NASA SBIR 2017 Phase I Solicitation

S3.08 Command, Data Handling, and Electronics

Lead Center: GSFC

Participating Center(s): JPL, LaRC

Technology Area: TA8 Science Instruments, Observatories & Sensor Systems

NASA's space based observatories, fly-by spacecraft, orbiters, landers, and robotic and sample return missions, require robust command and control capabilities. Advances in technologies relevant to command and data handling and instrument electronics are sought to support NASA's goals and several missions and projects under development.

The 2017 subtopic goals are to develop platforms for the implementation of miniaturized highly integrated avionics and instrument electronics that:

- Are consistent with the performance requirements for NASA science missions.
- Minimize required mass/volume/power as well as development cost/schedule resources.
- Can operate reliably in the expected thermal and radiation environments.
- Successful proposal concepts should significantly advance the state-of-the-art. Proposals should clearly:
- State what the product is.
- Identify the needs it addresses.
- Identify the improvements over the current state of the art.
- Outline the feasibility of the technical and programmatic approach.
- Present how it could be infused into a NASA program.

Furthermore, proposals developing hardware should indicate an understanding of the intended operating environment, including temperature and radiation. It should be noted that environmental requirements can vary significantly from mission to mission. For example, some low earth orbit missions have a total ionizing dose (TID) radiation requirement of less than 10 krad(Si), while some planetary missions can have requirements well in excess of 1 Mrad(Si). For descriptions of radiation effects in electronics, the proposer may visit (http://radhome.gsfc.nasa.gov/radhome/overview.htm).

If a Phase II proposal is awarded, the combined Phase I and Phase II developments should produce a prototype that can be characterized by NASA.

The technology priorities sought are listed below:

- *System-In-Package Integrated Assemblies* - Technologies enabling highly integrated System-In-Package (SIP) assemblies integrating multiple die from different processes and foundries, enabling implementation of miniaturized, highly-reliable embedded processing or sensor readout modules.

- *Printed Wiring Board Miniaturization* - Technologies enabling miniaturization of highly reliable printed wiring board assemblies and interconnect.
- *COTS Micropower/Ultra-Low Power Computing* - Technologies enabling the use of COTS micropower/ultra-low power computing devices in highly reliable spacecraft avionics systems.

- *Radiation Shielding* - Innovative additive manufacturing and/or deposition technologies starting at TRL 3 are sought to create integral one-piece surface claddings of graded atomic number (Z) materials for use as radiation shielding for electronics. Shielding thicknesses must be able to achieve up to 3 g/cm^2 for initial shielding applications. At the end of Phase I, delivery of layered slabs and/or half sphere samples is expected with areal densities from 1 -3 g/cm^2; samples must be able to show a strong interface property to avoid delamination and consistent density and thickness (areal density) uniformity.