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Basket of wires design guarantees signal reliability for Mars Science Laboratory

Hypertronics cPCI Mandated for use on all future space flight per specification S-311-P-822

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Hypertronics space grade Compact PCI (cPCI) connectors were selected by Jet Propulsion Laboratories (JPL) of Pasadena, CA for use on the Mars Science Laboratory (MSL) scheduled to launch in 2009. Incorporating the unique Hypertac® “Basket of Wires” contact technology, Hypertronics cPCI will be instrumental in all phases of the mission from lift-off, navigation, entry, descent, landing, roaming, and geological survey. Behind all of these complex embedded systems are high powered single board computers (SBC) connected together through common back planes which handle all control functions and analysis for the MSL rover. Essential to mission success, all systems and components must exceed the long and difficult journey to Mars as well as the extreme surface operation of 1 Martian year, equal to 2 Earth years.

Hypertronics cPCI connectors have undergone rigorous testing at NASA to the highest performance standards involving extreme environmental conditions, including thermal excursions, corrosive atmospheres and excessive vibration. Given its three-dimensional symmetry and multiple points-of-contact construction, Hypertronics cPCI connectors surpassed NASA’s expectations for shock and vibration and resulted in Goddard Space Flight Center (GSFC) specification S-311-P-822. No other cPCI connector was able to sustain operation under these rigid testing protocols and have subsequently all been prohibited for space flight per NASA addendum EEE-INST-002.

The key to Hypertronics cPCI performance is the advanced hyperboloid wire basket socket, distinguished by the unique shape of the contact sleeve and formed by wires strung at an angle to the socket axis. When a pin is inserted into this sleeve, the wires stretch around it, providing a number of linear contact paths extending the

contact area to 360° around the pin. The low mass and resultant low inertia of the wires enable them to follow the most abrupt or extreme excursions of the pin without loss of contact, eliminating fretting. Contact fretting, a leading cause of connector failure, is wear caused by the repetitive motion between tight-fitting, load-bearing surfaces and is accompanied by oxidation-related corrosion manifested as interface pits or grooves. The basket of wires design virtually eliminates the risk of fretting corrosion and guarantees continuous signal reliability.

Originally developed for the Solar Dynamics Observatory (SDO), Hypertronics cPCI connectors can also be found on planned manned and unmanned missions including the Lunar Reconnaissance Observatory (LRO), James Webb Space Telescope (JWST), Ares Rocket, Orion Crew Vehicle and many more. To learn more, please visit www.hypertronics.com or email james.demers@hypertronics.com.