

## >>FPGA



ALTERA



XILINX



### Selectable ALTERA, XILINX device modules and various application modules

#### HBE-Combo II

- Modularized ALTERA, XILINX devices
- Flexible and extendable capacity of device design
- Experiment on various application examples using peripheral devices
- Selecting 16 input frequencies through Clock Control Block
- Loadable on various application modules

#### Features

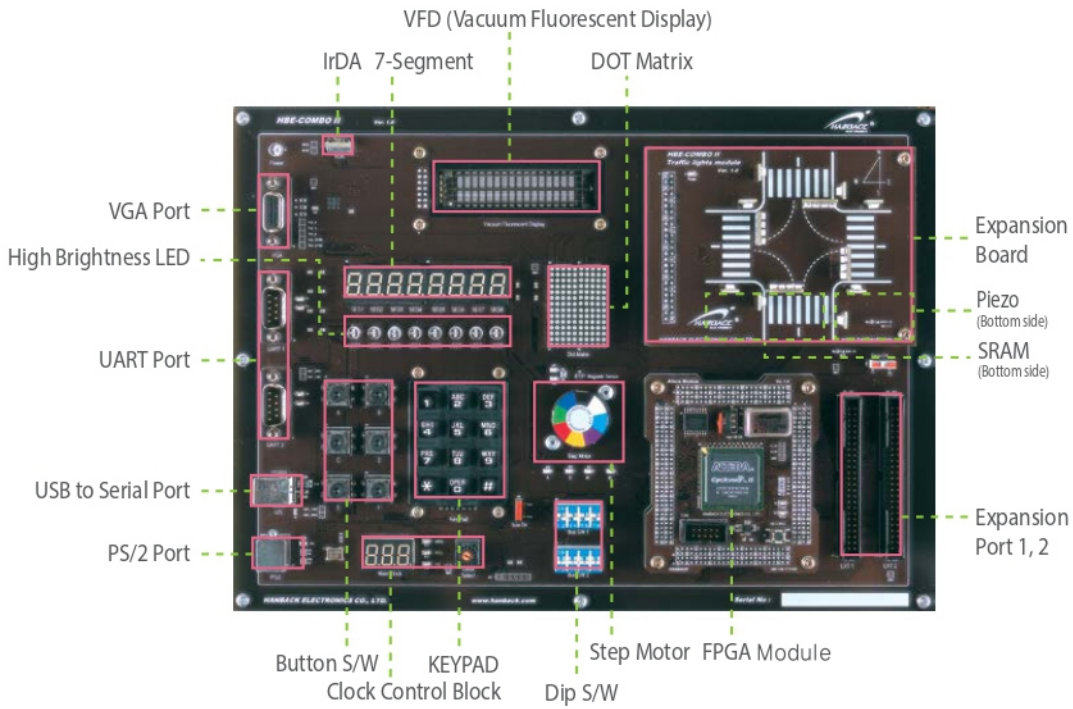
- Make ALTERA and XILINX devices replaceable with each other through modularization, taking the FPGA device's flexibility and extendibility into consideration.
- Supply an independent power to a module for its single use by making it possible to mount the FPGA device and configuration device oscillator on the device module.
- It is possible to receive 16 types of base clocks and user clocks ranging between 0Hz and 50MHz by using the Clock Control Block. And users can select a clock by using the User Clock EN switch of the FPGA module.
- There are 50 pin X 2 extendable ports to interface the user-made input/output devices. Moreover, users can control data in other places than a board. There is an extendable port on the top of a board to mount a dedicated module on it.
- Users can make a program easily by using a hardware module to connect the PC used in various tasks (FPGA Download, PROM Program).

#### Software

- **ALTERA : Quartus II Web Edition**
- **XILINX : ISE Webpack Design Software**

A design software can be downloaded free of charge from a download center of each device homepage. The Quartus II provided in the ALTERA is designed to control the ALTERA FPGA, while the ISE provided in the XILINX aims at controlling the XILINX FPGA.

## Component Names



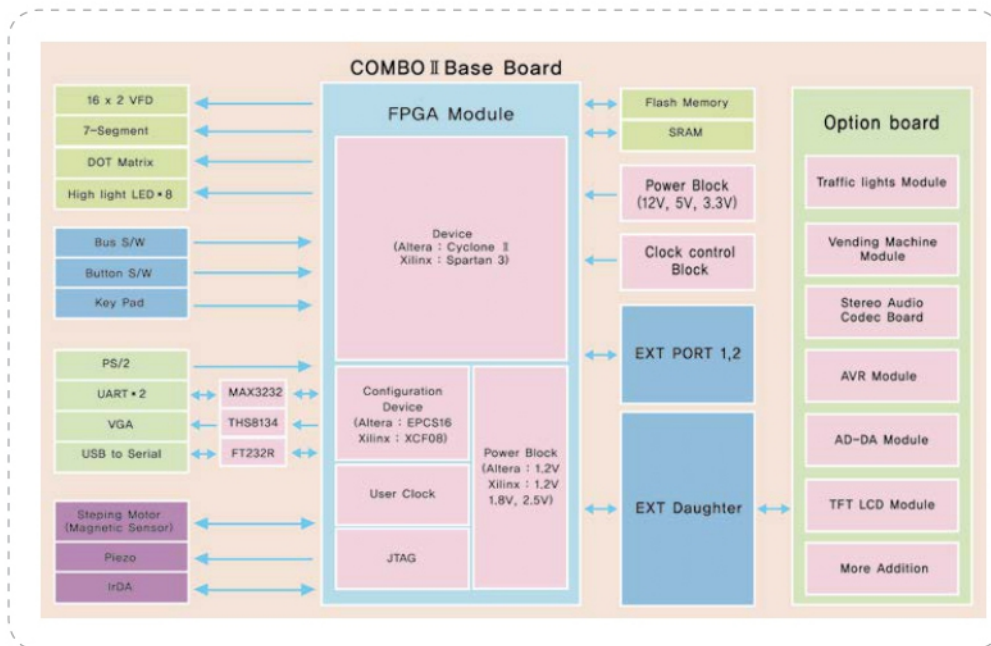
## FPGA

HBE-Combo II-DLD

**HBE-Combo II**

HBE-Combo II-SE

## Block Diagram



## FGPA >>HBE-Combo II

### Hardware Specifications

| Items                                 | Description  |
|---------------------------------------|--|
| <b>FPGA Device (Selectable)</b>       | ALTERA : Cyclone II Series (EP2C35 ~ 70F672), User I/O : 408 pin<br>XILINX : Spartan-3 Series (XC3S1000 ~ 4000FG676), User I/O : 391 ~ 408 pin |
| <b>Configuration ROM (Selectable)</b> | ALTERA : EPCS16, XILINX : XCF08PVO48 or XCF16PVO48   |
| <b>SRAM</b>                           | 256K * 16 bit High Speed Static RAM  |
| <b>Flash Memory</b>                   | 128 Mbit Embedded Flash Memory (Option)  |
| <b>Clock</b>                          | 50MHz base board Oscillator 1EA, Ext User clock  |
| <b>VGA Port</b>                       | 1024 * 768 Resolution 24-Bit True-color VGA port 1EA   |
| <b>USB Port</b>                       | USB to Serial Interface  |
| <b>Serial UART Port</b>               | RS232 UART Port 2EA (FPGA I/O)   |
| <b>PS/2 Port</b>                      | PS / 2 Keyboard or PS / 2 Mouse port 1EA   |
| <b>Keypad</b>                         | 3 * 4 KeyPad Switch  |
| <b>Input Button</b>                   | User Push Button 6EA   |
| <b>Input Bus Switch</b>               | User 8 bit DIP Switch 2EA  |
| <b>High Brightness LED</b>            | User LED Displays 8EA  |
| <b>7-Segment</b>                      | 4 Digit 2EA (Total 8 Digit)  |
| <b>VFD</b>                            | 16 * 2 Vacuum Fluorescent Display 1EA  |
| <b>Dot Matrix</b>                     | 10 * 14 Dot-matrix 5 * 7 Dot-matrix 4EA  |
| <b>Piezo</b>                          | 5V Input Piezo 1EA   |
| <b>Step Motor</b>                     | Step Motor with Phase LED 1EA  |
| <b>Sensor</b>                         | Magnetic Sensor 1EA  |
| <b>IrDA</b>                           | Compliant 4Mbps 3V Infrared Transceiver  |
| <b>Expansion Port</b>                 | 25 * 2 I/O Expansion port 2EA (Support total 92 pin), 5V Supply  |
| <b>Expansion Board</b>                | 25 * 2 I/O Expansion port 1EA (Support total 44 pin), 5V, 12V Supply   |
| <b>Power</b>                          | Input 220V/60Hz AC/Output : +5V, +3.3V, +2.5V, +1.8V, +1.2V  |
| <b>CD</b>                             | Electronic manual & example CD 1EA   |
| <b>Manual</b>                         | User's Guide   |
| <b>Accessory</b>                      | 220V Power cable 1EA<br>Serial cross cable 1EA<br>USB Downloader(Altera & Xilinx)  |

※ Specifications can be changed without notice

### Option Module

#### • Stereo Audio Codec



- 4EA Stereo-Audio Jack (MIC IN, Line In, Line Out, Headphone Out)
- 4EA Control Button Switch
- AIC23B (Stereo Codec)
  - 90dB SNR ADC
  - 100dB SNR DAC
  - 8KHz ~ 96 KHz Sampling Frequency

## • Vending Machine



- Implemented by Module
- Text LCD
  - 16 x 2
  - Display of Status, Item and Price
- Button S/W
  - Item select
  - Cash Insert and Refund
- LED
  - Indicate status of Item output and Button input

## • AVR



- Microprocessor ATmega128 interface module
  - Processor
    - ATmega128L
    - 4KBytes SRAM, EEPROM
    - 128K Bytes Flash
    - ADC
- Sensor
  - Temperature & Humidity Sensor
  - Distance Measuring Sensor
  - Photosensitive Resistance Sensor

## Contents

### Contents of Education

#### HBE-Combo II

1. BASIC VHDL THEORY
2. SCHEMATIC & VHDL PRACTICE
3. UNDERSTANDING ALTERA QUARTUS II
4. UNDERSTANDING XILINX ISE
5. APPLYING HBE-COMBO II 100%
6. APPENDIX

## Package contents

#### HBE-COMBO II (Altera)

- USB A-B cable 1EA
- 9pin Serial cable(female to female) 1EA
- USB Downloader
- 220V Power cable 1EA
- CD 1EA
- Textbook 1EA

#### HBE-COMBO II (Xilinx)

- USB A-B cable 1EA
- 9pin Serial cable(female to female) 1EA
- USB Downloader
- 220V Power cable 1EA
- CD 1EA
- Textbook 1EA

## FPGA

HBE-Combo II-DLD

**HBE-Combo II**

HBE-Combo II-SE