

Application Note

RF Coaxial Connector Gender Naming

RF coaxial connectors come in a wide variety of sizes, attachment types (including cable-termination, panel-mount and surface-mount) and coupling systems (most commonly screw-on and snap-on). All have the common traits of a center conductor to conduct a radio frequency signal and a connector housing to make and hold the connection as well as provide grounded shielding of the signal as depicted in the SMA connectors in Figure 1.

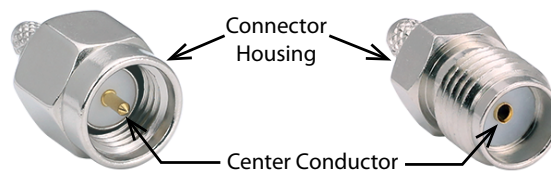


Figure 1. SMA Connectors

The ways in which the two housings and center conductors engage to make both physical and electrical connection have been treated as physical genders, male and female, to describe which half of the connection is which. There are a number of other terms used for the same purpose and they generally align as shown in Figure 2.



Figure 2. Typical RF Coaxial Connector Gender Terms

Of these terms, female or socket, and male or pin, are most often used to refer to the center conductor of the connector while plug and jack are most often used to refer to the housing connection. When considering the mechanical connection which the housing creates between the two connectors, the plug is generally the connector having the housing that initiates and/or holds the mechanical connection. However, there are no rules or even firm conventions across RF industry.

The SMA connector shown in Figure 1 is likely the most common and well-known RF coaxial connector in use. Using that as the “standard,” the connector on the left has a housing that is a plug with a male, or pin, center conductor and the whole assembly is commonly called an SMA plug. The connector on the right is a jack with a female, or socket, center conductor and the assembly is commonly called an SMA Jack. If the connector on the right was intended for printed circuit board mounting, it might be referred to as a receptacle instead of jack.

However, there exists what is called a reverse-polarity SMA (RP-SMA) connector which reverses the center conductors. With an RP-SMA connector, the plug housing has a female/socket center conductor and the jack housing has a male/pin center conductor.

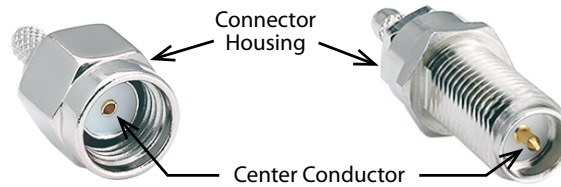


Figure 3. RP-SMA Connectors

Other connector families offer even greater challenges in understanding connector gender naming. U.FL-type connectors, also called MHF or UMCC connectors depending on manufacturer, often follow the RP-SMA format as the norm.

With U.FL connectors, as shown in Figure 4, the housing on the cable is a plug, but in almost all cases, particularly when used as the cabled connection for an antenna, the center conductor is female/socket. The opposite connector is seldom used on a cable and is most often mounted on a printed circuit board and called a receptacle even though it has a male/pin center conductor. While this may be confusing, there is a rationale for it. U.FL receptacles on a PCB board use the robust pin center conductor to last the life of the board which may require many connects and disconnects, while the more easily replaceable cabled plug must maintain the mechanical connection but is not expected to withstand as many interconnect cycles as the receptacle.

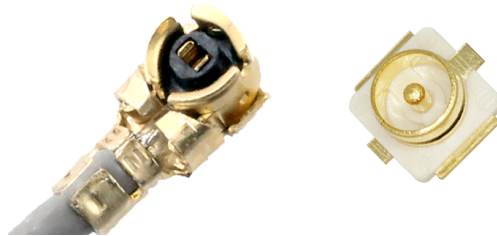


Figure 4. U.FL Connectors

Other connector families exhibit similar traits as well as inconsistencies. Therefore, careful review of RF coaxial connector genders is required in design and specification.

RF Coaxial Connector Selection Best Practices

When selecting connectors there are a few best practices to leverage to ensure that the components selected meet the needs and requirements of the project.

1. Do not rely solely on the part number to convey connector gender. The number may reflect naming for the housing or center conductor, or nothing at all.
2. Focus on the center conductor and housing descriptions which are often provided on distributor websites and in manufacturer data.
3. Be wary of web page descriptions, instead leverage photographs and mechanical drawings which are more typically passed through more stringent review than marketing copy.
4. Consult a field applications engineer or sales to confirm connector characteristics before committing to the design.

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