

RAD Hard Selection Guidance

Radiation Hardness Assurance (RHA)

RHA is required for all devices that must operate in a radiation environment. Three distinct situations are possible and each must be addressed separately as follows:

- (1) **QML Vendor Technology:** Pieceparts are accepted as qualified for the specified RHA level with no additional testing required when die are procured from a qualified QML vendor and application parameter limits lie within the die specification (a QML qualified die fabrication technology). The parts used in the equipment must pass all TCI/QCI test for the specified RHACL of the QML fabrication technology.

When the specified RHA levels and parameter limits for the qualified die and planned circuit application do not match, additional specification controls are needed. These may best be accomplished with a selected item drawing (SID).

- (2) **Vendor RHA Product Qualification:** When pieceparts are procured from a vendor where the supplier maintains die fabrication technology change control, the parts shall be qualified to the RHA level for the required RHA environment. The qualification test requirements shall be based on the requirements of Mil-PRF-38535, Appendix A, for Class B or Class S devices as appropriate for the application. Group "C" steady state life test shall be performed on a sample of each lot of die to establish parameter deltas. Post-radiation temperature and end-of-life deltas shall be established and documented. Qualification shall be reperformed as a result of a major change of the die vendors die fabrication technology.
- (3) **Commercial Vendor Lot Qualification:** When pieceparts are procured from a commercial semiconductor supplier who does not guarantee change control of the fabrication process, the equipment supplier shall develop and document a plan to assure fabrication lot uniformity (i.e., same wafer lot, homogeneous lot process, etc.) The plan shall identify a lot sample plan and qualification test for each lot based on the RHA requirements for the equipment. The qualification test requirements shall be based on the requirements of Mil-PRF-38535, Appendix A, type of requirement for Class B or Class S devices as appropriate for the application. Group "C" steady state life test shall be performed on a sample of each lot to establish parameter deltas. Post radiation temperature and end-of-life deltas shall be established and documented. Any fabrication lot exceeding initial established deltas shall be scrapped.

Parts Control Procurement Plan (PCPP) for RHA Devices

Since radiation requirements impose additional requirements on the parts control process the basic PCPP will have to be augmented to reflect these requirements. In addition to the normal controls, additional controls are required to establish both the radiation hardness of the device, and the maintenance of this level through the duration of the program. Assurance that the initial hardness level has not changed is a larger effort than establishing the initial level, particularly for the commercial quality system devices. Additional information is required for RHA devices and applications requiring equipment to operate in a radiation environment.