

SATA Storage Duplicator Instruction on Stratix-IV

Rev1.0 08-Oct-13

This document describes the step to run SATA Duplicator Demo for data duplication from one SATA disk to many SATA disks by using Design Gateway SATA-IP. The demo uses Stratix-IV Development board and HSMC RAID board, provided by Design Gateway, to copy data from one SATA disk to one to three SATA disks at the same time. More details are described as follows.

1 Hardware Setup

Necessary Hardware

1. Stratix-IV Development Kit
2. AB12-HSMCRAID board from Design Gateway
3. ATX Power Supply for AB12-HSMCRAID board
4. Power adapter for Stratix-IV Development board
5. USB A-B cable for FPGA configuration and JTAG Serial
6. PC for FPGA programming
7. 2-4 pieces of 2.5-inch SATA-III Disk

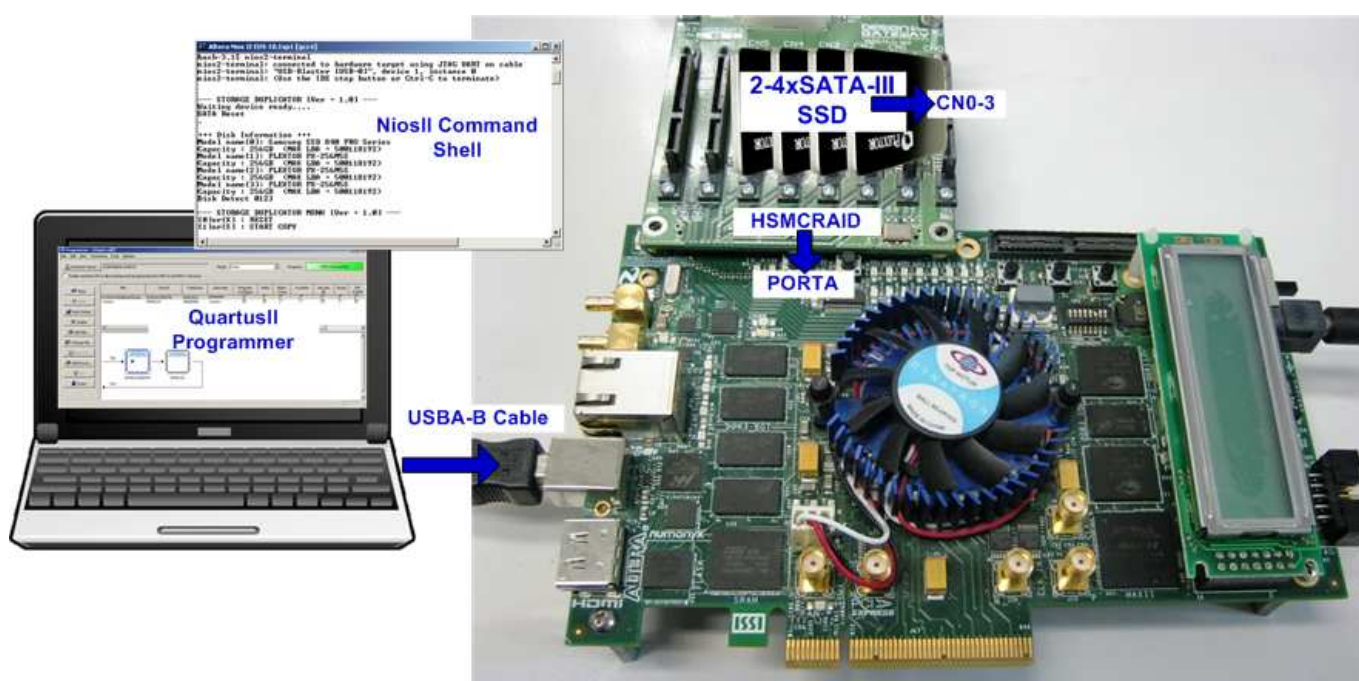


Figure 1-1 SATA Storage Duplicator Hardware Setup

2 Evaluation procedure

1. Check Power Switch on Stratix-IV board = OFF position and connect Power adapter to Stratix-IV board.
2. Connect USBA-B Cable to Stratix-IV board and PC for JTAG Programming and JTAG UART.

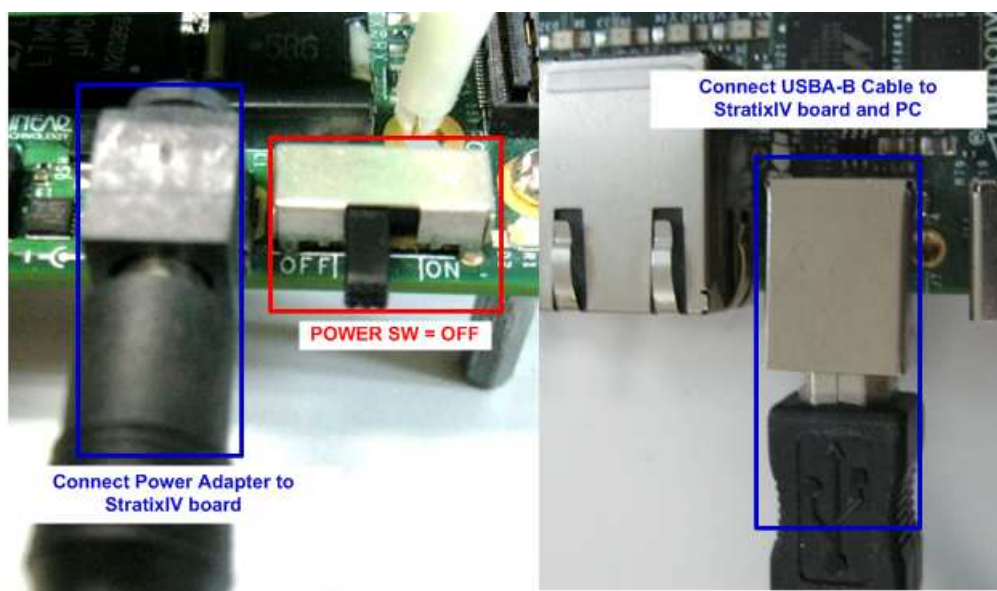


Figure 2-1 Power OFF board and USB connection

3. Check ATX power supply for HSMCRAID board = OFF and connect ATX power to HSMCRAID board.
4. Connect HSMCRAID board to PORTA (J1) on Stratix-IV board.

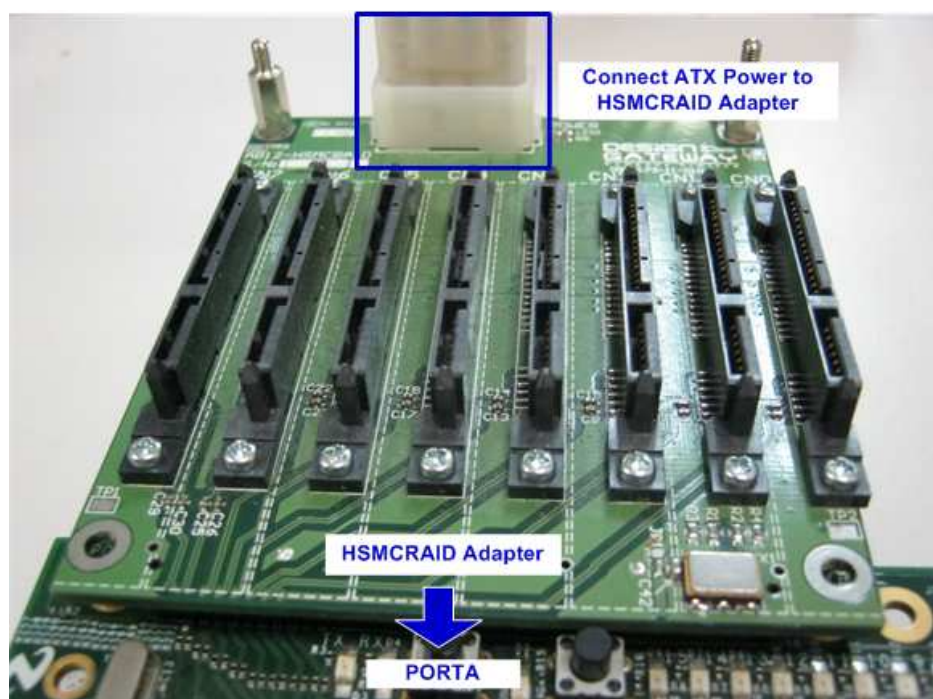


Figure 2-2 ATX Power to FMCRAID Adapter

5. Connect Master SATA-III Disk to CN0 and connect 1-3 Blank SATA-III Disks to CN1 – CN3 on HSMCRAID for data duplication from Master to all Blank Disks.

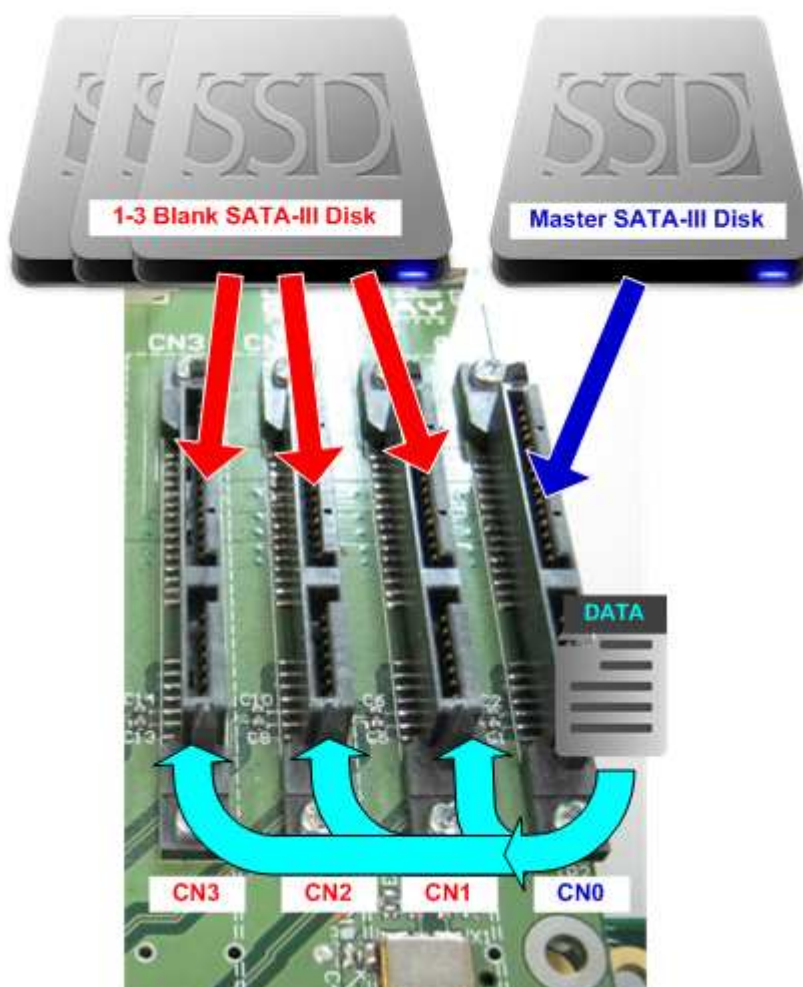


Figure 2-3 Connect SATA-III Disk to FMCRAID

6. Set Power SW = ON and power on ATX power supply.

- On PC, open QuartusII Programmer 10.1 or later version and download configuration file to Stratix-IV board.

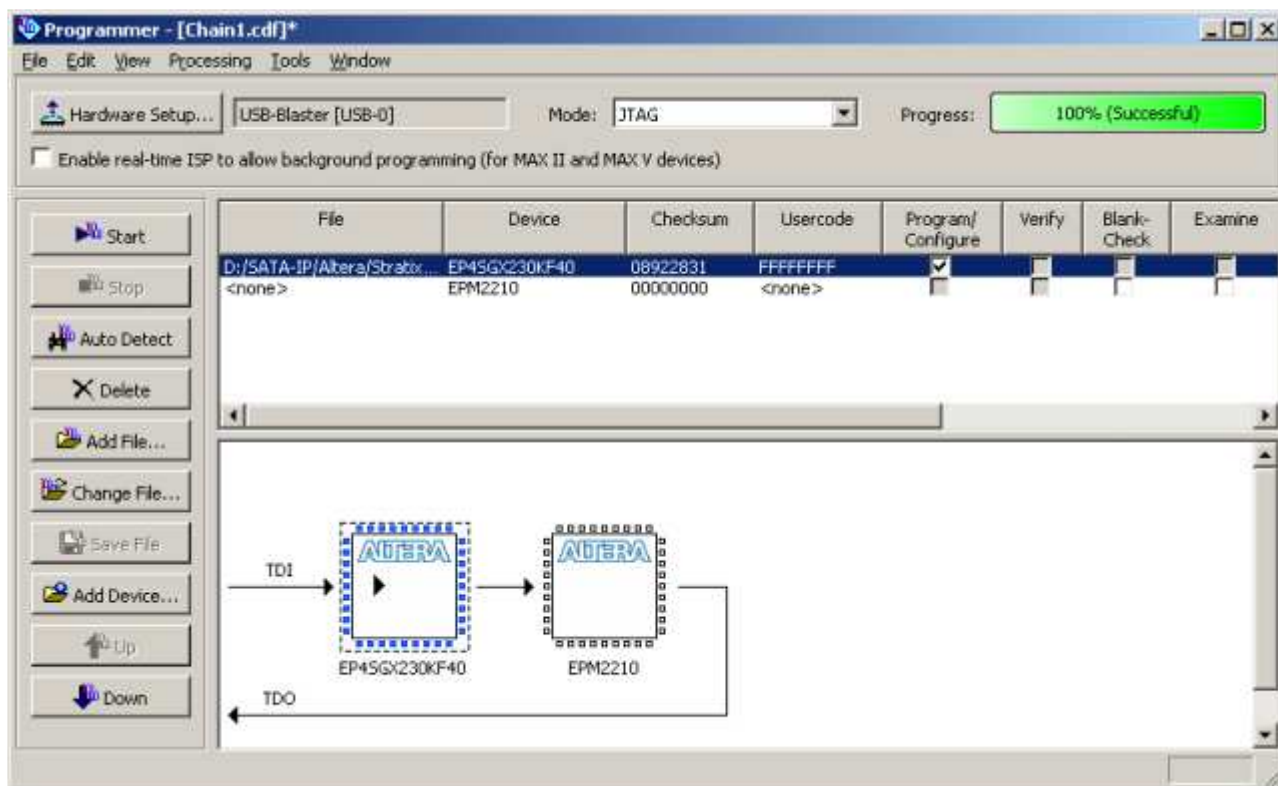


Figure 2-4 QuartusII Programmer for FPGA configuration

- Open NiosII Command Shell and type “nios2-terminal” for starting NiosII Terminal. Main menu will be displayed, as shown in Figure 2-5.

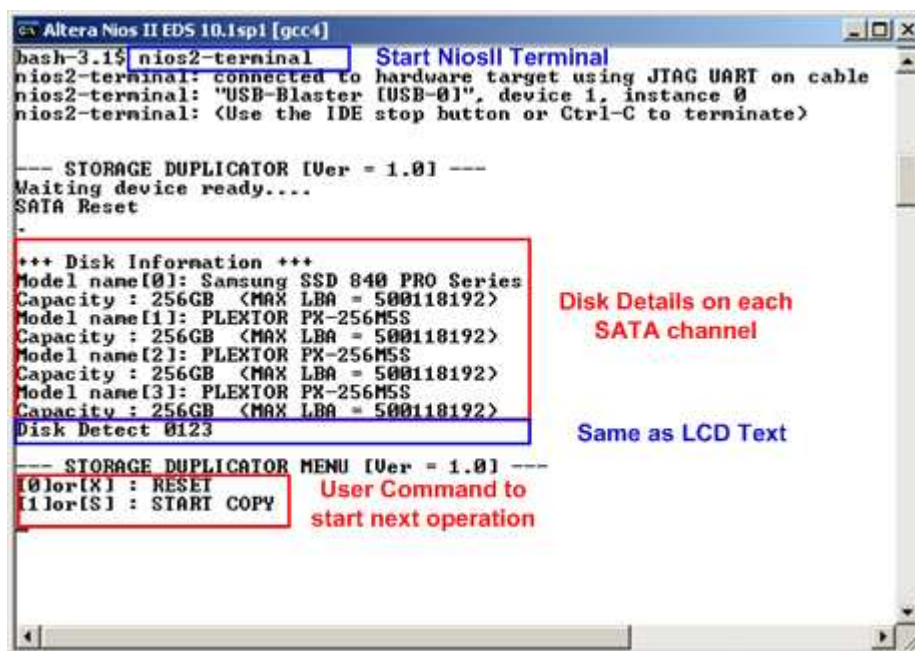


Figure 2-5 NiosII Command Shell

9. Check system status from NiosII Terminal, LED, and LCD.

- a) As shown in Figure 2-5, NiosII Terminal displays Disk information and main menu when initialize complete. “Disk Detect XXXX” text message which has same description as LCD text are also displayed on Terminal. The main menu will be displayed for receiving next command from user.
- b) LED Status: Two LEDs are ON when one SATA connection is available. LED Descriptions are shown in Table 2-1.

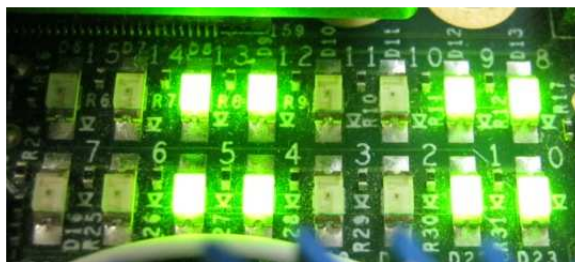


Figure 2-6 LED status if four SATA-III Disk connected

LED	SATA	ON	OFF	BLINK
LED0	CN0	OK	SATA-IP cannot detect SATA device. Please check SATA@CN0 connection.	SATA ERROR
LED1		OK	Internal PLL is not LOCK.	SATA ERROR
LED2		SATA device @CN0 is in writing process.	Idle Status	-
LED3		SATA device @CN0 is in reading process.	Idle Status	-
LED4-7	CN1	Same with LED0-3 for SATA device at CN1 status		
LED8-11	CN2	Same with LED0-3 for SATA device at CN2 status		
LED12-15	CN3	Same with LED0-3 for SATA device at CN3 status		

Table 2-1 LED Status description on Stratix-IV board

- c) LCD Display: “Sata Duplicator” on 1st line is displayed with “Disk Detect XXXX” text on 2nd line. The last four characters are referred to disk status on CN0-3 sequentially. Three status can be displayed, i.e.
 - 0-3 : Disk on CN0-3 is ready to use
 - X : Disk on CN0-3 is not available
 - E : Disk size on CN1-3 is less than CN0, so duplication will not run on this channel.



Figure 2-7 LCD Text Display after system initialize

Figure 2-8 is the example LCD text when Disk on CN0 and CN1 are ready, while CN2 is not available and Disk size on CN3 is too less.



Figure 2-8 LCD Text Display when Disk not available or error.

Note: Since this demo uses JTAG UART to print the message, NiosII Terminal must be called from NiosII command shell to show the message. System will hang from terminal buffer full if NiosII Terminal is not called by user.

3 Main Menu

User can send inputs to system by two ways, i.e. using PUSH SW or NiosII Terminal. There are two commands in this demo, i.e. Reset and Start copy. More details are described as follows.

3.1 SATA RESET

1) By using RESET SW

User can press RESET SW (S2) to reset system. After push RESET, “Sata Duplicator” text will be displayed on LCD and “Disk Detect XXXX” message will be displayed when all disk initialize complete. The LCD message will be similar to Figure 2-7.

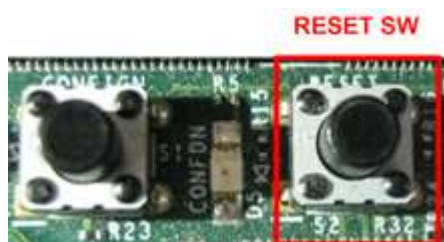


Figure 3-1 RESET SW (S2)

2) By using NiosII Terminal

For start operation by Terminal, input ‘0’ or ‘X’ to reset the system. “SATA Reset” message will be displayed and then display all disk information in system to show disk model and size. Finally, “Disk Detect XXXX” text message are displayed to show disk status on each SATA channel.

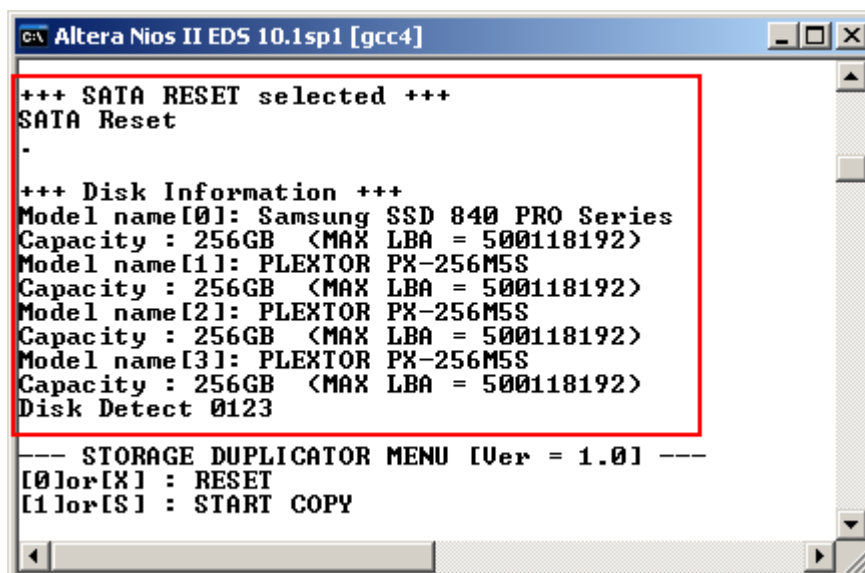


Figure 3-2 Serial Console when SATA is reset

3.2 START COPY

1) By using PB1

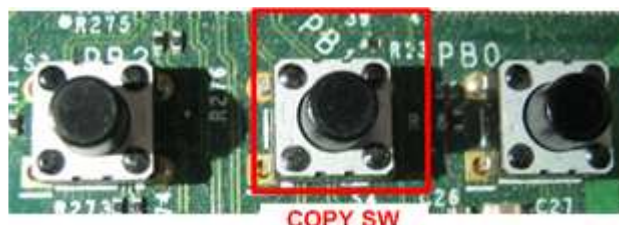


Figure 3-3 COPY SW (PB1)

User can press COPY SW (PB1) to start data duplication from disk on CN0 to disk on CN1 – CN3. Progress status in percent unit is displayed on LCD message, as shown in Figure 3-4.



Figure 3-4 Disk Copy Progress Status on LCD

After complete, “Complete XXXX” with speed performance will be displayed, as shown in Figure 3-5. XXXX is referred to disk status on CN0-3 sequentially.



Figure 3-5 Copy Complete Status on LCD

If any error is detected on which channel, ‘E’ status will be displayed instead of number 0-3, as shown in Figure 3-6. This is example output when error is found on CN2 and CN3.



Figure 3-6 Copy Complete with error disk on LCD

2) By using NiosII Terminal

Input '1' or 'S' to start data duplication by Terminal. Similar to using PB1 input, Disk duplication progress status in percent unit is displayed on Serial Console, as shown in Figure 3-7.

Figure 3-8 shows message and transfer performance when data duplication complete without any error.

Figure 3-9 shows the example message when error is detected during data duplication on CN2 and CN3.

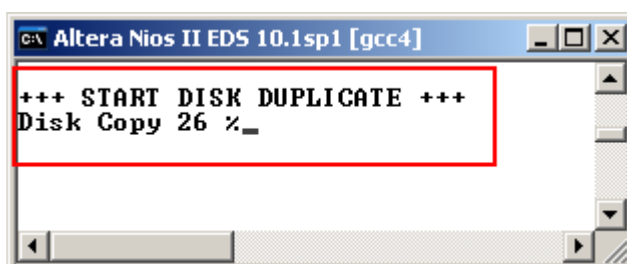


Figure 3-7 Disk Copy Progress Status on Serial Console

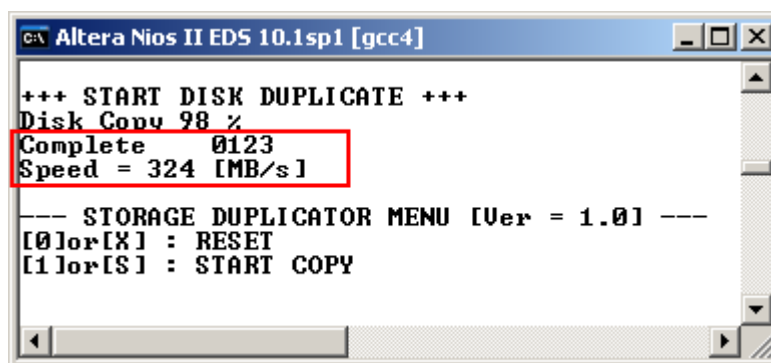


Figure 3-8 Copy Complete Status on Serial Console

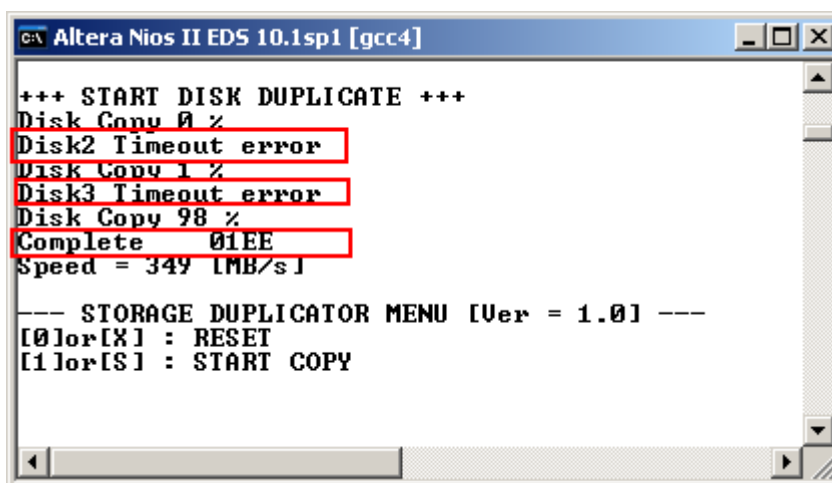


Figure 3-9 Copy Complete with error disk on Serial Console

4 Revision History

Revision	Date	Description
1.0	08-Oct-13	Initial version release