

# Adapting PC104*Plus* for Space

By  
Dr. Larry Abbott  
Gary Cox  
Hai Nguyen

**Abstract:** This article addresses the issues associated with adapting the commercial PC104*Plus* standard and its associated architecture to the requirements of space applications. In general, space applications exhibit extreme constraints on power, weight, and volume. EMI and EMC are also issues of significant concern. Additionally, space applications have to survive high radiation environment. Finally, NASA is always concerned about achieving cost effective solutions that are compatible with safety and launch constraints.

Weight and volume constraints are directly related to high launch cost. Power on the other hand is not only related to the high launch costs, but are related to the problem of dissipating the resulting heat once in space. The article addresses why PC104*Plus* is an appropriate solution for the weight and volume issues. The article also addresses what NASA did electrically to reduce power consumption and mechanically dissipate the associated heat in a microgravity and vacuum environment, and how these solutions allow NASA to integrate various sizes of ruggedized custom PC104 boards with COTS, PC104 complaint boards for space applications. In addition to the mechanical changes to deal with thermal dissipation NASA also made changes to minimize EMI. Finally, radiation issues are addressed as well as the architectural and testing solutions and the implications for use of COTS PC104*Plus* boards.