DE2-115 Control Panel - Part II

數位電路實驗

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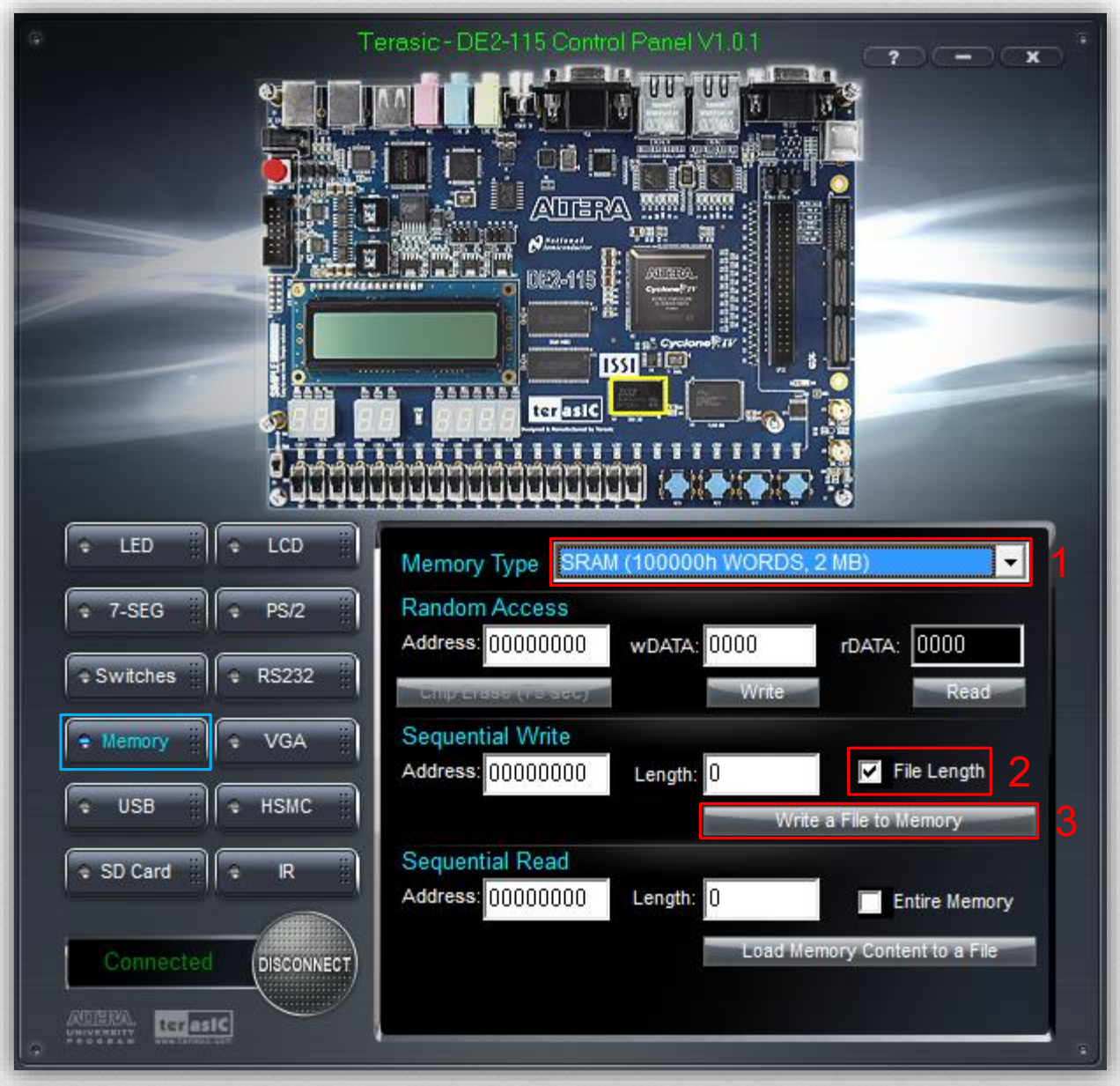
Outline

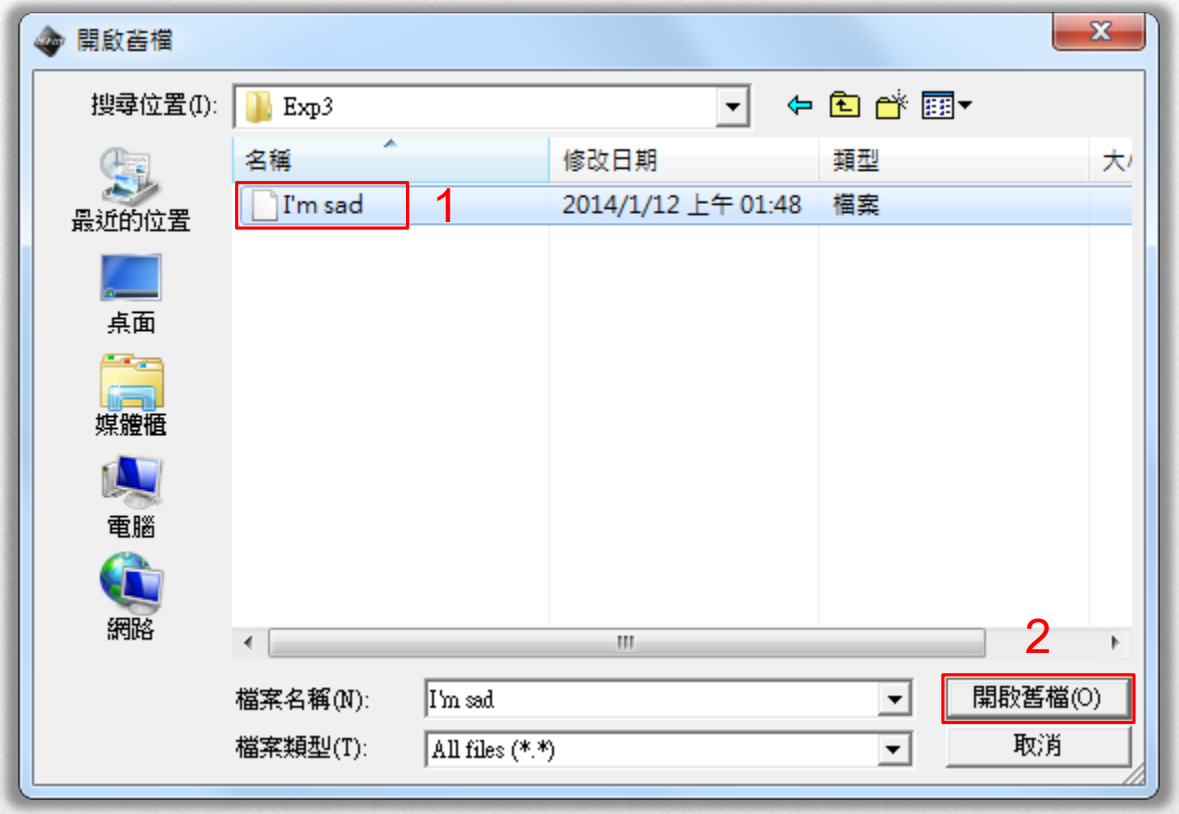
- SDRAM/SRAM/EEPROM/Flash Controller and Programmer
- VGA
- IR Receiver
- Others
  - USB, PS/2, SD Card, RS232, and HSMC
- Over all Structure of the DE2-115 Control Panel

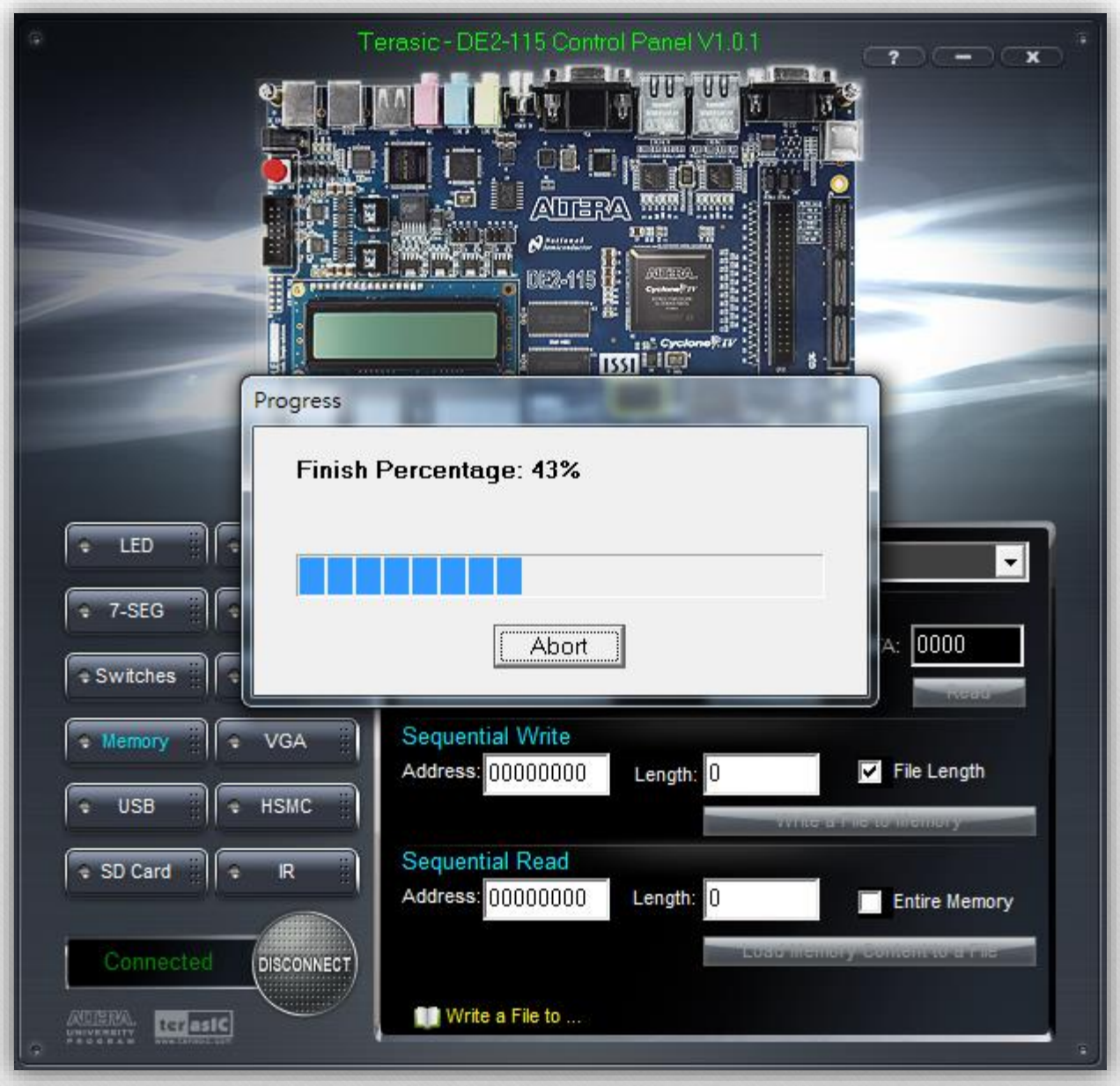
SDRAM/SRAM/EEPROM/ Flash Controller and Programmer

Memory Controller and Programmer

- The Control Panel can be used to write/read data to/from the SRAM, SDRAM, EEPROM, and Flash chips on the DE2-115 board.
- As an example, we will describe how the SRAM may be accessed; the same approach is used to access the SDRAM, EEPROM, and Flash.


Terasic - DE2-115 Control Panel V1.0.1
LED
LCD
7-SEG
PS/2
Switches
RS232
Memory
VGA
USB
HSMC
SD Card
IR
Connected
DISCONNECT
Memory Type
SRAM (100000h WORDS, 2 MB)
1
Random Access
Address: 00000000
wDATA: 0000
rDATA: 0000
Write
Read
Sequential Write
Address: 00000000
Length: 0
File Length
2
Write a File to Memory
3
Sequential Read
Address: 00000000
Length: 0
Entire Memory
Load Memory Content to a File


開啟舊檔
搜尋位置(I):
Exp3
名稱
修改日期
類型
I'm sad
1
2014/1/12 上午 01:48
檔案
最近的位置
桌面
媒體櫃
電腦
網路
2
檔案名稱(N):
I'm sad
檔案類型(T):
All files (*.*)
開啟舊檔(O)
取消


Terasic - DE2-115 Control Panel V1.0.1
Progress
Finish Percentage: 43%
Abort
LED
7-SEG
Switches
Memory
VGA
USB
HSMC
SD Card
IR
Connected
DISCONNECT
Sequential Write
Address: 00000000
Length: 0
File Length
Sequential Read
Address: 00000000
Length: 0
Entire Memory
Write a File to ...
0000


Terasic - DE2-115 Control Panel V1.0.1
LED
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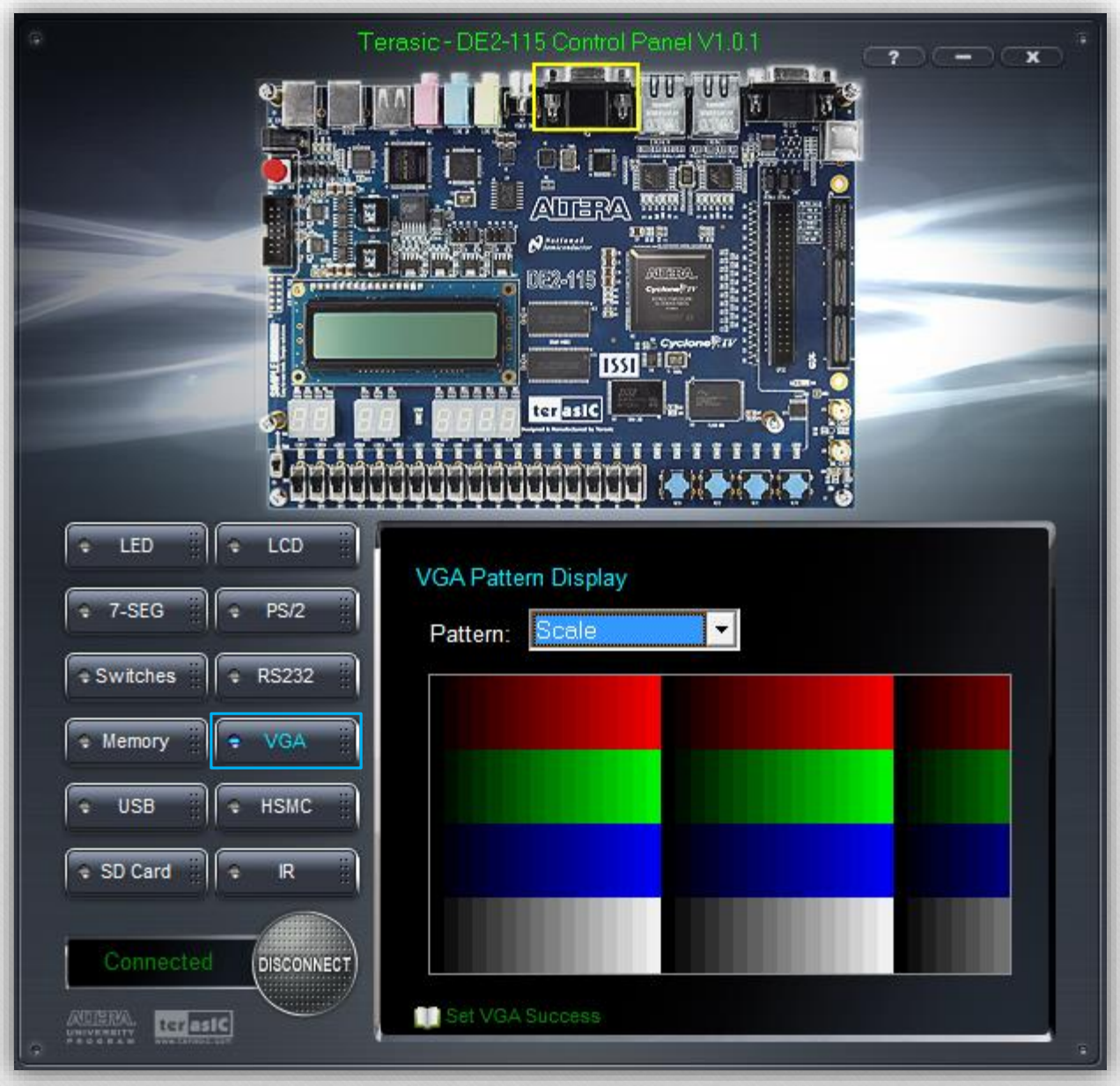
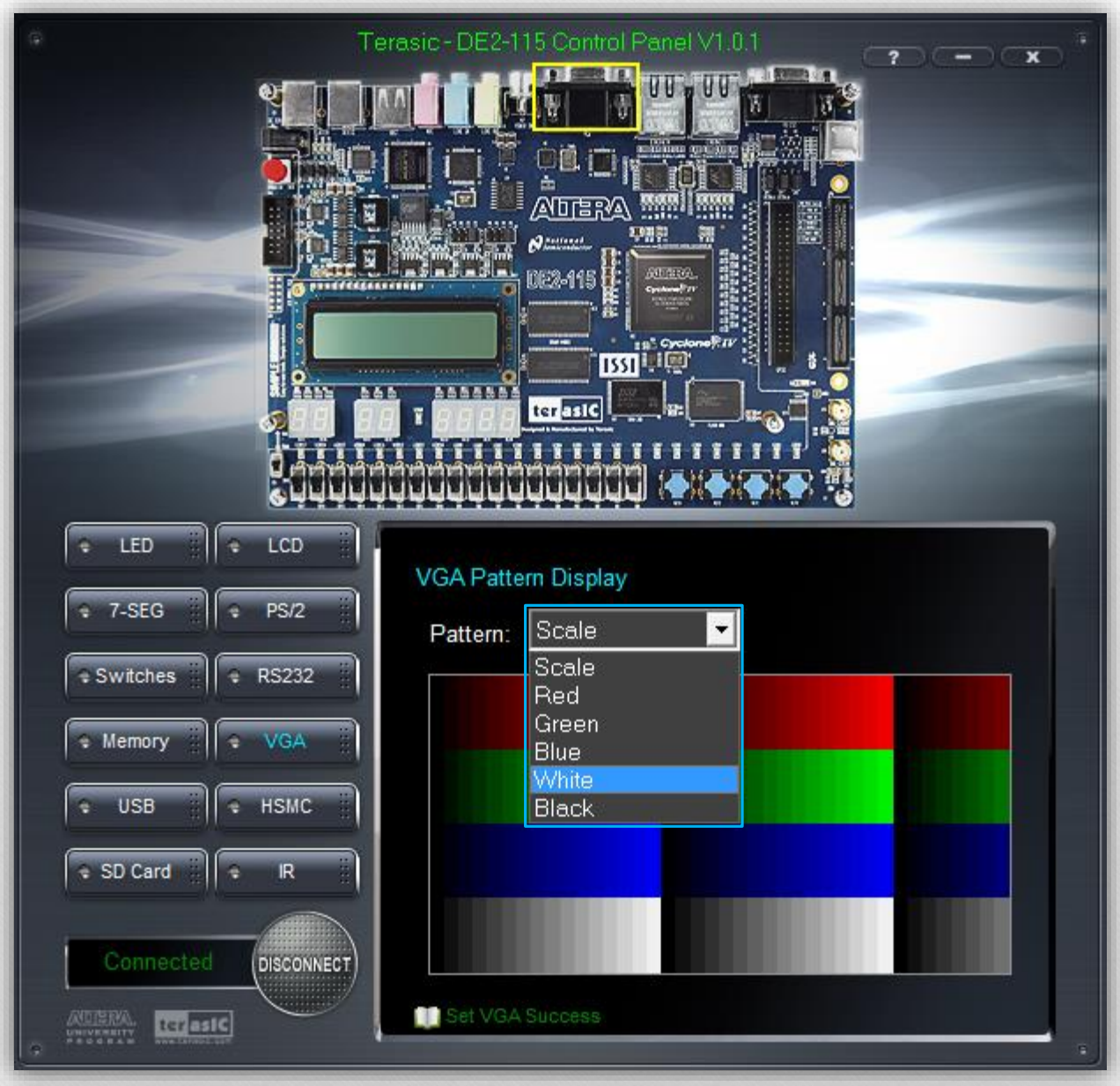
7-SEG
PS/2
Switches
RS232
Memory
VGA
USB
HSMC
SD Card
IR
Connected
DISCONNECT
Memory Type
SRAM (100000h WORDS, 2 MB)
Random Access
Address: 00000000
wDATA: 0000
rDATA: 0000
Write
Read
Sequential Write
Address: 00000000
Length: 100000
File Length
Write a File to Memory
Sequential Read
Address: 00000000
Load Memory Content to a File
Write a File to (null) Success.[439.7sec]
Let's listen to the song!

VGA

VGA Controller

- DE2-115 Control Panel provides VGA pattern function that allows users to output color pattern to LCD/CRT monitor using the DE2-115 board.
- Remember to plug a D-sub cable to VGA connector of the DE2-115 before using the Control Panel.


Terasic - DE2-115 Control Panel V1.0.1
LED
LCD
7-SEG
PS/2
Switches
RS232
Memory
VGA
USB
HSMC
SD Card
IR
Connected
DISCONNECT
VGA Pattern Display
Pattern:
Scale
Set VGA Success


Terasic - DE2-115 Control Panel V1.0.1
LED
LCD
7-SEG
PS/2
Switches
RS232
Memory
VGA
USB
HSMC
SD Card
IR
Connected
DISCONNECT
VGA Pattern Display
Pattern:
Scale
Scale
Red
Green
Blue
White
Black
Set VGA Success


Terasic - DE2-115 Control Panel V1.0.1
LED
LCD
7-SEG
PS/2
Switches
RS232
Memory
VGA
USB
HSMC
SD Card
IR
Connected
DISCONNECT
VGA Pattern Display
Pattern:
White
Set VGA Success

IR Receiver

IR Receiver

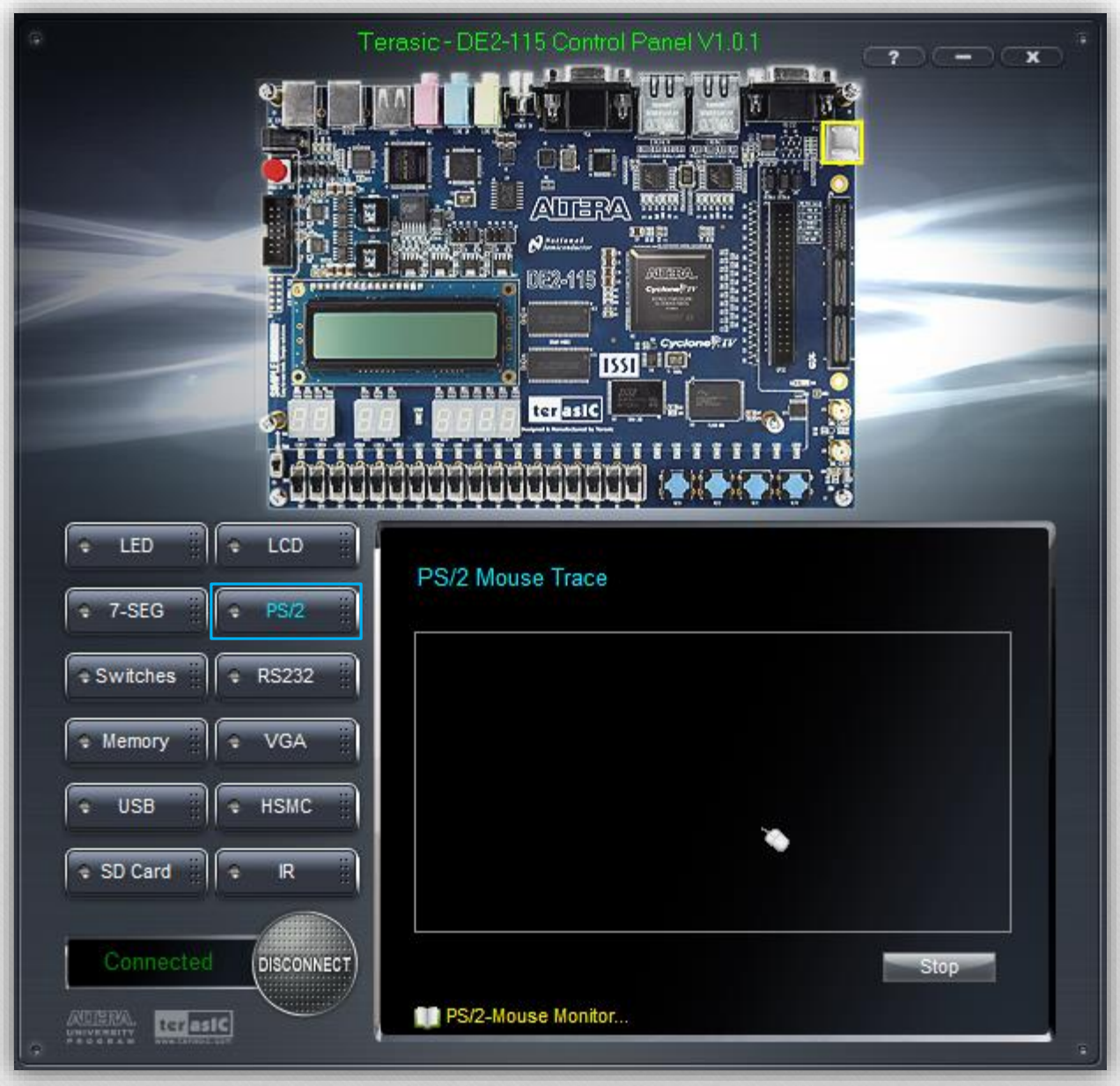
- From the control panel, we can test the IR receiver on the DE2-115 by sending scan code from a remote controller.
- When the scan code is received, the information will be displayed on the Receiver window represented in hexadecimal.
- Also, the pressed button on the remote controller will be indicated on the graphic of remote controller on the IR receiver window.


Terasic - DE2-115 Control Panel V1.0.1
LED
LCD
7-SEG
PS/2
Switches
RS232
Memory
VGA
USB
HSMC
SD Card
IR
Connected
DISCONNECT
IR Receiver
Scan Code (Heximal)
01
02
03
04
05
06
07
08
Clear
IR Monitor...

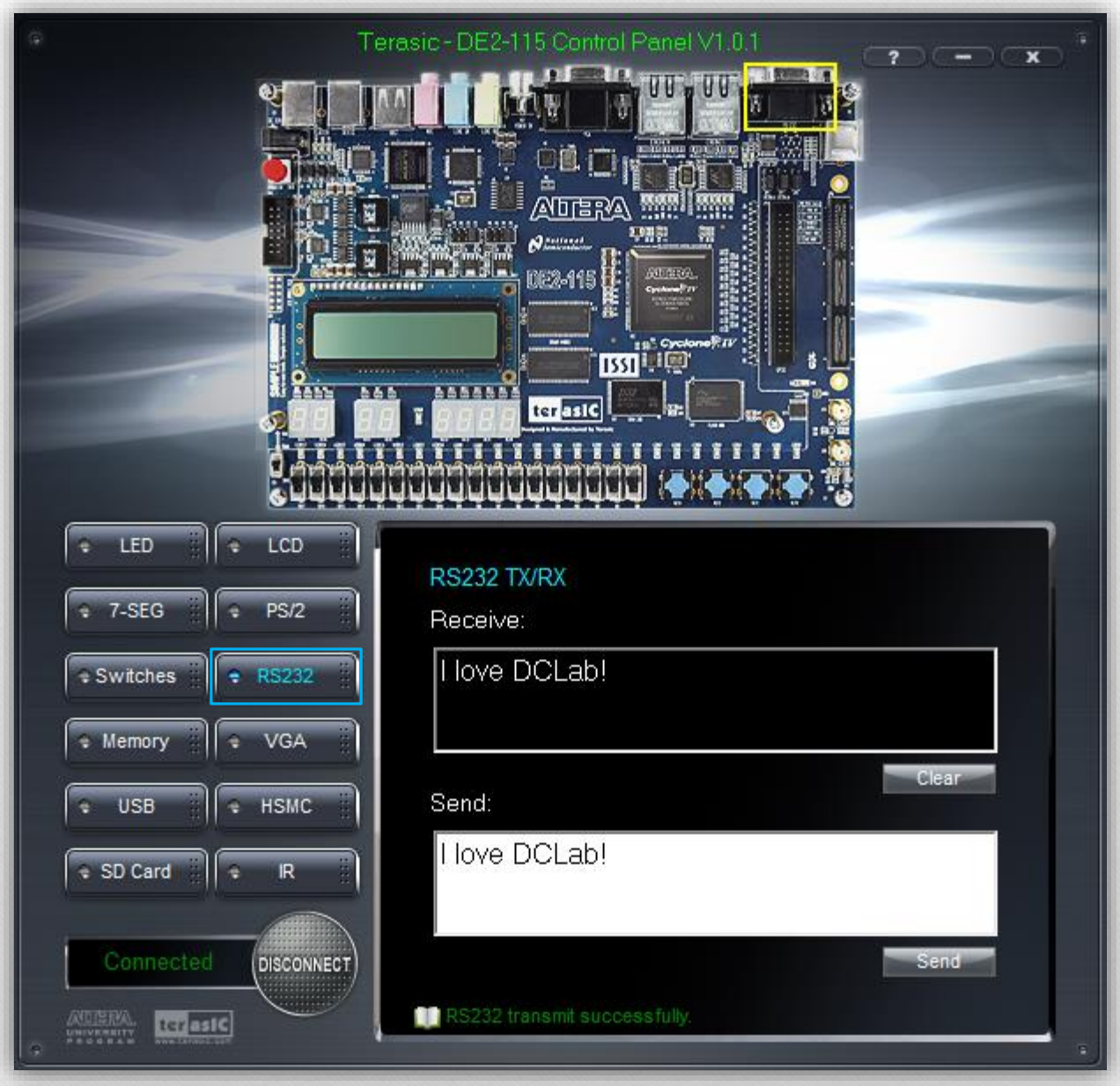
Others

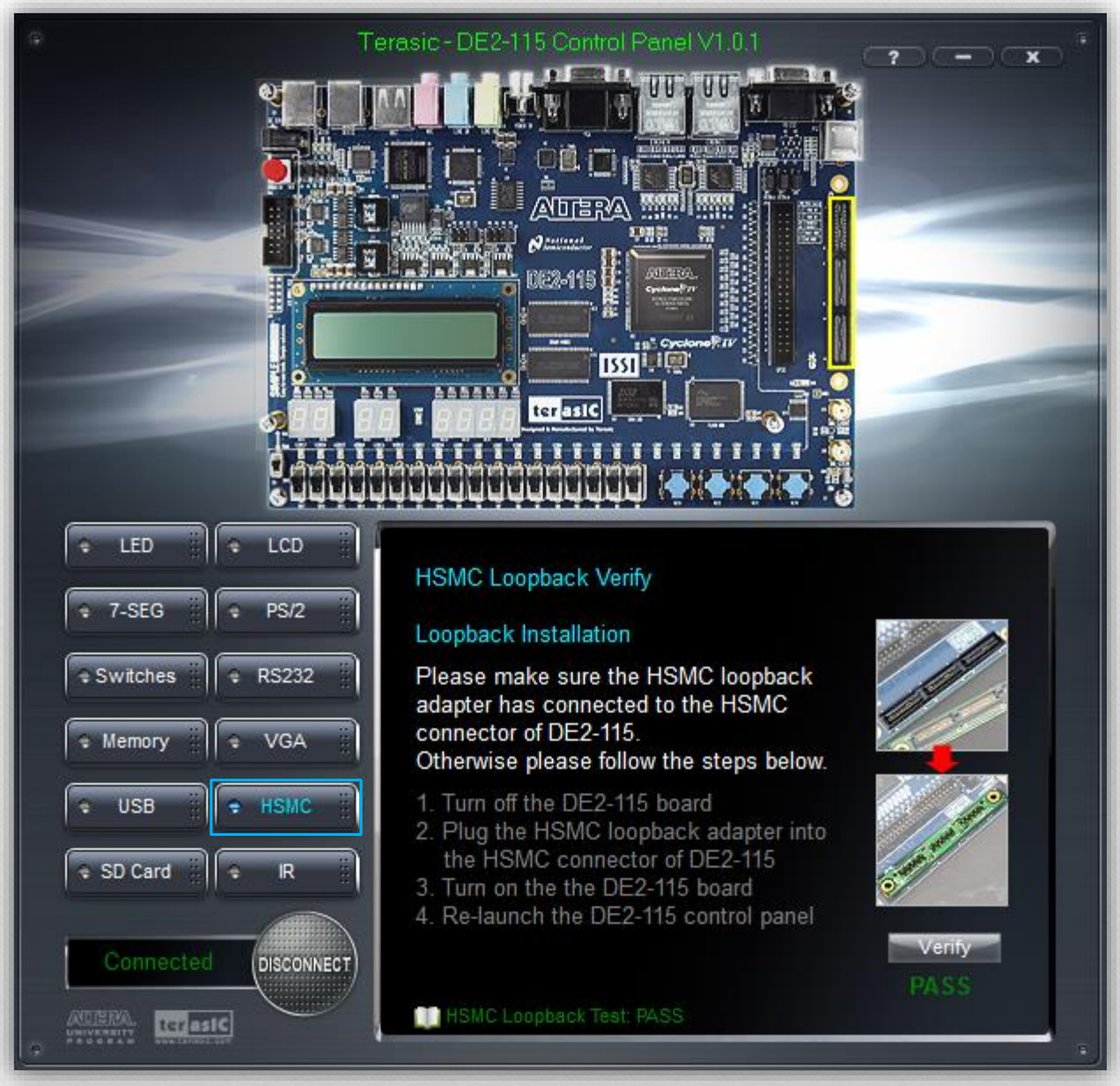
USB, PS/2, SD Card, RS232, and HSMC


Terasic - DE2-115 Control Panel V1.0.1
LED
LCD
7-SEG
PS/2
Switches
RS232
Memory
VGA
USB
HSMC
SD Card
IR
Connected
DISCONNECT
Host Port:
USB Mouse
A device is found in the USB Port.


Terasic - DE2-115 Control Panel V1.0.1
LED
LCD
7-SEG
PS/2
Switches
RS232
Memory
VGA
USB
HSMC
SD Card
IR
Connected
DISCONNECT
PS/2 Mouse Trace
Stop
PS/2-Mouse Monitor...


Terasic - DE2-115 Control Panel V1.0.1
LED
LCD
7-SEG
PS/2
Switches
RS232
Memory
VGA
USB
HSMC
SD Card
IR
Connected
DISCONNECT
Card Identification
-Manufacturer ID:03h
-OEM/Application ID:4453h
-Product Name:SD08G
-Product Revision:80h
-Serial No.:018FCAC6h
-Date Code:09Bh
Card Specific Data
-CSD Version 2.0
-Read Access Time:1000 us
-Read Access Time (NSAC):0 (x100 cycle)
-Max. Data Transfer Rate:25 Mbits/s
-Max. Read Data Block Length:512 Byte
File System:
FAT32
Read
Read SDCARD read successfully


Terasic - DE2-115 Control Panel V1.0.1
LED
LCD
7-SEG
PS/2
Switches
RS232
Memory
VGA
USB
HSMC
SD Card
IR
Connected
DISCONNECT
RS232 TX/RX
Receive:
I love DCLab!
Clear
Send:
I love DCLab!
Send
RS232 transmit successfully.


Terasic - DE2-115 Control Panel V1.0.1
LED
LCD
7-SEG
PS/2
Switches
RS232
Memory
VGA
USB
HSMC
SD Card
IR
Connected
DISCONNECT
HSMC Loopback Verify
Loopback Installation
Please make sure the HSMC loopback adapter has connected to the HSMC connector of DE2-115.
Otherwise please follow the steps below.
1. Turn off the DE2-115 board
2. Plug the HSMC loopback adapter into the HSMC connector of DE2-115
3. Turn on the the DE2-115 board
4. Re-launch the DE2-115 control panel
Verify
PASS
HSMC Loopback Test: PASS

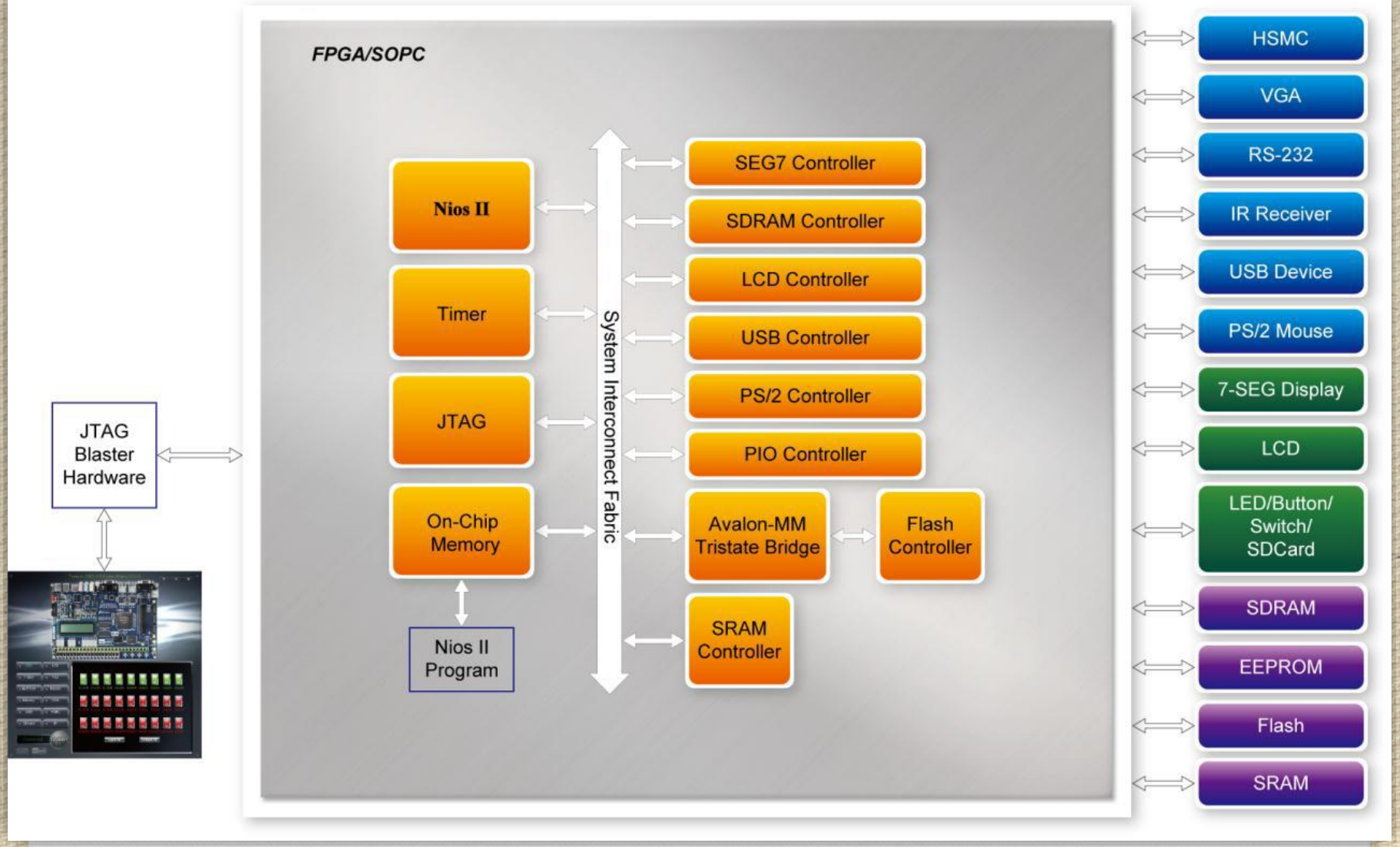
Over all Structure of the DE2-115 Control Panel

Overall Structure (1/2)

- The DE2-115 Control Panel is based on a Nios II SOPC system instantiated in the Cyclone IV E FPGA with software running on the on-chip memory.
- The software part is implemented in C code; the hardware part is implemented in Verilog HDL code with SOPC builder.
  - The source code is not available on the DE2_115 System CD.

Overall Structure (2/2)

- Each input/output device is controlled by the Nios II Processor instantiated in the FPGA chip.
- The communication with the PC is done via the USB Blaster link.
- The Nios II interprets the commands set from the PC and performs the corresponding actions.


FPGA/SOPC
Nios II
Timer
JTAG
On-Chip Memory
Nios II Program
System Interconnect Fabric
SEG7 Controller
SDRAM Controller
LCD Controller
USB Controller
PS/2 Controller
PIO Controller
Avalon-MM Tristate Bridge
Flash Controller
SRAM Controller
JTAG Blaster Hardware
HSMC
VGA
RS-232
IR Receiver
USB Device
PS/2 Mouse
7-SEG Display
LCD
LED/Button/ Switch/ SDCard
SDRAM
EEPROM
Flash
SRAM

The End.

Any question?

Reference

1. "DE2-115 User Manual" by Terasic Technologies Inc.