullet is designed to allow the joining of two RF Modules by captivating the bullet between the two shrouds. Its push-on design allows the installer to mate connectors without the need for threads or wrenches.

All connector companies have introduced new connectors that accommodate specific customer requirements, including precise interface to specific cable types, greater mating/unmating forces for high reliability, improved self-alignment in blind-mate connectors, plus simpler installation or smaller footprint on p.c. boards.

Interconnecting cable assemblies have also gotten significant recent attention. Test cables and system interconnect cable assemblies feature better mechanical properties and higher reliability, with a wide range of bending radius options. Miniature cables for consumer products are a growing segment of the market, as frequencies increase and signal integrity becomes more important. Applications driving the consumer market include wire-

less networking equipment, digital television, CATV set top boxes, and many other devices. Often, these applications require interconnection from the p.c. board electronics to an antenna, input connector or output connector.

Optical Cables and Connectors

A few notes on optical technology are appropriate for this report, as well. One of the recent developments is the growth of high definition television. For such applications, Omron has announced its P1TX4C-SX51 Transmitter Optical Subassembly (TOSA) and the P1RX4C-SX51 and Receiver Optical Subassembly (ROSA) to serve the high-definition video market. These products are p.c. board-mounted, with integrated electronics, optics and optical connector. They support long-distance data transfer challenges inherent in the bandwidth-intensive, high-speed data applications associated with HDMI rev1.3 compliant high-definition video and audio formats.

An application area that is in the early stages of development is optical linking from an on-ground equipment housing to tower-mounted wireless base station radios. As MIMO (multiple input, multiple output) technology becomes widely deployed, tower-top equipment will become common. The solutions to the required communication links in an outdoor environment is an important subject for future coverage.
