Arria2 GX SATA Host Demo Instruction

Rev1.0 05-Jan-11

This document describes the instruction to run SATA-IP host demo on Arria II GX development board. This SATA-IP includes internal 1-hour timeout. After running system about 1-hour, system will not able to continue any operation.

1 Environment Setup

To run host demo, Terasic SATA/SAS HSMC daughter card is required to connect Arria II GX development board with SATA-II HDD/SSD, as shown in Figure 1.

Figure 1 Host Demo Environment Setup

Following step is setup procedure for running demo.

- Set jumper J7 on SATA/SAS HSMC daughter card to select clock frequency to be 150MHz, as shown in Figure 2

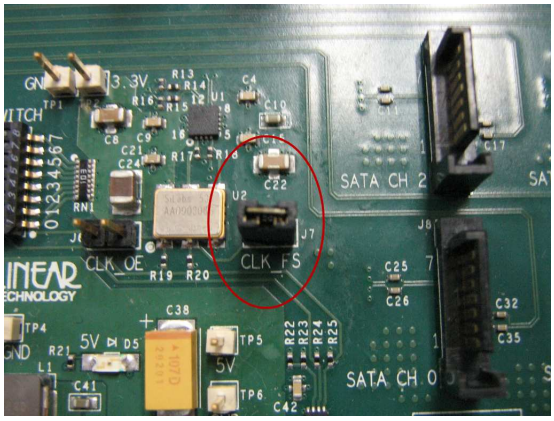

Figure 2 Jumper J7 setting to select clock frequency 150MHz

- Connect SATA/SAS daughter card to HSMC connector Port A on Arria II GX development board
- Connect SATA cable to SATA-II HDD/SSD
- Connect power supply to SATA-II HDD/SSD
- Connect USB A-B cable from Arria II GX board to PC and connect power supply to Arria II GX board.
- Power on Arria II GX board and SATA-II HDD/SSD
- Open Quartus Programmer and download “nios2_sata2_test.sof” to Arria II GX board, as shown in Figure 3.

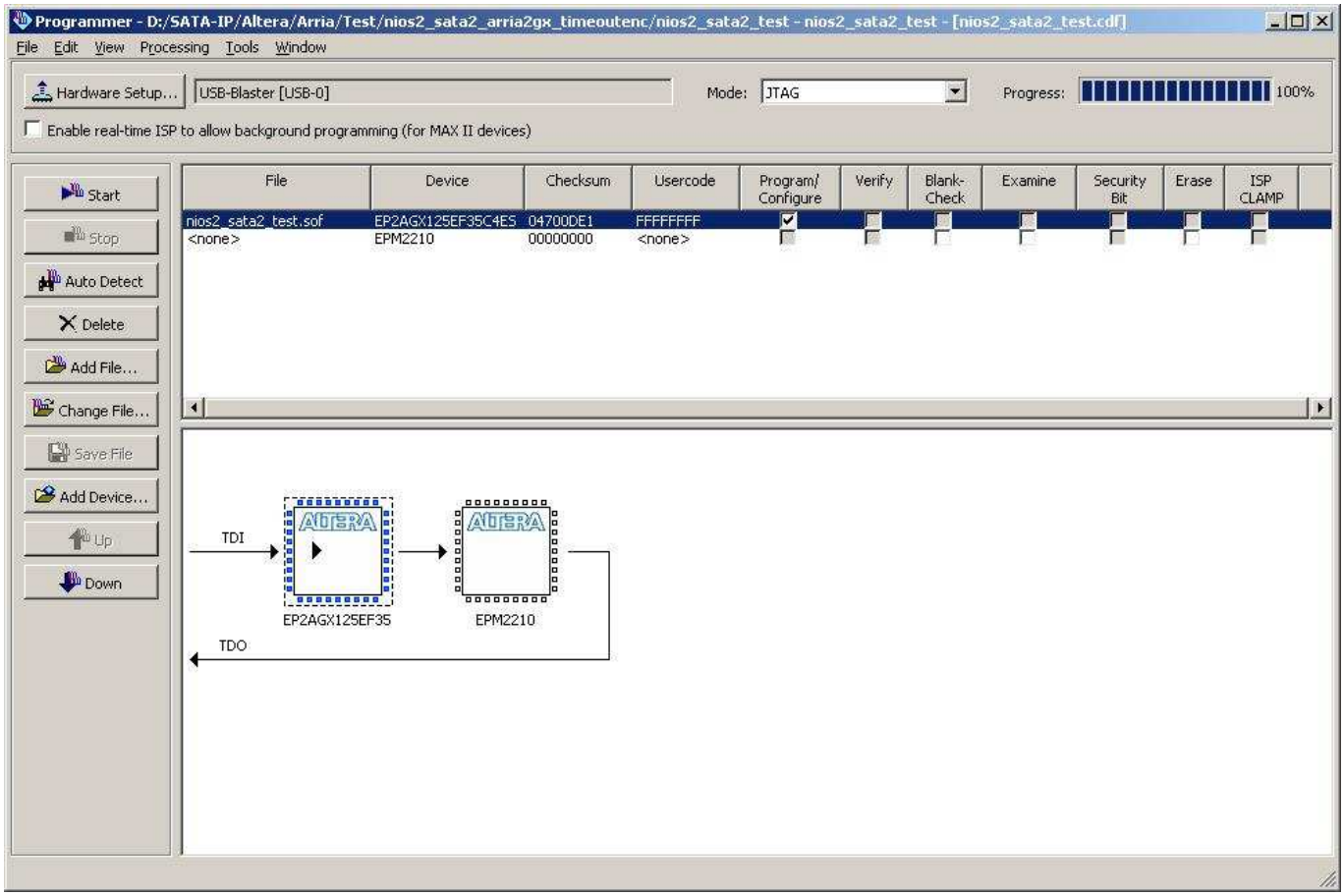

Figure 3 Programmer Environment

- Check LED status on Arria II GX board now and LED0-1 should be turn-on, as shown in Figure 4. After running for 1-hour, SATA-IP will stop operation and LED0-1 will be blink.

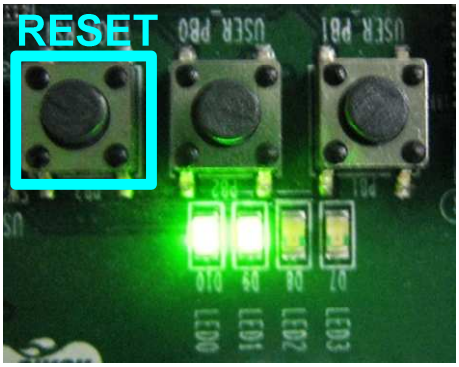

Figure 4 Normal operation LED Status

LED	ON	OFF	BLINK
LED0	OK	SATA-IP cannot detect SATA device. Please check SATA-cable connection or reference clock frequency setting that should be 150 MHz.	1-hr timeout
LED1	OK	Internal PLL is not LOCK.	1-hr timeout
LED2	In process of write SATA HDD/SSD	Idle Status	N/A
LED3	In process of read SATA HDD/SSD	Idle Status	N/A

Table 1 LED Status of host reference design on Stratix-IV board

Note: After 1-hour timeout, user need to re-configuration FPGA again to re-run system.

- Open NiosII 10.0 Command Shell.
- Type “nios2-terminal” and then Main menu for running SATA host demo is displayed, as shown in Figure 5. More details about each Menu are described in next topic.

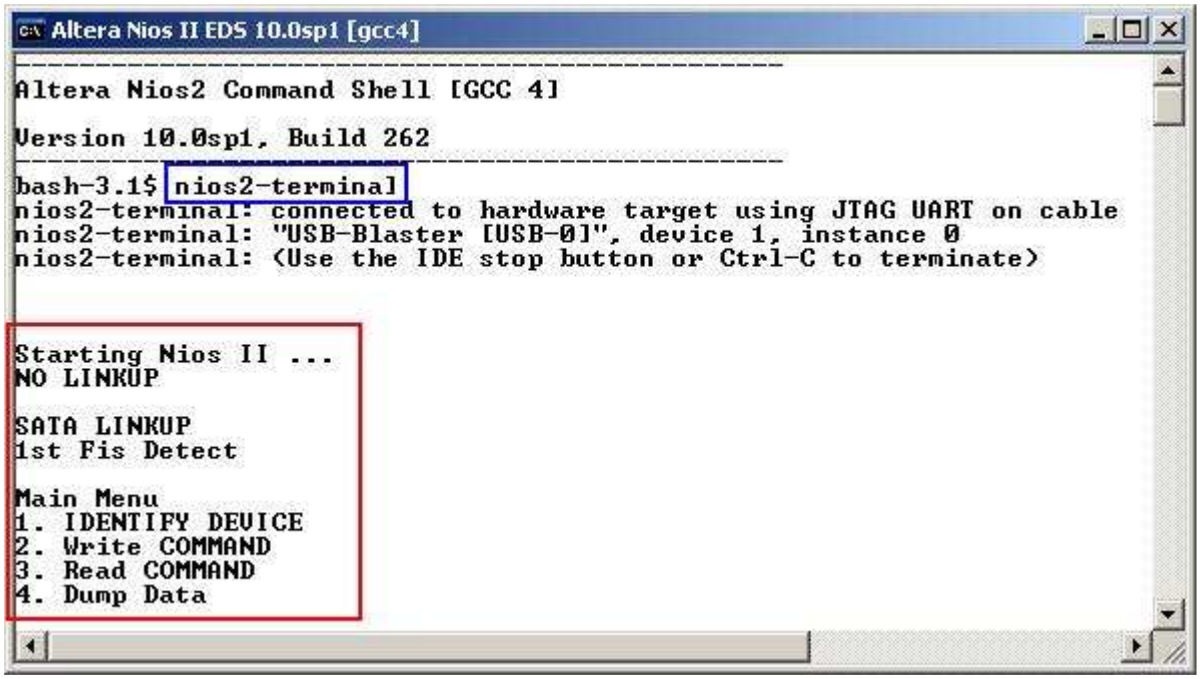

Figure 5 Run NIOSII Terminal

2 Main Menu

2.1 IDENTIFY DEVICE

Select '1' for sending "IDENTIFY DEVICE" command to HDD/SSD. Disk information (Model name, 48-bit LBA supported, disk capacity) will be displayed by using this menu, as shown in Figure 6.

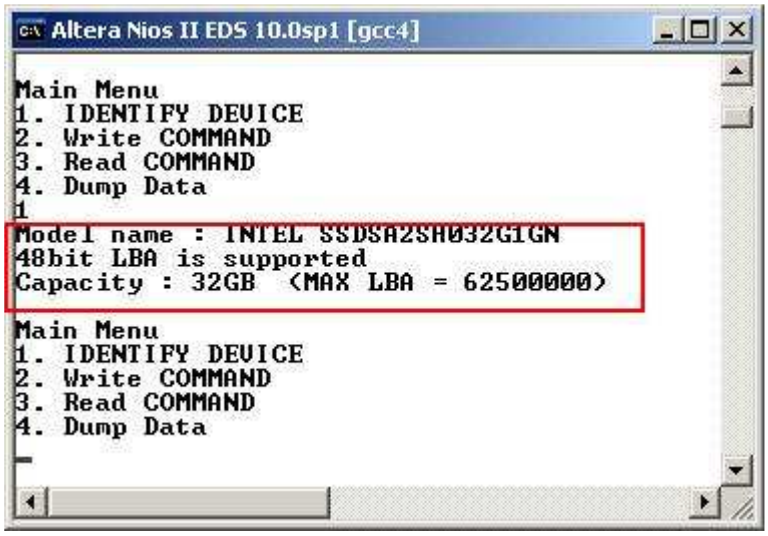

Figure 6 IDENTIFY DEVICE Menu

2.2 WRITE COMMAND

Select '2' for sending "WRITE DMA (EXT)" command to HDD/SSD. Three inputs are required for this menu, i.e.

- Start LBA: this value is used to be the sector number of HDD/SSD to start write data to it.
- Sector Count: this value is used to be total transfer size in sector unit (512 byte) to write HDD/SSD. If this value is more than 65536, data written to HDD/SSD will be duplicated every 65536 sectors from write buffer limitation.
- Write Pattern: this value is used to select test pattern to write to buffer and HDD/SSD. There are 4 test patterns in this demo, i.e. 32-bit increment pattern[0], 32-bit decrement pattern[1], 00000000H[2], FFFFFFFFH[3].

After Software receives all inputs correctly,

- "Prepare data" will be displayed during CPU writing test pattern data to write buffer.
- Transfer speed will be displayed after write operation complete.

The example to use "WRITE COMMAND" menu is shown in Figure 7. Write operation will be cancelled when user input is out-of-range value, as shown in Figure 8.

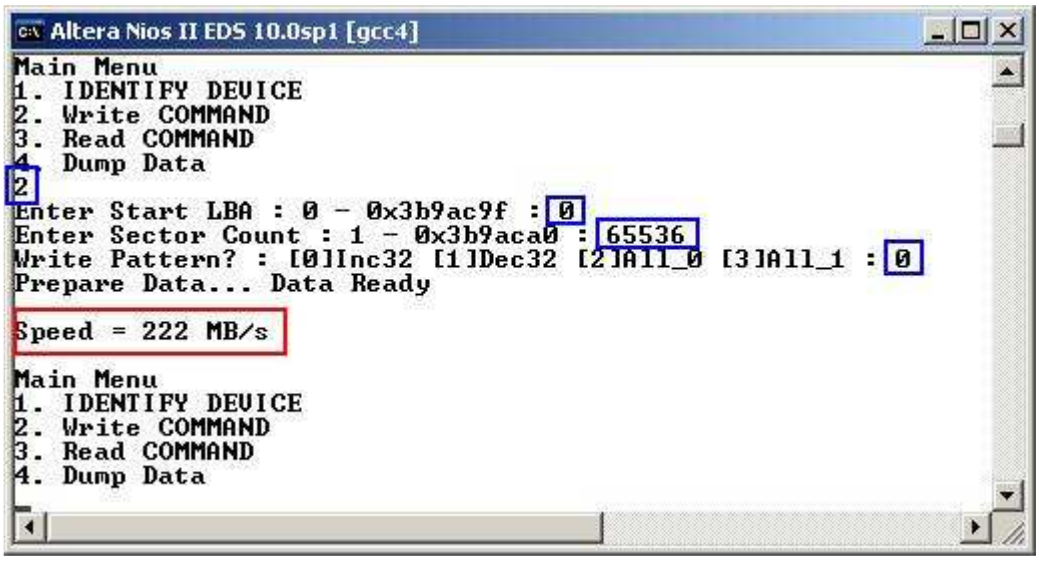

Figure 7 WRITE COMMAND Menu

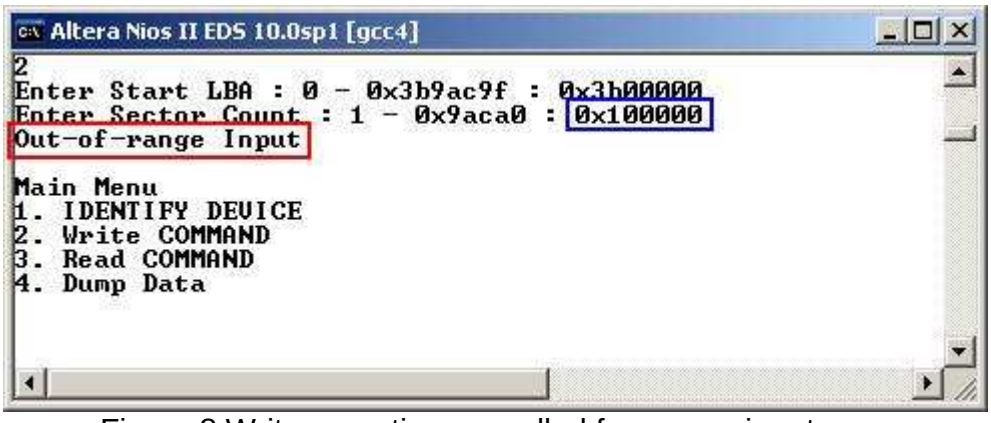

Figure 8 Write operation cancelled from error input

2.3 READ COMMAND

Select '3' for sending "READ DMA (EXT)" command to HDD/SSD. Two or three inputs are required for this menu, i.e.

- Start LBA: this value is used to be the sector number of HDD/SSD to start read data from it.
- Sector Count: this value is used to be total transfer size in sector unit (512 byte) to read HDD/SSD. If this value is more than 65536 which is read buffer size value, transfer speed will be displayed as output without verify, as shown in Figure 9.
- Verify Pattern: this menu will be displayed if Sector Count value is not more than 65536. 4 verify patterns can be selected, like in WRITE COMMAND menu. "Verify Data … Success" will be displayed if all data in read buffer is equal to check pattern, as shown in Figure 10. But "Data Mismatch with failure value" will be displayed instead if data is not equal, as shown in Figure 11.

Similar to WRITE COMMAND menu, read operation will be cancelled if receiving error input value, as shown in Figure 12.

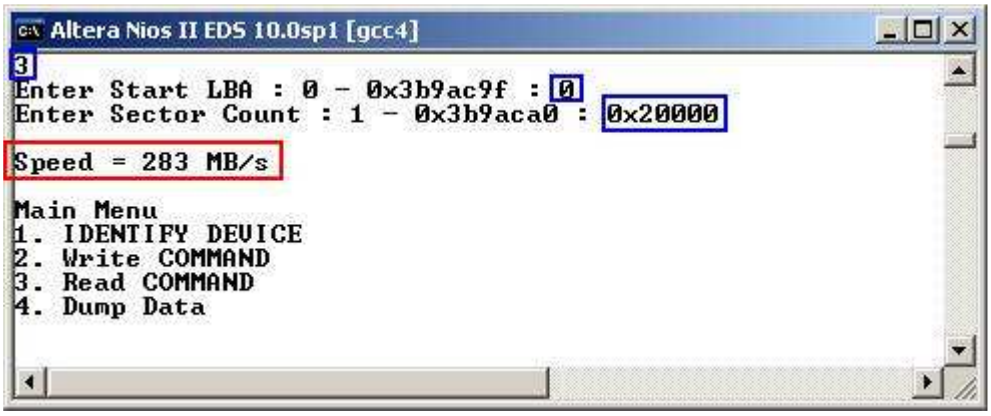

Figure 9 READ COMMAND without Verify

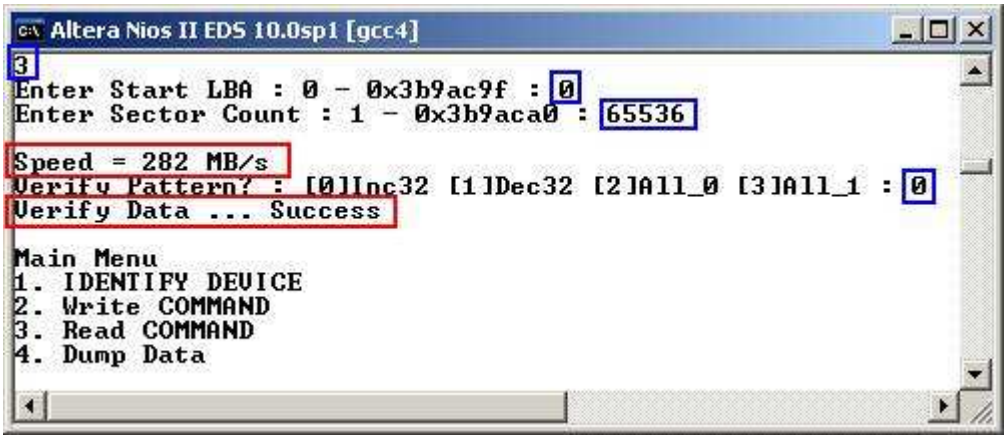

Figure 10 READ COMMAND with verify successful

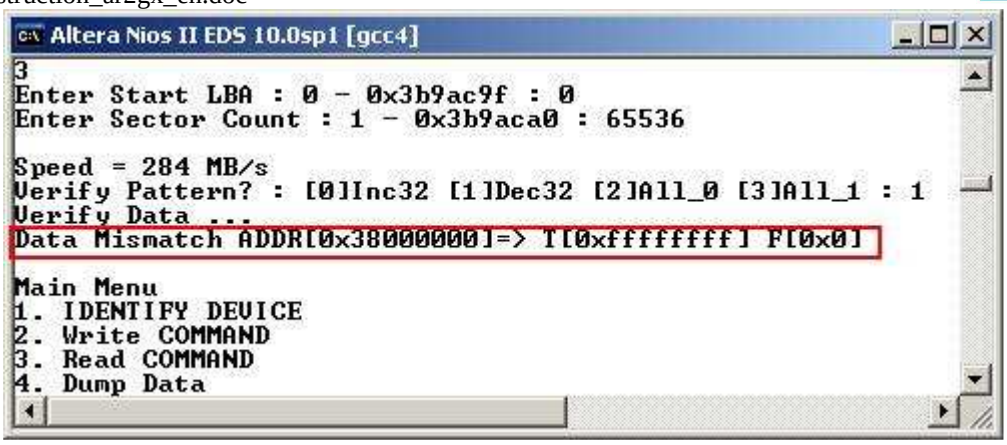

Figure 11 READ COMMAND with verify failure

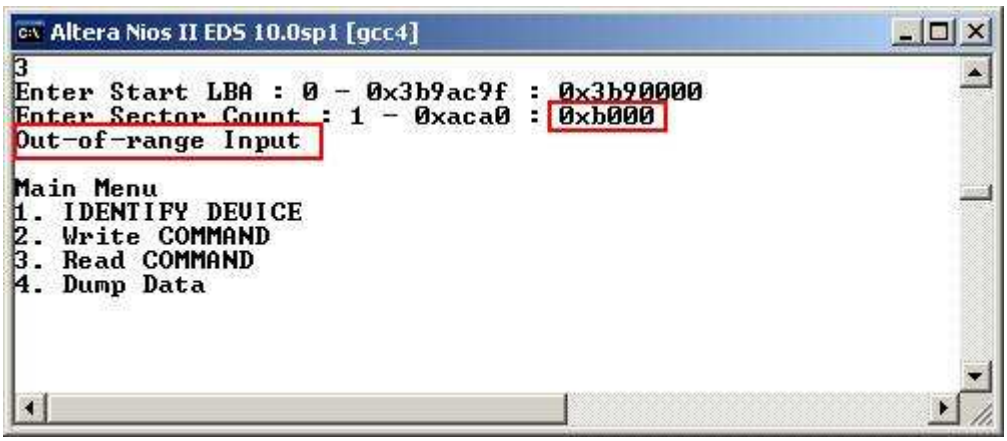

Figure 12 Read operation cancelled from error input

2.4 DUMP DATA

Select '4' to read data from DDR2 to check real value or read control register inside Avalon2SATA module. Two inputs are required for this menu, i.e.

- Start address: Heximal value can be input by adding prefix "0x". Memory map of this reference design is displayed in Table 2.
- Byte length: Input read length in byte unit.

After setting all inputs, all read values will be displayed on console, as shown in Figure 13.

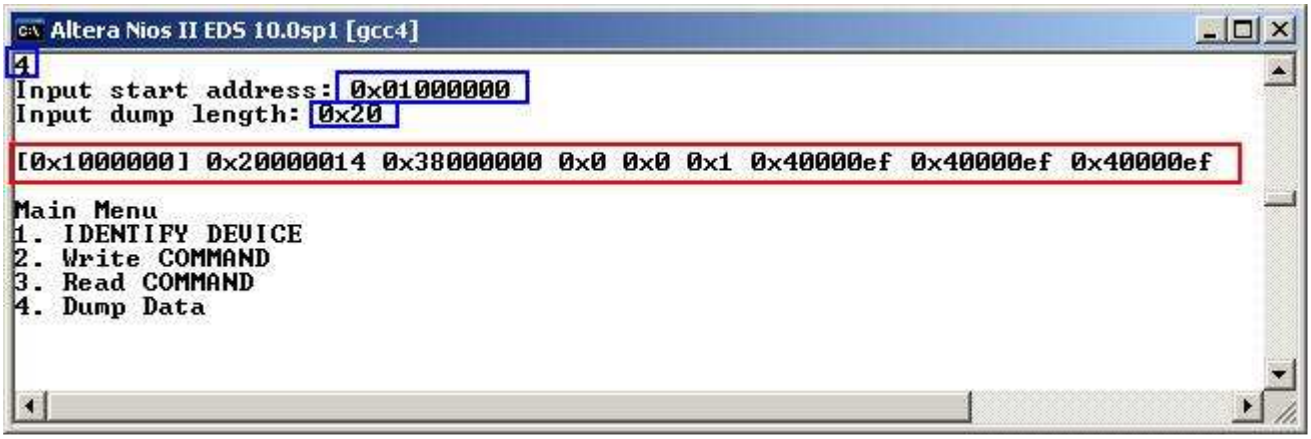

Figure 13 DUMP DATA Menu

Address	Memory map
0x01000000-0x0100001F	Avalon2SATA register area
0x40000000-0x7FFFFFFF	DDR2 memory area
- 0x40000000-0x40000FFF	TX FIS area
- 0x40001000-0x40001FFF	RX FIS area
- 0x50000000-0x57FFFFFF	TX DATA FIS area
- 0x58000000-0x5FFFFFFF	RX DATA FIS area
- 0x60000000-0x7FFFFFFF	Available

Table 2 Memory map in NIOSII system

3 Revision History

Revision	Date	Description
1.0	05-Jan-11	Initial version release