

High Performance Measurement Application in MicroTCA.4

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Data acquisition systems using open platform standards compared to proprietary systems offers a high modularity and the usage of a variety of different boards from various vendors. Especially the new standard MicroTCA.4 offers the benefit of combining high-speed digital data processing AMC boards together with high precision analog signal conditioning RTM boards. To achieve ultimate analog performance it requires carefully design of AMC and RTM boards, and good understanding of the electromagnetic compatibility (EMC) to maintain the required signal-integrity in a modular system. In this tutorial we show high precision applications far below -80dB using different grounding configurations. Particularly AMC and RTM ac-coupled differential signal transmission via Zone 3 for the detection and regulation of high frequency cavity fields on the fs-level and broadband dc-coupled signal conditioning on AMCs or RTMs. To achieve this we will address the following items:

- 1 Overview and Motivation
- 2 High Performance Applications in MicroTCA.4 systems
 - 2.1 (AMC / RTM) - IF Detection for Cavity Field Regulation
 - 2.2 (eRTMs) - Low Jitter RF and Clock Distribution
 - 2.3 (AMC/RTM) - Broadband baseband Detection
- 3 EMC Zone Concepts
 - 3.1 EMC Zones
 - 3.2 Ground System Topologies
 - 3.3 Interfacing Zones / Systems
 - 3.4 Ground Loops and Breaking Methods
- 4 Grounding in MicroTCA.4
 - 4.1 Grounding Configurations
 - 4.2 Distortion coupling mechanism
 - 4.3 Crate Ground Modelling
 - 4.4 Measuring Ground Distortions
 - 4.5 EMC Optimization
 - 4.6 EMC Debugging
 - 4.7 System Partitioning

Summary

Tutorial

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Session Classification: Tutorial

Track Classification: Tutorials by experts