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EVENTECH EVENT TIMER FOR SPACE APPLICATIONS

Abstract

In the framework of the project "On-board Implementation of the Multi-Purpose Event Timer" (ESA Contract No: 4000115326/15/NL/NDe) a new high-precision Space Event Timer for space applications was developed and verified. This Event Timer implementation is based on the unique Eventech's timing technology presented in the A033-ET (developed in the Institute of Electronics and Computer Science) – one of the best Event Timer used in Satellite Laser Ranging Stations around the world. This timing technology uses the Digital Signal Processing of a specific signal produced in response to an input event. It is optimized to elementary operations performed in real time and with high degree of noise immunity. Such optimization allowed implementing the on-board Event Timer version as Qualification Model using the prototypes of the space-qualified components without sufficient loss of the performance parameters despite the fact that these components mostly are very slow comparing to components used in the A033-ET. The implemented Qualification Model of the developed Event Timer was carefully tested for full functionality and performance in the wide temperature range from –35oC up to +75oC and the test didn't detect any failures or loss of the performance and precision. The Event Timer output results are time-tags of the input events in the internal time-scale synchronized to the external 10 MHz Reference from the Time and Frequency Standard and this means that these events can be registered in UTC or any other time-scale supported by corresponding Time and Frequency Standards. Thanks to high precision (single-shot RMS resolution 5-6 ps) and high registration speed (more than 15 million events per second until the internal memory is full) such type of measurements can be used in different space applications, for example: Laser Ranging for space navigation and space debris detection and location; LiDAR and 3-D Scan systems, Time and Data Transfer by laser link, Planetary altimetry, etc.