Ku Band Ortho Mode Transducer – Expansion of the SatCom Product Portfolio

In the past few months, the focus of our satellite communication portfolio was on different C band and Ku band rotary joints. Various models both for C band and Ku band were presented which were specifically tailored to this purpose both in terms of technical features and costs.

C band and Ku band Rotary Joints

Since SPINNER supplies both rectangular as well as circular waveguide rotary joints for the Ku band, it was only consequent to offer the waveguide components which are usually located in between as well. The BN 960802 presented in this issue is an Ortho Mode Transducer (OMT) for the Ku band which is equipped with a band-stop filter for transmit frequencies at the receiver side.

Ortho Mode Transducer (OMT)

Components of this kind are part of satellite communication systems and are used as polarization duplexers which separate or combine transmit and receive signals. The common circular waveguide port with a standard diameter of 19.05 mm (= 0.75") is used as antenna port which carries both transmit and receive signals by means of two orthogonal H11 modes.

The transmit signal is fed to the axial R120/WR75 rectangular waveguide port and transformed into the appropriately polarized H11 mode inside the OMT with exceptionally low reflection and loss. The orthogonal waveguide port provides the receive signals and is arranged perpendicularly to this.

The monolithic design of the OMT produced on high-precision CNC machining centers is the basic requirement for lowest possible mechanical tolerances resulting in excellent electrical parameters.The isolation between the rectangular waveguide ports achievable by polarization discrimination, for example, is a quality feature which is essentially the result of production accuracy. Values of at least 40 dB are ensured over the entire range of 10.75 GHz to 14.50 GHz (measured without band-stop filter); typical values in series production are between 50 and 60 dB.

In interaction with the band-stop filter, which is located at the orthogonal waveguide port for the receive signals and selectively rejects the frequency range between 13.75 GHz and 14.5 GHz, isolation values of 85 dB in the transmit frequency range can be guaranteed (typical: >95 dB).

The material used is, of course, the same seawater proof chromated aluminium alloy as used for our rotary joints. The components are marked by means of abrasion-proof laser engraving. In order to avoid electro-chemical corrosion, all hardware parts and tuning elements are completely made of stainless steel or are properly galvanized to ensure the maximum service life of the components.

Unnecessary soldering and contact spots which are exposed to the transmit signals are completely avoided; this way loss is reduced and the power rating consequently enhanced. It goes without saying that this design is also superior in terms of lowest possible intermodulation.

Typically, there is an excellent broadband VSWR of typically 1.05 (1.10 guaranteed within a transmit frequency range between 13.75 GHz and 14.5 GHz) at the axial waveguide port, whereas the insertion loss towards the round waveguide door is only a few hundredths of a dB (guaranteed value: 0.10 dB).

In the standard version, the band-stop filter at the re- ceive path is adjusted to a stop band of 13.75 GHz to 14.5 GHz which results in a VSWR value at the orthogonal waveguide port of below 1.20 in a range between 12.25 GHz and 12.75 GHz as well as below 1.25 between 10.75 GHz and 12.25 GHz. The attenuation of the receive signals is below 0.25 dB and typically around 0.2 dB. Specific tunings of the band-stop filter as well as customer-specific circular waveguide flanges are possible on request.

SPINNER