

Application Note 09: Application Guide to RF Coaxial Connectors and Cables

There is a wide variety of coaxial connectors and cables available for use in the RF and Microwave spectrum. While often not much thought is given to these essential components, a misstep here can result in undesirable system degradation. Given that typical RF systems are comprised of any number of items, e.g. RF generators, amplifiers, attenuators, power meters, couplers, antennas, etc., it is not uncommon that a great deal of thought is given to these "high end" devices while mundane items such as connectors and cables are often treated as an "after thought" .

RF coaxial connectors

RF coaxial connectors provide vital RF links in communications, broadcast, EMC testing, commercial and military, as well as test and measurement fields. While there is a vast array of RF connectors available, they are all characterized by just a few key parameters. The most obvious characteristic of a connector is its physical size. Other considerations include power handling and frequency range capabilities. To insure maximum power transfer, the characteristic impedance of the connector should match the source and load. All of these characteristics along with connector durability and cost must be considered in light of the specific application. This application note provides guidance and insight in choosing connectors best suited to accommodate your specific application.

Let's begin by reviewing the most commonly found connector types in RF applications. These ubiquitous "traditional" connectors are available in both male and female configurations, standard and precision grades, high frequency and in some cases high power versions.

BNC

The BNC connector is perhaps one of the most widely used connectors in the test and measurement field. It was developed by Bell Labs in the early 1950'S and is most commonly found on oscilloscopes, receivers, analysers and similar lab test equipment. It is typically used for low power interconnections on RF test equipment such as audio and signal generators, oscilloscopes and amplifiers. The inexpensive BNC utilizes a bayonet retention collar to provide quick mate/de-mate action and also serves to prevent accidental disconnection. The BNC connector is typically designed to provide a characteristic impedance of 50 or 75 ohms, depending on the application. BNC connectors are generally rated for use in the DC-4GHz frequency range; however, they are rarely used above 500MHz. While they are capable of handling 80-100 Watts average power up to 1.0 GHz, they typically do not have a maximum power rating but carry a maximum voltage rating of about 500V.

TNC

The TNC connector is merely a threaded-version of a BNC connector. It provides a more secure connection and thus reduces vibration issues found with the BNC. The TNC will operate at higher frequencies and there are high power TNC versions available.

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