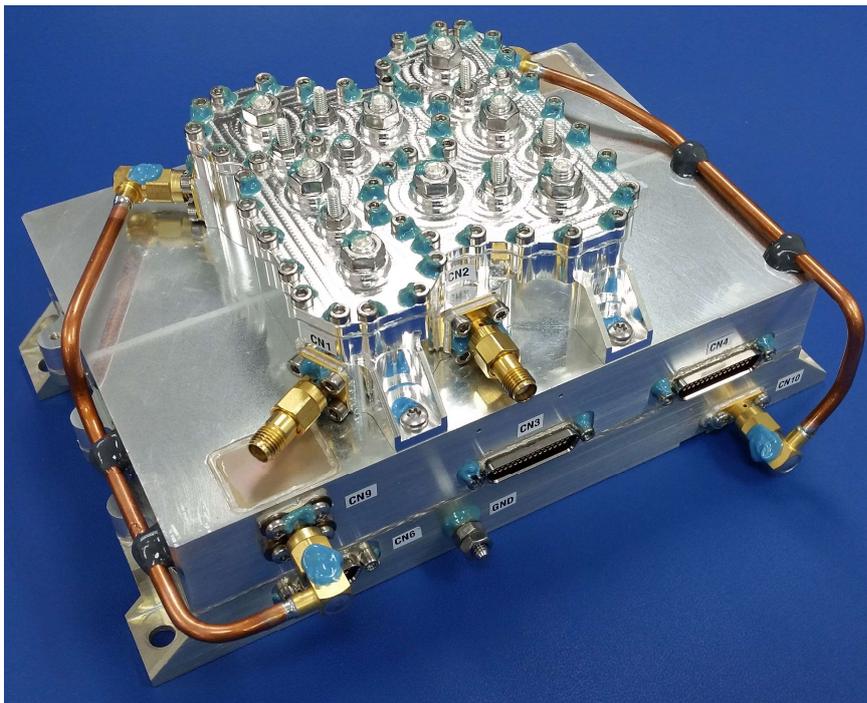


Q893 Case Study-TT&C Diplexer

The S Band TT&C frequencies are used to control spacecraft during the ascent into space and in orbit. Our customer supplies the TT&C transponder and required a filtering solution to fit between their transponder and the antenna.

The dual filter solution on top of its TT&C transponder.



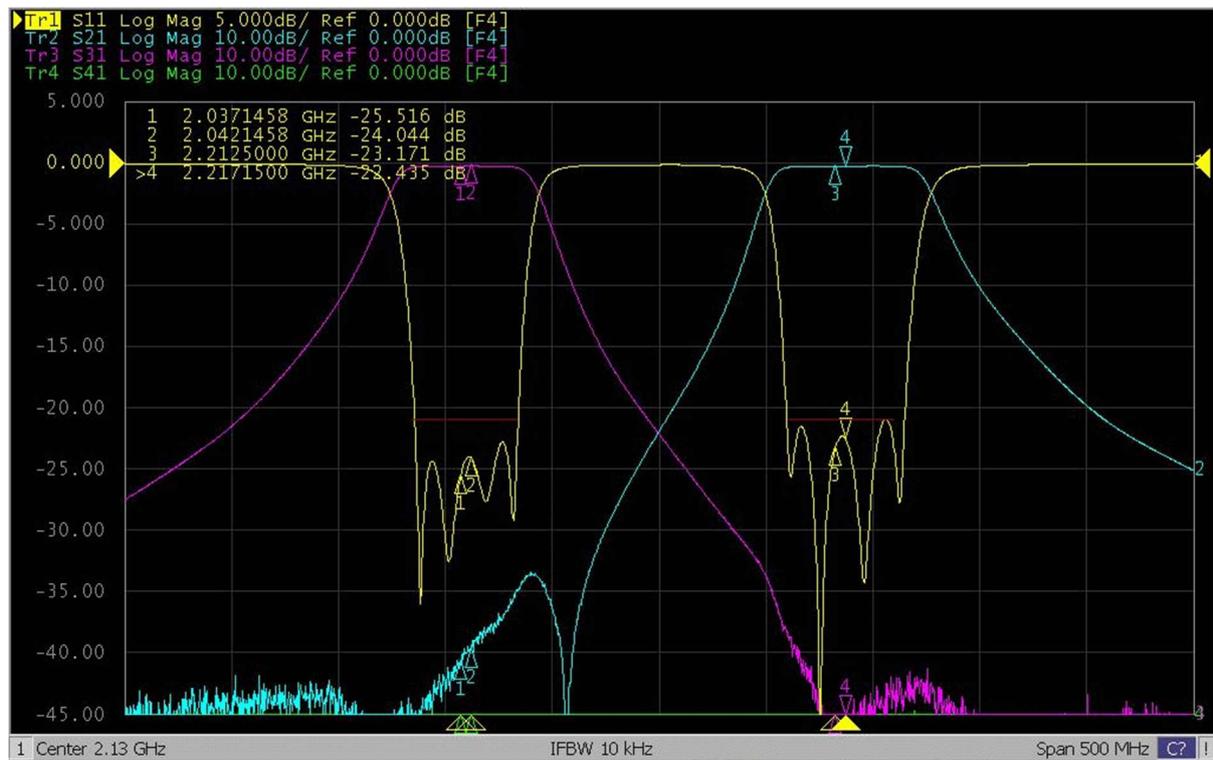
Challenge

The solution needed to suit all types of spacecraft and not breakdown either during the ascent or in orbit. TT&C frequencies are only allocated late in the day so the filters need to be able to tune across the band. Some spacecraft have one antenna while others have separate transmit-receive antennas so a dual filter or diplexer solution, being small, flexible and lightweight was required.

Solution

Two 4 section combline filters each with a stop-pole located at the other channel were designed. This maximised rejection and minimised size. In-house programs were used to work out the voltage at each resonator. The resonators were

shaped to allow the large gaps required to avoid multipaction and electrical discharge at low pressures. The calculations were done at the bottom of the band where the tuning capacitance was highest. Resonator lengths were ear 56 degrees to minimise the bandwidth changes as the frequency was tuned.



A third harmonic rejection requirement meant that a notch was needed which was realised using specially placed tuners. The same basic housing is used for the two filters or diplexer. The only difference being the number of output connectors.

The units are built and tested using clean room facilities at Phase2 Microwave.

These units have successfully flown and one is being used on the Cheops mission to find exoplanets.

