

ASTROSDR

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SDR AND DSP SYSTEM FOR SPACEFLIGHT

- Dual receivers & transmitters, 70 MHz to 6 GHz
- Xilinx Zynq Z-7045 FPGA & dual ARM system-on-chip (SoC)
- Daughter card interface for expansion, I/O, and custom applications
 - 64 Gbyte eMMC flash memory card
 - Gigabit Ethernet and flash memory card with GPIO
- 64 GByte eMMC flash on daughter card for data storage
- Designed for CubeSat Next-Generation Bus (CNGB) and Space Plug-and-Play Architecture (SPA)

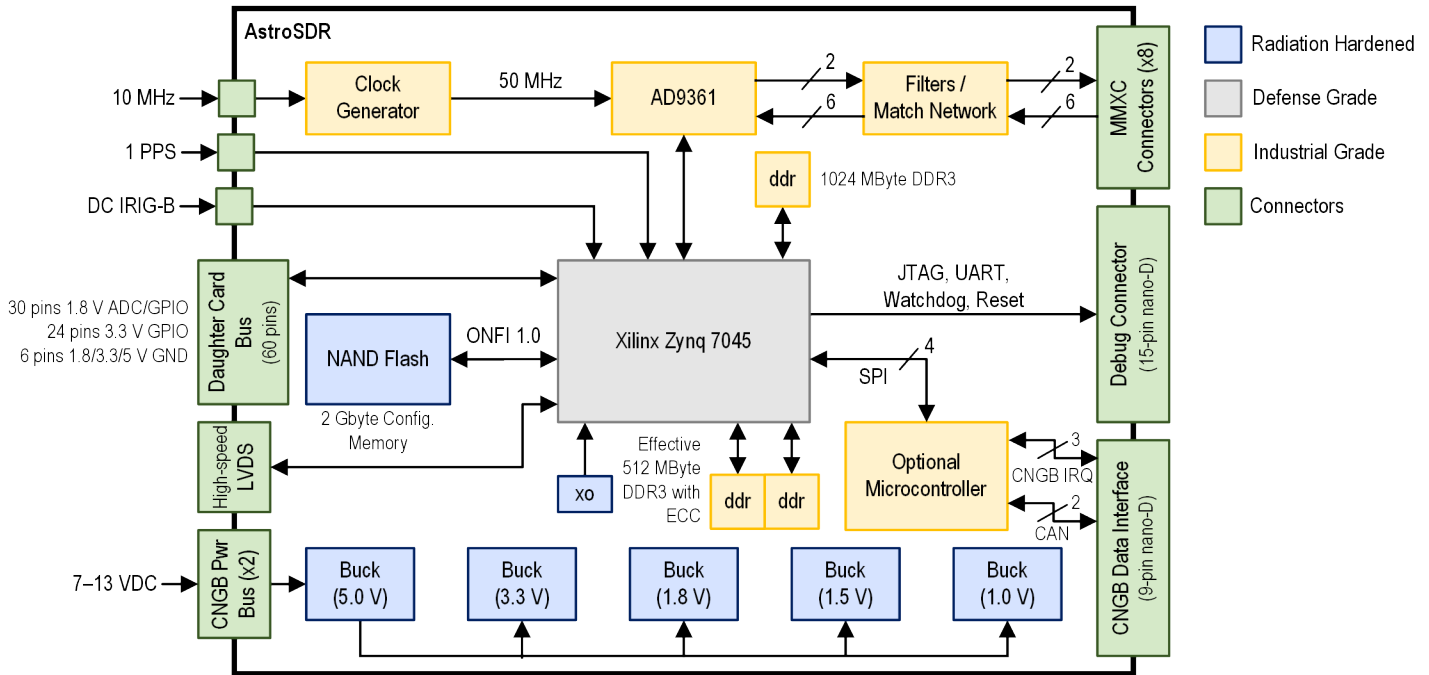
THE ASTROSDR PRODUCT FAMILY provides key components for a user-developed RF payload: receiver, transmitter, FPGA, ARM processor, data storage, and high-speed I/O. The board-support-package includes pre-build functions for interfacing to the radio, ARM processor, and eMMC storage, as well as a Vivado project to assist the user in developing their own unique applications.

ASTROSDR HAS THE DEVELOPER-FRIENDLY FEATURES found in our terrestrial SDR and DSP systems. The on-board processor runs embedded Linux, providing a flexible and capable development environment. APIs are provided for basic control of the FPGA, receivers, and transmitters.

ASTROSDR HAS MULTIPLE INTERFACES for I/O and command/control: dual UARTs, two FPGA-attached LVDS pairs, and an Ethernet interface on an optional daughter-card.

RINCON RESEARCH SUPPORTS MISSIONS with more than just hardware. We provide mission planning and operation services. We also have unique IP for digital signal processing, including interference cancelation, high-rate modems, adaptive beamforming, geolocation, and space situational awareness.

BLOCK DIAGRAM



SPECIFICATIONS

PROCESSING

- Xilinx Zynq 7045 FPGA and dual ARM SoC
- Dual-core Arm Cortex A9 with NEON, up to 733 MHz
- 512 MByte DDR3 RAM (with ECC)
- 2 GByte flash for radiation-tolerant OS storage
- Kintex-7 FPGA fabric: 350k logic cells
- 900 DSP slices
- 1 GByte DDR3 RAM (ECC capable)
- 64 GByte eMMC flash on daughter card, designed to support dual-channel recording at up to 8 MS/s (32 Mbytes/s)
 - Each eMMC supports sustained write speeds of 8Ms/s

MECHANICAL

- 90 mm x 90 mm (3.543" x 3.543")
- Approximately 95 grams (without heatsink or daughter card)

ENVIRONMENT

- Operating Temp: -40°C to 85°C (flight), 0°C to 85°C (eng.) wider range available upon request
- Vibration: Passed GEVS proto-qualification levels
- Thermal Vacuum: Passed CNGB spec -20°C to +50°C operational
- Projected radiation performance report available upon request

POWER

- Power: CNGB compliant, 7 VDC to 13 VDC
- Standby: 18 mW (typ)
- System Management: 3.5 W (no FPGA load, ARM booted)
- Idle: 4 W (typ)
- Passive Collect: 5.5 W (typ, includes recording to flash)
- Max: 30 W

DIGITAL INTERFACES

- **CAN:** Microcontroller connected and bus powered
 - Remote on/off capable
 - 9-pin nano-D connector (2x for pass-through)
- **Timing Signals:** FPGA connected
 - 1 PPS, 5/10/50 MHz reference
 - Serial timecode (DC-IRIG-B) (MMCX)
- **Daughter Card Interface:** 30 pins 1.8 V GPIO (includes 11 ADC channels)
 - 24 pins 3.3 V GPIO
 - Samtec LSHM-130 60-pin strip, available for connections to custom board or cables
- **LVDS:** FPGA connected, 4-LVDS pairs up to 200 MHz operation (or 8 GPIO)
 - 9-pin nano-D connector
 - Supports HDLC (transmit only)
 - Supports SpaceWire link layer
- **Development Interface:** External watch dog timer input, Reset, JTAG, UART console
 - 15-pin nano-D connector

ECCN 9A515

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