

# VL - FPGA - A : ADVANCE SPARTAN 7 FPGA TRAINER

## This Evaluation Board has Two Board System

- Spartan 7 System on Module Board
- Carrier Board

### System on Module Board

Device : FPGA SPARTAN 7 XC7S50-1FGGA484I

DDR3 : 256MBit, DDR3

JTAG : ON Board standard JTAG Connector 14 pin 2mm pitch dual row

DEBUG: UART Debug interface over USB type C connector

USB : "On Board 2 USB2.0 Type A connectors. Self-power USB ports"

EPROM: I2C EEPROM 1Mbit size

Flash : On Board Programming Flash 128MB

IOs 3 Nos of IO 0.8mm Board to board connector with Max 169, 3.3V

IOs

LEDs On board 3 LEDs for Indications

EPROM I2C EEPROM 1Mbit size

### Carrier Board

Power Supply: 2.5V, 3.3V & 1.2V

### Onboard function generator

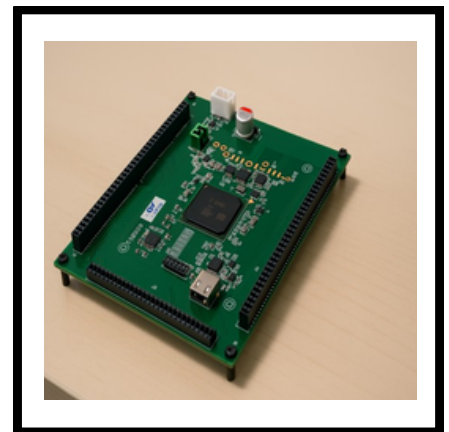
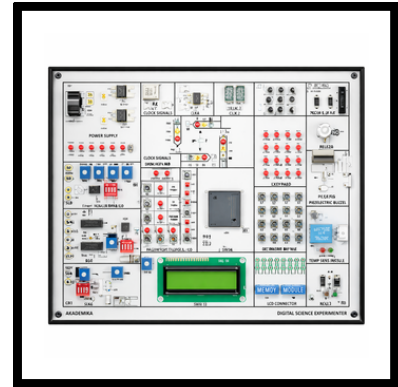
- Provision for Square and Triangular wave generation
- Frequency variable from 40 to 100 KHz with provision of fine and coarse selection for both square and triangular wave
- Amplitude variable from 0 to 2Vp-p for both square and triangular wave
- Offset adjustment for triangular wave

### Onboard Motor interface

- Stepper motor interface using 5-VDC, 200 steps / revolutions motor
- 5V DC, DC motor interfaced using unpolarized connection so that it can be reversed

### Onboard Relay Interface

- One NO and NC contacts are provided using 5-VDC relay



## **Onboard RTC interface**

- Real time clock interface using I2C bus

## **Onboard Buzzer Interface**

## **Analog inputs**

- ADC AD7934 (12-bit) with 4 channels to be used
- Thermistor interface to be given to ADC channel 4
- Anti-aliasing filter at the input of ADC (channel 1) with provision for time constant adjustment

## **Analog output**

- DAC TLV 5619 (12-bit, 100ns conversion time)
- Reconstruction filter at the output DAC with provision for time constant adjustment

## **Applications of Finite State Machine in FPGA**

### **Onboard**

- Traffic light controller
- Elevator controller

### **User interface**

- 16 input switches
- 4X4 LED matrix
- 4 X 4 matrix keyboard
- Two 7- segment displays
- OLED display

## **FPGA configuration through: USB JTAG**

On board Breadboard

Free I/O's on Connector

JTAG to USB programming Cable will be provided with the system.

## **Experiments that are possible and its HDL Codes will be provided**

- a. Implementation of Multiplexer, Decoders, Encoders, Flip Flop, Counters etc.
- b. Design and Implementation of RAM and ROM using FPGA
- c. Design and Implementation of 4-bit, 8-bit and 32-bit Arithmetic Logic Unit (ALU)
- d. Interfacing of ADC & DAC and develop an application to display Temperature
- e. Applications of Finite State Machine in FPGA like Traffic Light Controller & Elevator Controller
- f. PRBS Generator
- g. RTC Interface using I2C Bus
- h. Design Applications using LED Matrix