

### Training Contents

#### Introduction

Analog and Digital Design Flow  
Getting Started

#### HDL(Hardware Description Language)

Structure and Foundation of VHDL  
Structure and Foundation of Verilog HDL

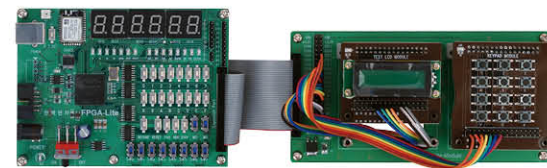
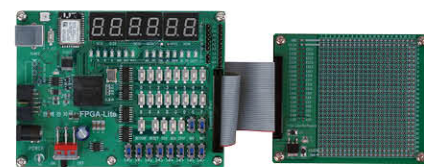
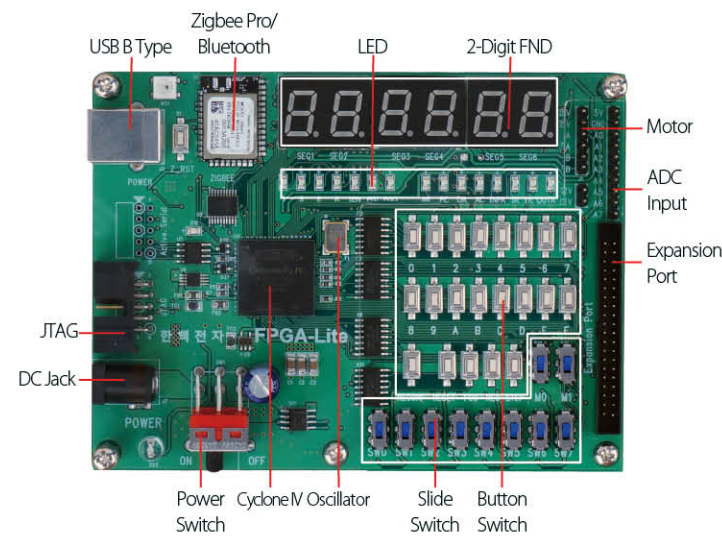
#### Digital Logic Circuit

Logic Gate Design  
Operation Circuit  
Combination Logic Circuit  
Flip-flops and Applications  
Counter  
Register  
State Machine

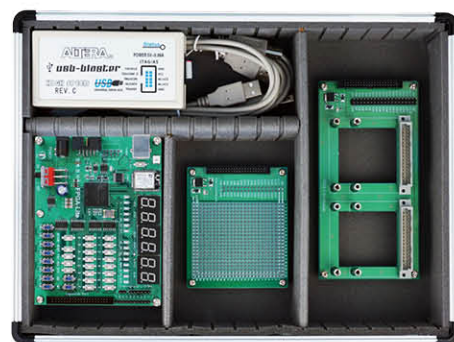
#### Application Logic Design

Clock Design using FND Array  
Piano Design using PIEZO  
Serial Data Communication with PC  
Wireless Communication using Zigbee

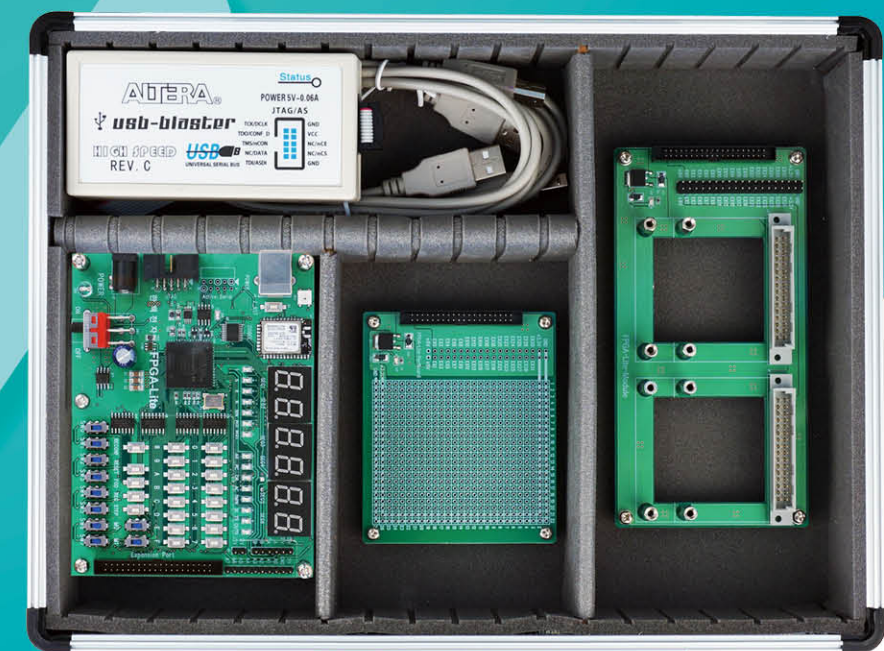
### Layout



### Product Configuration



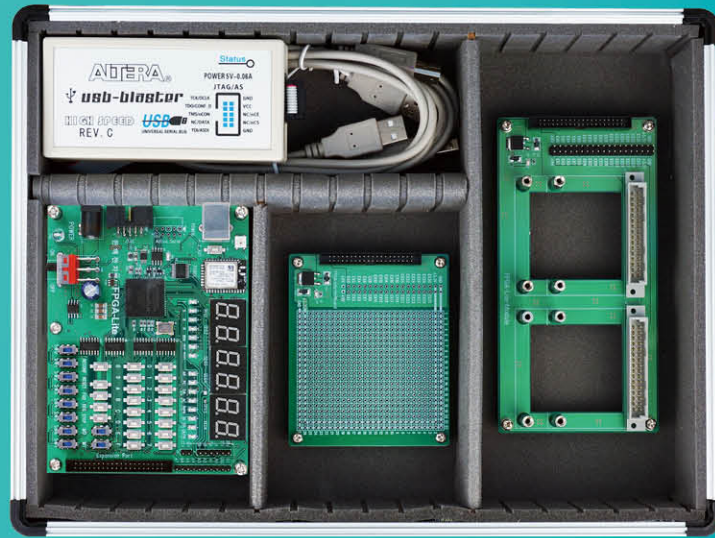
FPGA Lite



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# FPGA Lite

- Cyclone IV and EPCS PROM are built-in to enable fast programming through JTAG
- Basic logic circuit experiment and design through 1MHz oscillator
- Input/output devices such as Button Switch, Slide Switch, LED, and 7-Segment are configured by default
- Basic operation possible through USB power of PC
- 8ch ADC and Motor Driver are built-in as standard, possible to configure various input devices and drive the driver using a separate power adapter
- Built-in Zigbee Pro/Bluetooth function to utilize IoT connectivity application training device
- User circuit is configured using double-sided universal board in the form of breadboard
- Through the expansion interface board, various experiments and projects are possible with 10 kinds of option modules such as Display Module (FND, OLED, etc.), Actuators (Motor, Relay, etc.), Sensors (CdS, Temperature/Humidity, etc.), and I/O device

## Software Specifications

List	Specifications
Quartus Prime Lite Edition	System and Software Requirements   Windows 10 64bit or higher

## Hardware Specifications

List	Specifications
FPGA-Lite	Device : Cyclone IV E Series PROM : EPCS4 Download Port : JTAG Clock : 1Mhz Input Device Button Switch : 20EA Slide Switch : 10EA Output Device LED : 15EA FND : 2 Digit 7-segment 3EA Piezo : 1EA ADC : SPI Interface, 8ch 1EA(10pin Header Support) Motor Driver : 12V/4A, 6pin Header support USB : B Type 1EA, Serial to USB Interface Expansion Port : 2x20 2mm Pitch Box Header (40Pin IDC Ribbon Cable Support) Size : 120 X 90(mm)
Expansion Board (Bread Board Type)	Bread Board : 2.54mm Pitch, 22x27 FPGA-Lite Interface : 2x20 2mm Pitch Box Header Power : +5V, +3.3V, GND Size : 75 X 90(mm)
Option Module Interface Board (Option)	Option Module Interface : 2x16, 2.54mm Pitch DIN Connector 2EA FPGA-Lite Interface : 2x20 2mm Pitch Box Header Power : +5V, +3.3V, GND Size : 148 X 90(mm)

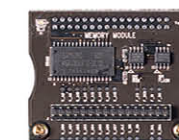
## Option Module



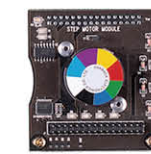
Text LCD Module



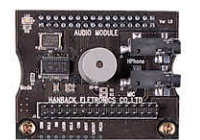
OLED Module



Memory Module



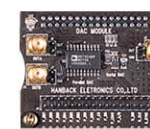
Step Motor Module



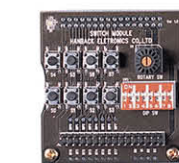
Audio Module



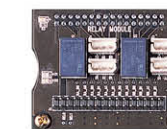
Sensor Module



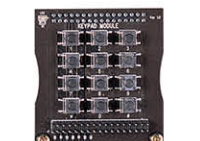
DAC Module



Switch Module



Relay Module



Keypad Module