Phoenix Company of Chicago PkZ® System Advances RF Cable Density with Ease

The Phoenix Company of Chicago has developed a complete interconnect system for cryogenic-based quantum computing applications featuring its patented PkZ technology.

The PkZ system, a drop-in upgrade to the existing RF interconnect set, includes all connections from external microwave cables through a hermetic header into each level of the cryostat down to the quantum processor. Semi-rigid CuNi cables transmit the RF signals to the processor, while the contact housings and hermetic header keeps lines organized, connected and properly thermalized.

The heart of this system is the blindmate constant impedance PkZ contact. Designed with optional embedded attenuation for mass interconnection, the system replaces thread-on SMA connectors and attenuators. The PkZ housings fit existing cryostat ports and contain up to 64 RF lines; effectively doubling the number provided by SMA installations, while simplifying mating of all 64 lines with one plug-in operation.

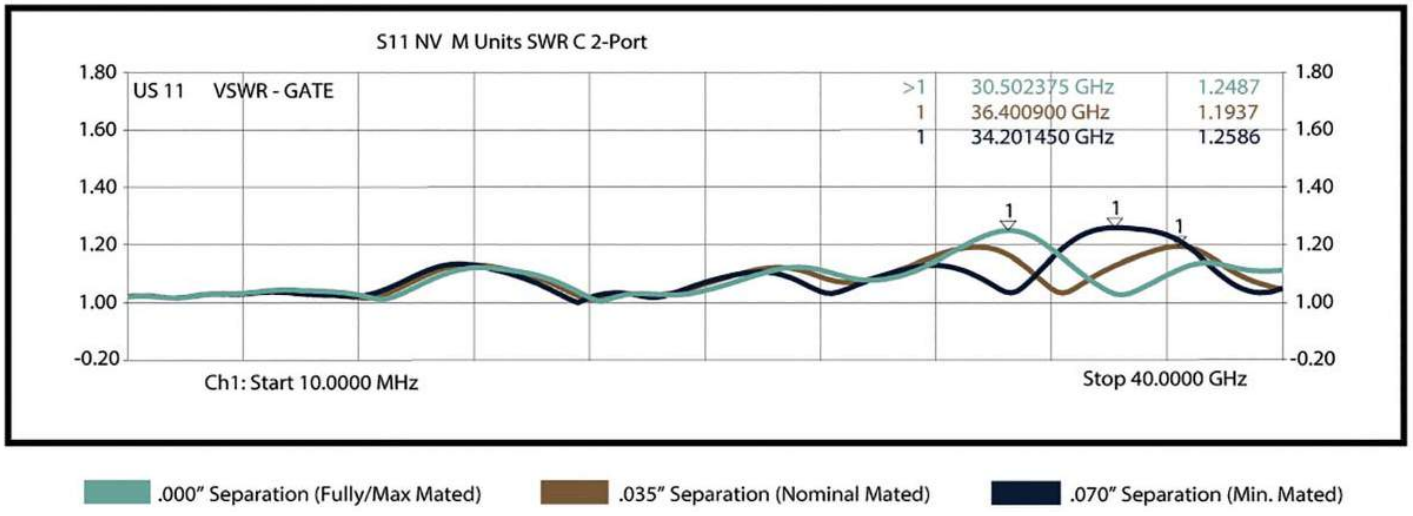
All high density blindmate connectors feature slide-on contacts that often operate in challenging applications involving system tolerance stack-ups, which prevent the contacts from fully mating. With a typical contact, this mating gap alters the dielectric constant and ratio of conductors producing a change in impedance that degrades signal integrity. Thermal expansion and contraction within cryogenic systems further complicates these axial mating challenges. The PkZ contact has been designed to overcome these issues by providing constant impedance and uninterrupted electrical performance over axial mating tolerances commonly found in modular applications.

The chart depicts gated VSWR performance of a size 12 PkZ mated pair to 40 GHz at three stages of mating. The results are quite stable from full engagement to a separation of 0.070", making the PkZ an ideal solution for high density modular applications. With an axial mating tolerance up to 0.110", PkZ contact technology is the primary choice for demanding modular applications.

The PkZ contact's constant impedance performance facilitates a high density modular design greatly easing installation and maintenance. Semi-rigid cable assemblies are snapped into their housings and shipped as complete 64-line subassemblies ready for cryostat installation on arrival. Likewise, all 64 lines (within a level) can be removed from the cryostat in one simple operation. This allows a cable or attenuator change to be performed on a stable work surface rather than in the confines of the cryostat itself. Once a subassembly is transferred from tank to table, cables can be replaced freely in any sequence desired. Attenuator values (up to 30 dB) can be replaced without removing the cable assemblies from their housings. Innovative PkZ contact design and the use of specialized housings make these features possible.

The Phoenix Company's quantum computing-focused designs and processes are highly adaptable. Established configurations can be modified to suit various cable types and cryogenic tanks or can be reconfigured to meet the requirements of other low temperature applications. US-based, in-house capabilities, along with a strong desire to serve customers, facilitates innovative solutions to meet specific program requirements.

For 50 years, The Phoenix Company of Chicago has reached success across a wide range of markets including telecom, medical, defense and aerospace. Their custom housings and PkZ contacts can be found in numerous cellular base stations, highly sensitive MRI equipment, ruggedized military vehicles and commercial avionics systems, among others. The Phoenix Company of Chicago offers a wide range of flexibility and customization to customers by maintaining control of the entire process from design through manufacturing at their integrated facility in Naugatuck CT. **http://phoenixofchicago.com** ■



VSWR performance of a size 12 PkZ mated pair to 40 GHz at three stages of mating. *Image: The Phoenix Company of Chicago*