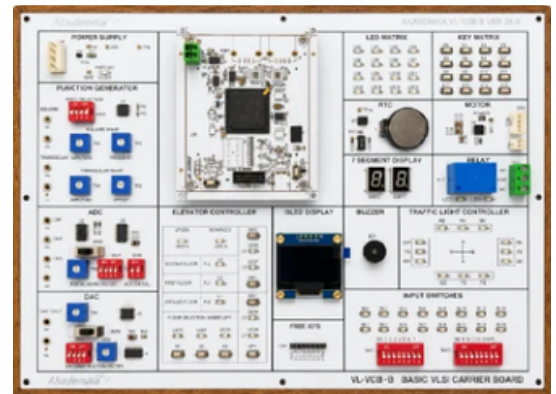


VL-SPARTAN7

Spartan-7 SoM with Basic Carrier Board



FEATURES

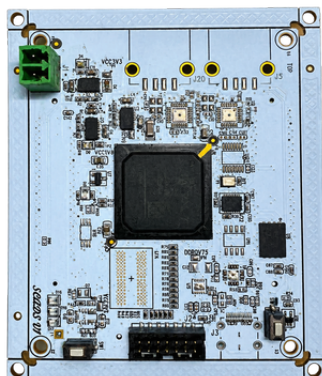
- Based on FPGA Spartan-7 XC7S50-1FGGA484I
- SOM Interface : high-density board-to-board for SOM
- 87mm x 67 mm board size Compact form factor
- Linux BSP, tool chain and Support available
- Industrial Grade, Rugged platform
- On module required power supplies for efficient power management
- Linux board support package along with Root file system enables seamless integration
- Customized Carrier boards for instant board bring-up and quick prototyping

CONFIGURATION & I/O

- FPGA configuration through USB JTAG
- On-board breadboard · 6 free I/Os on connector
- JTAG-to-USB programming cable provided
- Software for Spartan-7 : VIVADO

SPECIFICATIONS

System on Module Board



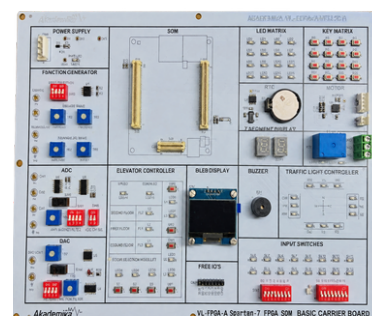
- Device: FPGA SPARTAN 7 XC7S50-1FGGA484I
- DDR3: 256 Mbit, DDR3
- JTAG: On-board standard JTAG connector, 14-pin, 2 mm pitch, dual row
- Flash: On-board programming Flash, 128 MB

- IOs: 3 Nos. of I/O 0.8 mm board-to-board connectors with max. 169, 3.3 V I/Os

OPTIONAL Interface Present on SOM Hardware

- LEDs: On-board 3 LEDs for indications
- EEPROM: I2C EEPROM, 1 Mbit size
- DEBUG: UART debug interface over USB Type-C connector
- USB: On-board 2 USB 2.0 Type-A connectors, self-powered USB ports

CARRIER BOARD



CARRIER - CORE, RESET & DEBUG

- Power : Regulated supply as per SOM & peripheral load 1.2V, 2.5V, 3.3V
- RTC : External real-time-clock provision
- Test points : For important signals and power rails
- SOM Interface : high-density board-to-board for SOM
- On board 50MHz clock and Power On reset circuit.

CARRIER - FUNCTION GENERATOR

- Square and triangular wave generation
- Frequency variable 4 KHz–40 KHz with fine & coarse selection (both waves)
- Amplitude variable 0–2 Vp-p for square and triangular wave
- Offset adjustment for triangular wave

ANALOG INPUTS

- Anti-aliasing filter at ADC input (ch 1) with time-constant adjustment
- ADC AD7934 (12-bit) with 4 channels
- Thermistor interface on ADC channel 4

ANALOG OUTPUT

- Reconstruction filter at DAC output with time-constant adjustment
- DAC TLV5619 (12-bit, 100 ns conversion time)

USER INTERFACE

- 16 input switches · 4×4 LED matrix
- 4×4 matrix keyboard
- Two 7-segment displays · OLED display

CONFIGURATION & I/O

- On-board breadboard · 6 free I/Os on connector

FSM APPLICATIONS (ON-BOARD)

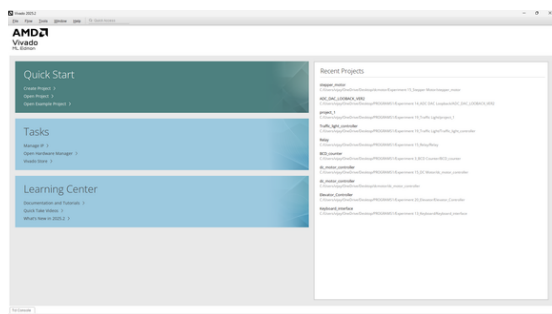
- Traffic light controller
- Elevator controller

MOTOR - RELAY - RTC - BUZZER

- Stepper motor — 5 VDC, 25–100 steps/sec
- DC Motor — 5 V
- Relay — One NO & NC contact via 5 VDC relay
- RTC — Real-time clock via I²C bus
- Buzzer — On-board buzzer interface

SOFTWARE

- AMD Vivado Design Suite is a software tool used to build and program digital hardware for AMD adaptive SoCs (System on Chips) and FPGAs (Field Programmable Gate Arrays)
- **Design Entry:** Write hardware code using VHDL or Verilog, or use visual block diagrams via the IP Integrator.
- **Synthesis:** Change your high-level code into a gate-level netlist optimized for your specific chip.
- **Implementation:** Handle the physical Place and Route steps to connect logic cells and meet timing limits.
- **Verification:** Simulate and test designs before loading them onto real hardware.
- **Bitstream Generation:** Create the final binary file (.bit) needed to program the FPGA.
- **Hardware-centric design:** Used for creating the physical digital logic on the FPGA fabric.
- **Core tasks:** Handles design entry (writing Verilog, VHDL, or block diagrams), synthesis, place-and-route, and timing/power verification.
- **Output:** Generates the hardware bitstream and an XSA (Xilinx Support Artifact) file, which describes the hardware layout for software tools.



EXPERIMENTS

Implementation and verification of Verilog

- 8:1 MUX.
- T-flipflop, D-flipflop, RS-flipflop, JK-flipflop
- BCD counter, Down Counter.
- 8-bit bidirectional shift register.
- 4-bit comparator.
- Active low 2:4 Decoder
- 8:3 priority encoder.
- binary to gray converter.
- Full Ripple Carry adder and
- Full Ripple Borrow Subtractor.
- 4-bit ALU. a. BODMAS Rule.
- PRBS generator.
- LED Matrix testing.
- Keyboard testing.
- Buzzer, Relay.
- OLED testing.
- temperature display on OLED.
- RTC display on OLED.
- Traffic Light Controller.
- Elevator Controller.
- Many and more Experiment Support.

