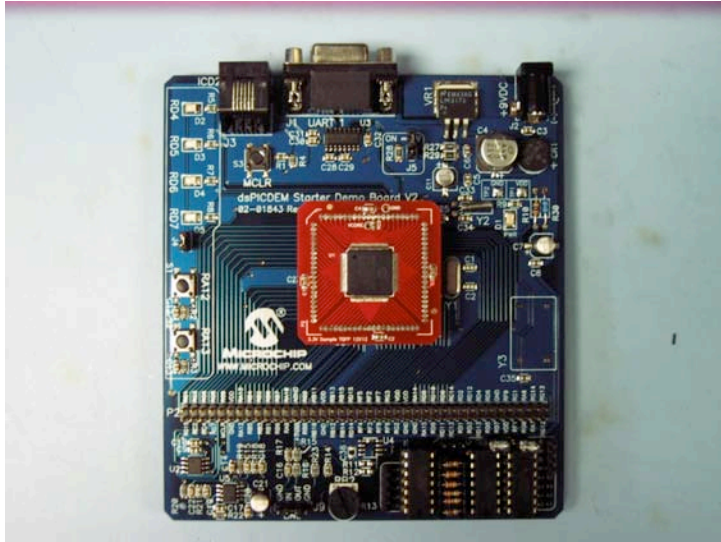


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Aerospace structural health monitoring

The EDI/VT-SHM-003 unit shown above delivers autonomous, self-contained structural health monitoring (SHM) and damage assessment for a variety of aerospace structures. The EDI/VT-SHM-003 features impedance-based SHM and uses miniaturized autonomous sensor/actuator units to detect and diagnose damage. EDI/VT-SHM-003 wireless, self-powered sensor/actuators can operate off energy harvested from vibration and thermal gradients. Each sensor/actuator is a complete SHM system and reports independently; this computationally distributed framework minimizes single points-of-failure. The EDI/VT-SHM-003 is based on a PIC model dsPIC30F6010A (Microchip microcontroller. It has a 30 MHz operating frequency, 16 bit operation, and 8 Kbytes of SRAM memory. The EDI/VT-SHM-003 supports two-channel operation and is powered by a 9 V 400 mAh Li-ion rechargeable battery. The idle system consumes 27 mA for a power of 227 mW. Two channel operation draws 144 mA for a power consumption of 1.21 W. With damage on one or both channels. the current is 173 mA and 201 mA, respectively. Power consumption with damage ranges from 1.45 W to 1.69 W. The EDI/VT-SHM-003 was developed under NASA support and guidance with aerospace requirements as the basic design driver. The EDI/VT-SHM-003 therefore deploys wirelessly and has been demonstrated in simulated launch environments.

CEV reentry / on-orbit operations

General purpose SHM

- Complete structural health monitoring
- Detects micro-cracks, gouges, debonds and other incipient damage
- Autonomous, wireless, self-powered piezoelectric (PZT) sensor/actuators
- Unique all-digital structural excitation and response detection scheme
- Each unit performs a complete SHM process and reports damage
- Computationally distributed framework
- Acts as technology evaluation package
- SHM demonstrated on KSC launch support structures & Boeing TPS
- Wind turbine SHM
- Custom technical support package

EDI/VT-SHM-003 customers and developers

**NASA LANGLEY RESEARCH CENTER / NASA GLENN RESEARCH CENTER
VIRGINIA TECH / LOS ALAMOS NATIONAL LABORATORY
WESTINGHOUSE ELECTRIC COMPANY (NUCLEAR)**