

CSP-02 FM

FEATURES

- Compact Single Board Computer designed around Xilinx Zynq-7020
- Radiation hardening utilizes Space Micro's patented mitigation technologies
- 1U Cubesat form factor (8.81 cm X 8.95 cm)
- Various interfaces supported
- Robust hybrid computing platform for wide range of applications
- Low SWAP-C

SPECIFICATIONS

Processor

Xilinx Zynq-7020 System on Chip (SOC)
Dual Arm Core and Reconfigurable 7-Series FPGA Fabric

2.5 DMIPS/MHz per CPU
CPU frequency: 766 MHz

IO**

Reconfigurable IO:

26x MIO (Multiplexed IO)
60x HR SelectIO (High Range Select IO)

**Not all interfaces can be used simultaneously

Memory

32 Gbit Rad Tolerant NAND Flash [FM]
2 Gbit NAND Flash [EM]*
2 Gbit DDR3 SDRAM (1 Gbit when EDAC is active)

*Legacy Note: All CSP EMs in the 94500 and 97930 RevE series and prior are manufactured with 8 Gbits of NAND Flash.

FPGA Programmable Logic

- 33 MHz or 100 MHz Clock
- 24 differential pairs, 12 single ended
- 140 - 36Kb Block RAM (4.9 Mbit)
- Programmable I/O Blocks Support LVCMOS, LVDS, and SSTL, with 1.2 V, 2.5 V, 3.3 V I/O

Power

1.6 W — 2.85 W

Size

Designed in a 1U Cubesat form factor (8.81 cm x 8.95 cm)

Thickness: 0.25 cm (tallest component) [EM]
Thickness: 1.73 cm (tallest component) [FM]

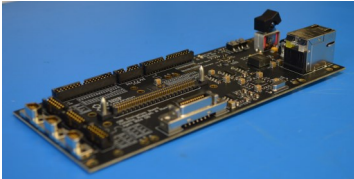
Mass

60 g [EM]
74 g [FM]

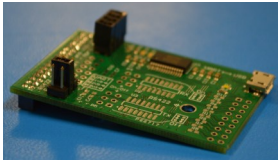
SPECIFICATIONS

Interfaces

CSP Evaluation Board



CSP USB/UART Board



CSP Board

EM kit includes:

Connects to Samtec SEAR-RA 4x40 Connector on CSP

Included PHYs:

1x USB
1x Ethernet
1x JTAG
1x UART
3x SpaceWire
1x CameraLink
GPIO Breakout Headers
Power Regulators to Power CSP
FMC Header



CSP-01 EM Development Kit

Connects to Evaluation Board

USB to UART Converter

SpaceWire
UART
SPI
I2C
JTAG*
Ethernet*
USB*

*Requires external PHY (Included with EM Evaluation Board)

Parts Grade

Commercial Space

Operating Temperature

CSP-01: EM 0°C to 70°C

CSP-02: FM 0°C to 70°C

Workmanship Standards

CSP-01: IPC-A-610 Class 2 Acceptability of Electronic Assemblies

CSP-02: IPC-A-610 Class 3 Acceptability of Electronic Assemblies, J-STD-001 with the J-STD-001 Space Addendum

End Item Data Package (EIDP)

Engineering Model

- CSP PCBA Kit Test Procedure/Record
- CAD Model for CSP PCBA (SolidWorks)
- Certificate of Conformance

Flight Model

- CSP Board Test Procedure/Record
- CSP Load Procedure/Record
- Random Vibration Test Procedure/Record
- Thermal Cycle Test/Record
- Burn-In Test Procedure/Record
- Non-Environmental Test Procedure/Record
- Certificate of Conformance

SPECIFICATIONS

Hardware Models

CSP-01: Engineering Model [EM]
CSP-02: Flight Model [FM]

Connector

Samtec SEAR-RA 4x40 Connector
Designed to be Connected to a Samtec SEAM 4 x 40 Backplane

Radiation Tolerance

SEL

No Destructive Events
Watchdog SEL/SEB LET_{TH} : 86MeV•cm²/mg

SEU

Unmitigated—Same SEU rates as a commercial Xilinx 7 family Zynq part
30 krads (Si)

TID

Mitigated with Watchdog for ARM Cores (Patent Number 7,237,148 plus Re-Examination Certificate number RE42,314 C1)

SEFI

Software

Operating Systems

Bare Metal
Wumbo GNU/Linux
ThreadX

Bare-metal functional test code is included. In addition, demo programs utilizing ThreadX operating system and NetX extension have operated with success on this platform.

Many additional Options are supported on the Zynq-7020. Refer to Xilinx literature for more details.

Testing

Tested Interfaces (EM and FM)	Test Code Provided	Comments
NAND Flash	Yes	Tested across entire memory range.
DDR3	Yes	Tested across entire memory range. Read and write eye tested.
Spacewire	Yes	Transmit (Tx) and Receive (Rx) packets validated through external Spacewire probe.
Serial Peripheral Interface (SPI)	Yes	Tested Tx and Rx packets.
Ethernet PHY	Yes	Internet ping test. Assigned MAC address.
USB-UART	Yes	Tx and Rx packets used for outputting all serial test data to external PC.

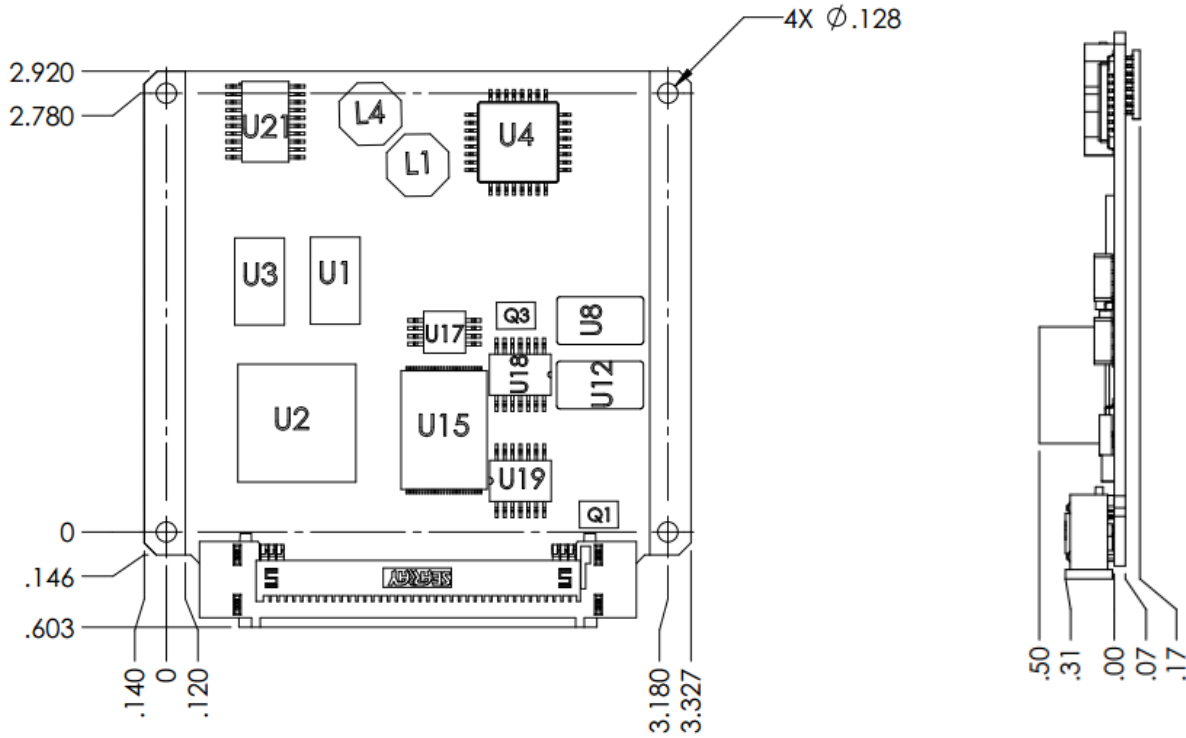


Figure 1: CSP-02 FM (dimensions in inches)

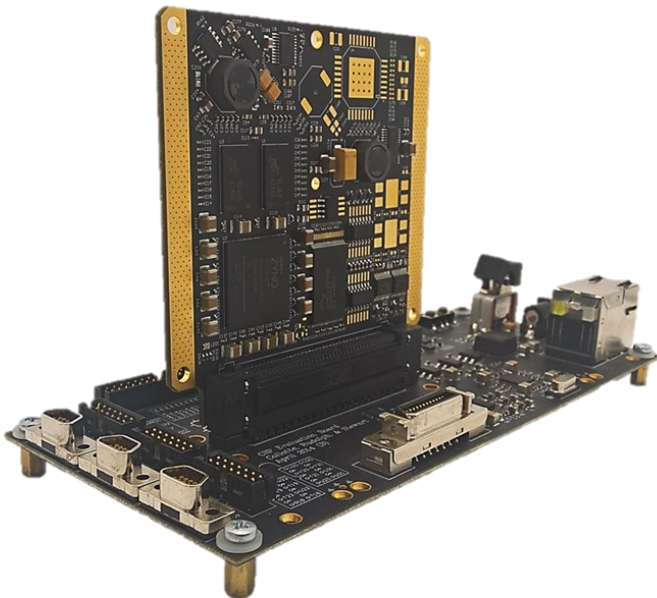
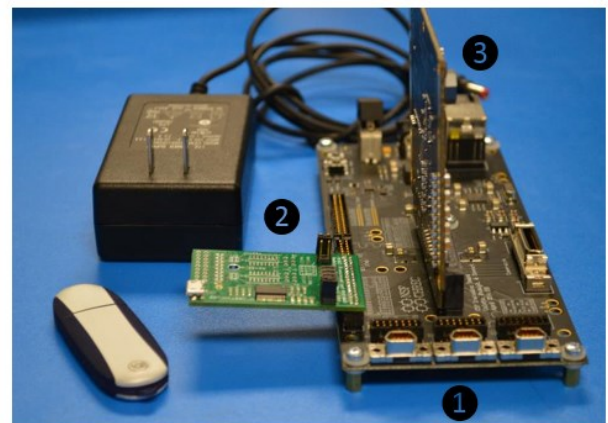


Figure 2: CSP-01 EM on Evaluation Board



CSP Development Kit

- ① Evaluation Board
- ② USB to UART Converter Board
- ③ CSP

Figure 3: CSP-01 EM Development Kit