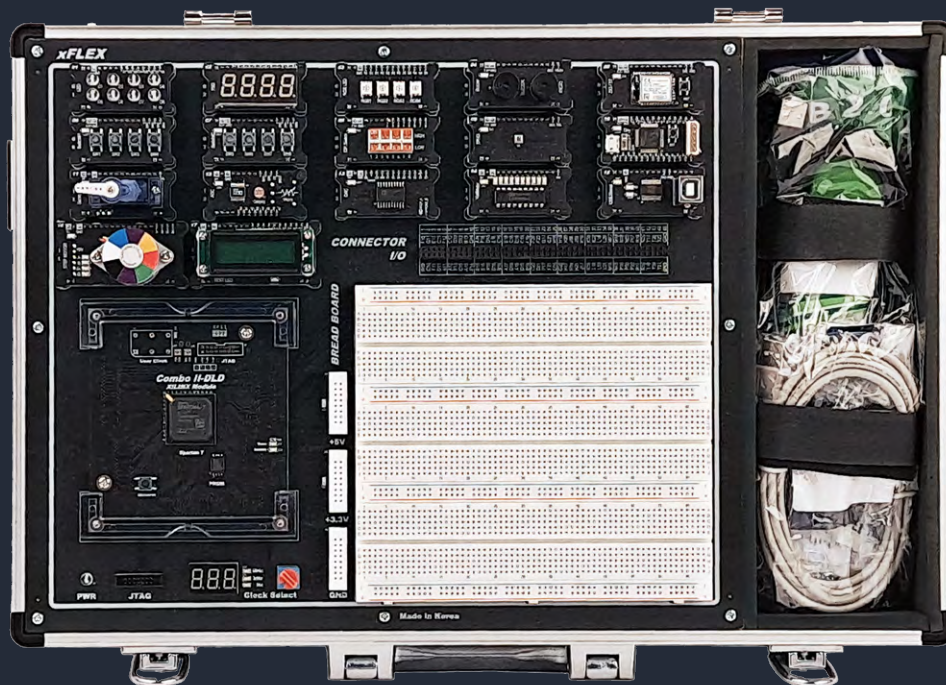


xFLEX



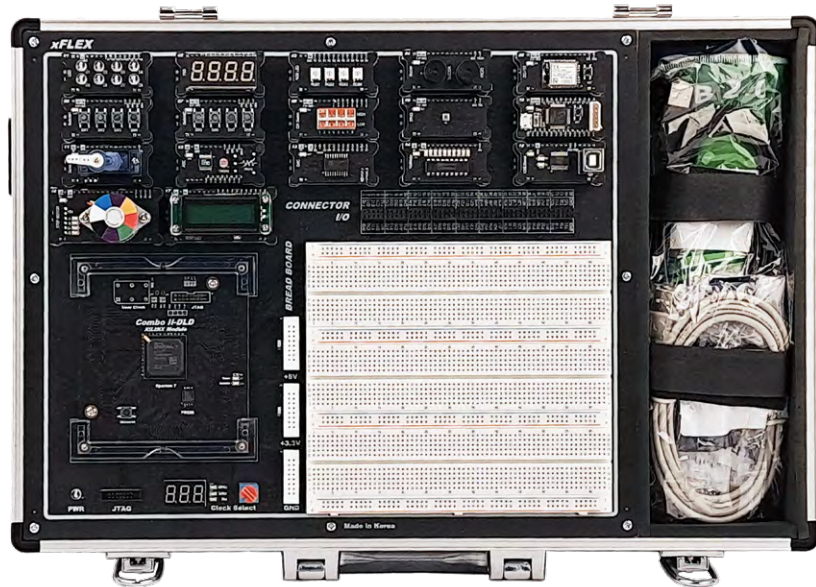
Digital Logic Circuit Experiment Equipment Using xFLEX Equipment



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xFLEX

Product Features

- ◎ Wide range of practice is possible using high-performance FPGA, actuator, sensor, breadboard, and expansion connector for digital electronic circuit practice
- ◎ SoM (System on Module) type high-performance FPGA provides Xilinx Spartan 7 as standard, and Intel Cyclone 4 can be replaced as an option
- ◎ Various electronic circuit application practices with not only highly useful RGB LED, servo/step motor but also potentiometer, light sensor and peripheral device module are possible
- ◎ Standard 2.54mm connector-based power supply and breadboard included for users to configure and experiment with circuits
- ◎ Configured to connect optional real-life application electronic circuit modules (traffic light, vending machine, etc.)
- ◎ Analog-to-digital converter and digital-to-analog converter module configuration for analog signal input/output
- ◎ Built-in 16-step clock generator from 00Hz to 50MHz for various electronic circuit experiments
- ◎ With Xilinx's latest compilation tool Vivado, reliable timing closures, improved resources can be used

Design Environment

List	Specifications
VIVADO Design Software	
System and Software Requirements	OS: Windows Professional/Enterprise 10 64bit Memory: over 8GB

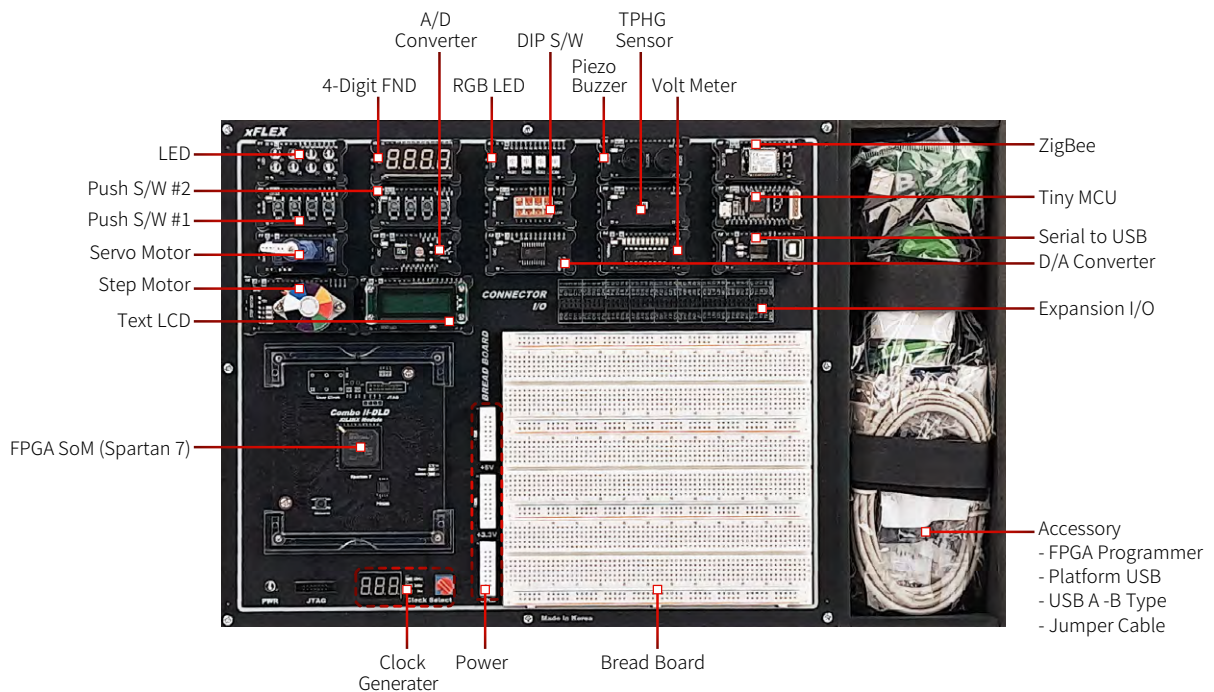
Hardware Specifications

List	Specifications	
FPGA SoM	Spartan 7 Device XC7S75 76,800 Logic Cells, 3,240kbit Embedded Memory 140 DSP Slices 128MBIT Configuration ROM(FLASH MEMORY) Power Block IN(+5V, +3.3V) Generation (+1.2V, +2.5V) JTAG Port, Reconfiguration Switch Size: 97mm x 107mm	
Base	Size	336mm x 273mm
	Power	220V
	Clock Generator	50MHz base board Oscillator 1ea, Ext User clock 16-phased clock with 0 Hz ~ 50 MHz is provided checking of set-Clock through 3 digit 7-segment and LED
	Bread Board	Overcurrent blocking circuit Terminal Strip : 3ea / 1890 holes Distribution Strip : 4ea / 400 holes Size 167 x 146mm Power supply : +5V, +3.3V, GND
	Module Connector	FPGA SOM Equipped Connector 1ea 48 x 22 mm Module Equipped Connector 15ea 61 x 30 mm Module Equipped Connector 2ea
Peripheral Device Module	Input Device Module	Dip Switch 1ea Push Button Switch 4ea (#1~#4) Push Button Switch 4ea (#5~#8) AD Converter - SPI ADC : 8 Channel 8Bit 1MHz Sampling - CdS 1ea - Volume Resistor (0 ~ 5V ADC In)
	Output Device Module	16x2 Text LCD LED 8ea(Diffused RED) RGB LED 4ea 4 digit 7-Segment 1ea Servo Motor 1ea Step Motor 1ea (include status LED 4ea) Piezo, Buzzer 1ea DA Converter : Parallel DAC : Dual Voltage Output 8-Bit DAC Voltage Meter (include LED 10ea)
	Others	Serial to USB Module Zigbee/Bluetooth Module TPHG Module : Temperature, Pressure, Humidity, Gas Sensor Tiny MCU Module : Cortex-M4 Module Extension Connector : FPGA GPIO 88 pin Connector, GND 2pin Project Module :Traffic Lights (LED 24ea)

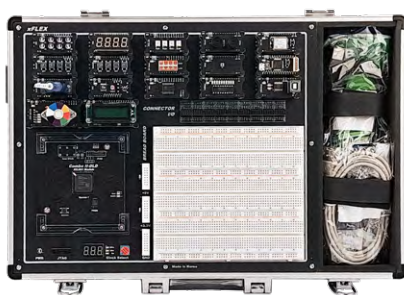
Training Contents

- **Introduction**
xFLEX Equipments
FPGA circuit design tool installation
- **Design of Digital Circuit**
Analog system and Digital system
Digital circuit and logic circuit
- **Logic Gate Design**
Logic Gate Implementation
Basic Gate Operation
- **Operation Circuit**
Arithmetic Circuit
Design of full adder & full subtracter
- **Combinational Logic Circuit(I)**
Decoder & Encoder Design
- **Combinational Logic Circuit(II)**
MUX & DEMUX Design
- **Memory element**
Data storage and Transmission
Shift Register
- **Counter(I)**
Asynchronous Counter.
Synchronous Counter
- **Counter(II)**
MOD-N Counter
Piano Design with Piezo
Create a clock displaying minutes and seconds
- **PWM Control**
Full Color LED Control
Servo Motor Control
- **State Machine**
Moore Machine
Mealy Machine
- **Parallel Interface**
Text LCD Control
- **Serial Interface**
UART Design
- **Application Module**
Traffic Light Control

Layout



Components



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