

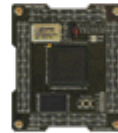
# FPGA TRAINER

## HBE-COMBO II

### HBE-Combo II



- Replaceable thanks to 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



#### KEY WORD

Replacing ALTERA, XILINX device modules and using various application modules

#### ■ Features

Make ALTERA and XILINX devices replaceable with each other through modularization, taking the FPGA device's flexibility and extendability 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 CICKEN switch of the FPGA module. There are 50pin 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.

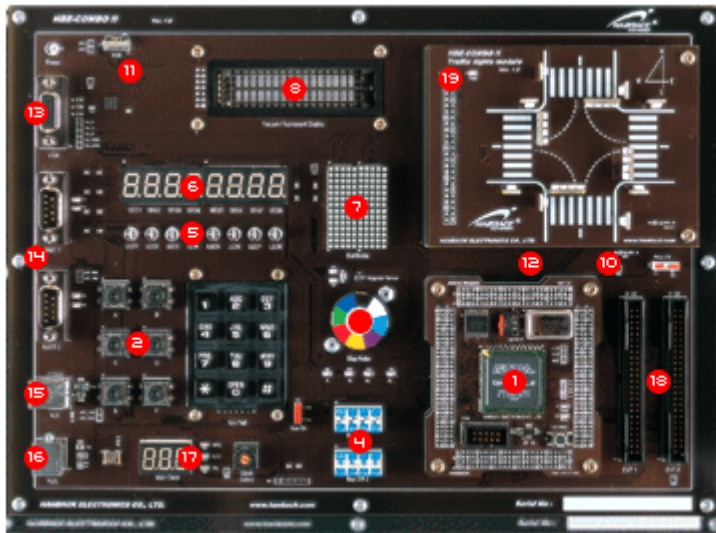
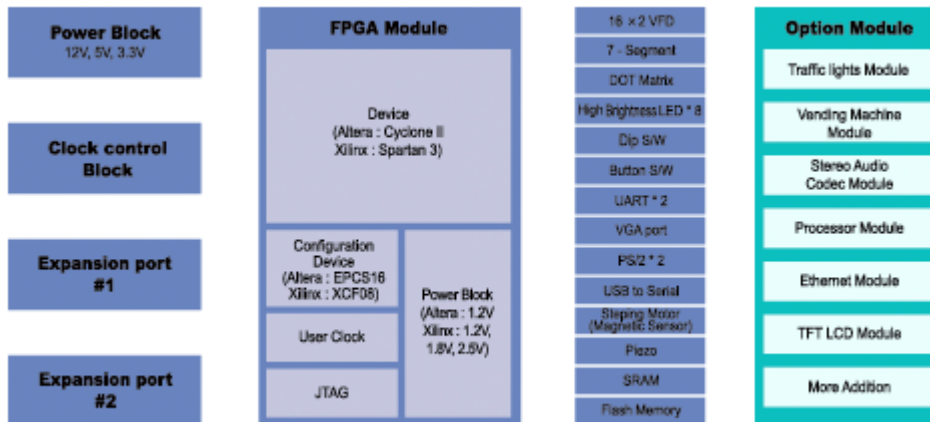
Users can make a program easily by using a hardware module to connect the PC used in various tasks (FPGA Download, PROM Program).

## ■ HBE-COMBO II Software

Altera : Quartus II

Xilinx : ISE

HBE-Combo II 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.



01. FPGA Module
02. Button S/W
03. KEYPAD (Keypad)
04. Dip S/W
05. High Brightness LED
06. 7-Segment
07. DOT Matrix
08. VFD (Vacuum Fluorescent Display)
09. Step Motor
10. SRAM
11. IrDA
12. Piezo
13. VGA Port
14. UART Port
15. USB to Serial Port
16. PS/2 Port
17. Clock Control Block
18. Extension Port 1, 2
19. Extension Port 3

## ■ HBE-COMBO II Application Board (Optional)

### TFT-LCD



#### Graphic LCD Features

Display the CMOS Image sensor-produced data on the 4" TFT-LCD by using the FPGA and SRAM.

#### TFT-LCD

- 4.0" wide TFT-LCD
- 480 X 272 resolution
- 16,777,212 display colors

#### CMOS Image Sensor

- 640 X 480 (1280x1024) Array size
- 0 - 30 fps
- RGB Bayer, RGB888, YCbCr422

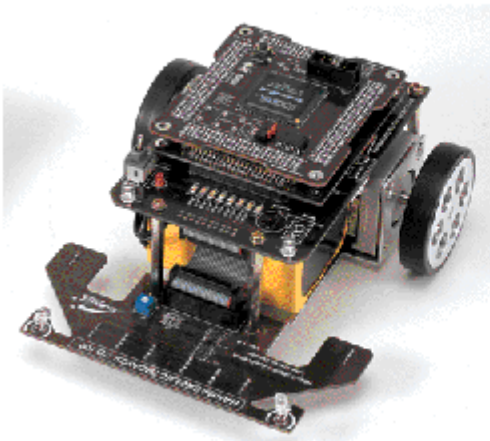
## Stereo Audio Codec



### Stereo Audio Codec Features

- 4 Stereo- Audio Jack s (MIC IN, Line In, Line Out , Headphon e Out)
- 4 button switches for controlling
- A IC23 B(S tereo Codec)
  - High-Performance St ereo Codec
  - 90dB SNR ADC
  - 100dB SNR DAC
  - 8KHz ~ 9.6 KHz Samp lin g Frequency

## Line Tracer



### Line Tracer Features

- Enabl e a lin e tracer-dr i v ing experimen t by using an i np ut v al ue a n d mo t or co nt rol th rough t he FP GA Mod ul e.
- Step Motor (Driv in g Part)
  - SST42D110 0(SHINANO MOTOR)
  - 1.8DEG/STEP, 3.7V, 0.95A
  - Deliver FPGA' s control sign als to a motorthrough a motor driver.
- Sensor

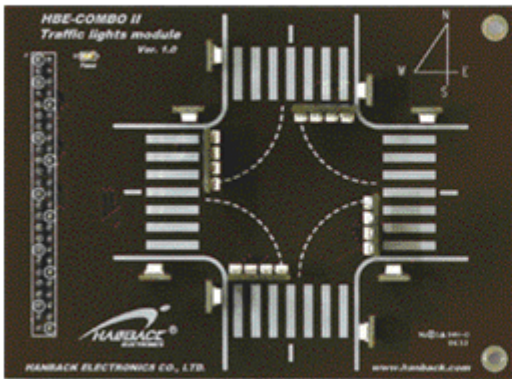
## Vending Machine



### Ven din g Mach in e's Features

- Implem ent a key board using a mod ul e.
- Text LCD
  - 16x2
  - Ind icate a vending mach ine's st at us, i tem a n d price.
- But ton S/W
  - Select an item.
  - Cash in pu t & return LED
  - Ind icate an item output status.
  - Ind icate a bu tton in pu t.

## Traffic Lights



### Traffic Lights' Features

Three-colored PLCC LEDs including Green , Yellow and Red  
PCB configuration for three-dimensional view Handle traffic lights based on the LED.

Traffic light for vehicles and pedestrians

## ■ HBE-COMBO II Specifications

<b>FPGA Device (optional)</b>	ALTERA : Cyclone II Series (EP2C35~70F672), User I/O : 408 pin XILINX : Spartan-3 Series (XC3S1000~4000FG676), User I/O : 391 ~ 408 pin
<b>Configuration ROM (optional)</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
<b>Clock</b>	50MHz base board Oscillator 1EA , Ext User clock
<b>VGA Port</b>	1024 x 768 Resolution 24- Bit True- color VGA port 1 EA
<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 8bit 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>Ext. port</b>	25*2 I/O Expansion port 2EA(Support total 92 pin), 5V Supply
<b>Ext. port (Daughter)</b>	25*2 I/O Expansion port 1EA(Support total 44 pin), 5V, 12V Supply
<b>Power</b>	Input 220 V/60Hz AC/Output : +5V, +3.3V, +2.5V, +1.8V, +1.2 V
<b>Accessory</b>	Electronic manual & example CD 1EA User' s Guide 220V power cable 1EA Serial cross cable 1EA Parallel cable 1EA ALTERA ByteBlaster II download cable or XILINX Parallel download cable 1EA
<b>Board Size</b>	FPGA board : 96x122 (mm), base board : 312 x221 (mm)