VTAC

REVOLUTIONIZING HIGH SPEED DATA TESTING IN THE AUTOMOTIVE INDUSTRY

Virginia Panel Corporation's industry-leading solution, VTAC, has revolutionized the world of high speed data testing. One reason for the success of VTAC is its high speed data transfer rate greater than 12.5 Gbps per differential pair. While other high speed solutions exist, VTAC's revolutionary design helps to mitigate crosstalk and insertion loss. The application of high speed data is broad and is found in a variety of military and commercial applications, ranging from military drone surveillance aircraft to high definition televisions. However, most prevalent is the incorporation of high speed data in the automotive industry through a variety of standards.

Serial buses such as Controller Area Network (CAN), Local Interconnect Network (LIN), and FlexRay have a long history in automotive design, but there are advantages and limitations to each. While CAN supports a multi-master system with message prioritization, CAN usage is limited by its maximum transfer speed of 1 Mbps, which is only viable if the maximum cable length is not exceeded. LIN has experienced great application to door modules, sunroofs, and seat and climate control, but only has a maximum transfer speed of 20 kbps. FlexRay supports high data transfer rates—up to 10 Mbps—and allows for both synchronous and asynchronous data transfer in a fault-tolerant environment.

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The increased complexity of interoperability and the demand for more interactive systems to report real-time data requires data transmission at ever-increasing speeds. For instance, vehicles equipped with RF, GPS, audio signaling, serial buses, rear headrest screens, front dashboard screens, and backup cameras may require test speeds of 3 GHz (6 Gbps). The abundance of electrical devices creates challenges like electromagnetic interference (EMI). To combat interference, VTAC was designed to protect signal integrity and reduce interference from other signal transmissions.

PROTECTING SIGNAL INTEGRITY

Signal integrity is an important component to any test setup, especially when it comes to testing with broadband data. Properties of the signal transmission such as crosstalk, attenuation (insertion loss), return loss, impedance matching, and signal path are critical to successful testing. Additionally, connectors, printed circuit boards (PCB), and cables can have a significant effect on a signal's transmission speed and signal integrity. Each new connection creates an opportunity for signal degradation. Any failure to transmit or receive signal during a test creates potential for erroneous data that would otherwise indicate a system failure or other problem not caused by the device under test (DUT).

Wire manufacturers strive to design high speed cables that limit the effects of EMI, prevent crosstalk between the different signals within the cable, maintain impedance matching, and minimize energy loss from the signal. Nevertheless, each application is different and the challenge of matching impedance and controlling interference can only be ensured with proper utility.

That is where mass interconnect systems come in. Mass interconnect systems encourage uniformity in design, connection, and operation. They also provide additional EMI protections where applicable. The VTAC insert was designed to be used within a mass interconnect solution, as well as with small secondary connectors, to meet both the current and future demands of test engineers.

THE LIMITATIONS OF OTHER SOLUTIONS

Solutions already exist for many kinds of high speed applications, but many are limited. Test engineers may build their own cable assemblies, but run into trouble with impedance matching. For instance, FPD-Link III LVDS may face issues when used with twinax cable since it is rated for 25 ohms. The VTAC insert was designed to minimize transmission line and coupling effects to reduce signal degradation. The result is a 100 ohm connection that accommodates two differential pairs per insert. While VTAC inserts create an additional connection in the signal path, it does not add significant signal loss. VTAC is a decidedly reliable solution for data transfer rates greater than 12.5 Gbps.

Where other solutions might offer 1,000 to 2,000 mating cycles, VTAC is quality-checked for at least 200,000 mating cycles, which translates to fewer replacements in the life of a project. Further, it is compatible with several standard high speed protocols such as: HDMI, USB 5 Gbps (USB 3.0, USB 3.1 Gen 1, USB 3.2 Gen 1), SATA, RosenbergerHSD, DisplayPort, SFP+, Cat 6, and more. In terms of compatibility, a test engineer can expect signal integrity to be safeguarded while leveraging some of the highest data transfer rates available.

CONCLUSION

Modern vehicles may contain up to 50 microprocessors that govern everything from instrument display panels and climate controls to airbag response. Since failure can be potentially catastrophic, automotive test engineers shoulder enormous responsibility. Real-time communication between the DUT and the test application via reliable high speed data transfer is critical in order to keep up with testing demands and reduced costs. Product innovations such as VTAC can aid in ensuring the most reliable high speed data transfer within any test application. It is not enough to simply make faster technology; VPC is taking steps to ensure that signal integrity is safeguarded and that reliability is a priority to improve industrial application. ■