SPACEWIRE CABLE AND CONNECTOR CHARACTERISATION

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Long Paper

Martin Suess

European Space Technology Centre, PO Box 299, 2200 AG Noordwijk ZH, The Netherlands

Steve Parkes, Paul Crawford

Space Technology Centre, University of Dundee, Dundee, DD1 4HN, Scotland, UK

E-mail: martin.suess@esa.int, sparkes@computing.dundee.ac.uk, psc@sat.dundee.ac.uk

ABSTRACT

The SpaceWire physical layer comprising twisted pair cables and micro-miniature D-type connectors is specified in detail in the SpaceWire standard ECSS-E-50-12A. In some cases the physical layer defined in the standard is not fulfilling all requirements. The cables are quite rigid for use in the laboratory and for very long distances cables with the stronger gauge have been proposed as well as different types of connectors. In order to be able to assess the consequences of these modifications a test setup for SpaceWire cable and connector characterisation has been developed and a set of performance parameters to be measured has been defined.

The testing uses a Vector Network Analyser (VNA) and a set of specially developed interface boards to measure the S-parameters. From these S-parameters the figures for return loss, insertion loss, near- and far-end cross talk etc. are derived.

Two different test set-ups have been built and are compared in the paper.
The first uses a conventional 2-port VNA together with baluns on the interface board in order to transform the single ended configuration of the VNA to the balanced configuration of the twisted pair cable. This setup is limited in its maximum measurement frequency to about 1.4 GHz due to the limitations of the balus and it requires a careful calibration.
The second test set-up uses a 4-port VNA. With this the measurement can be extended to higher frequencies and the set-up is simpler but the 4-port VNA is quite expensive measurement equipment and which is not very common today.

Further a number of measurement results of different SpaceWire cables and connectors are show and discussed.