SDXC-IP Raw Demo Instruction on ML505/506

Rev1.0 11-Nov-10

This document describes SDXC-IP reference design by using Raw data format of SDXC-IP reference design bit-file on ML505/506.

1 Environment

For real board evaluation of SDXC-IP with Raw data format reference design, environment shown in Figure 1 is required.

- ML506/505 Platform
- iMPACT Software in ISE Suite version 10.1.03 or newer
- SDXC-IP Demo board, provided by DesignGateway
- SD Card
- Serial cross-cable

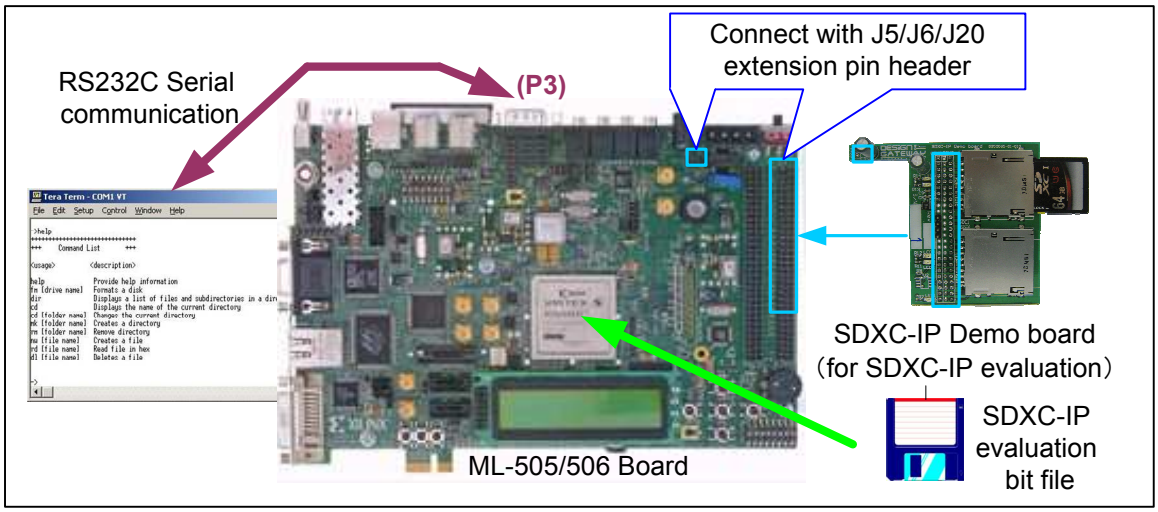

Figure 1 Evaluation environment using reference design bit-file

Note: For evaluation version, IP-Core has 1-hour time limitation to use. After 1-hour use, IP-core will stop any data transfer.

2 Evaluation procedure

- Check all system is power off
- Connect download cable (USB Platform Cable) from JTAG pin (J1) on ML505/506 to PC.
- Connect Cross-serial cable from COM1 port on ML505/506 to Serial port on PC.
- Remove two jumpers of J20 on ML505/506
- Connect SDXC-IP Demo board to ML505/506 board, as shown in Figure 2.
  - CON1 of SDXC-IP Demo board to pin3-4 of J20 on ML505/506 board
  - CON2-3 of SDXC-IP Demo board to J5-J6 on ML505/506 board

  Note: SDXC-IP Demo board can be requested from Design Gateway.

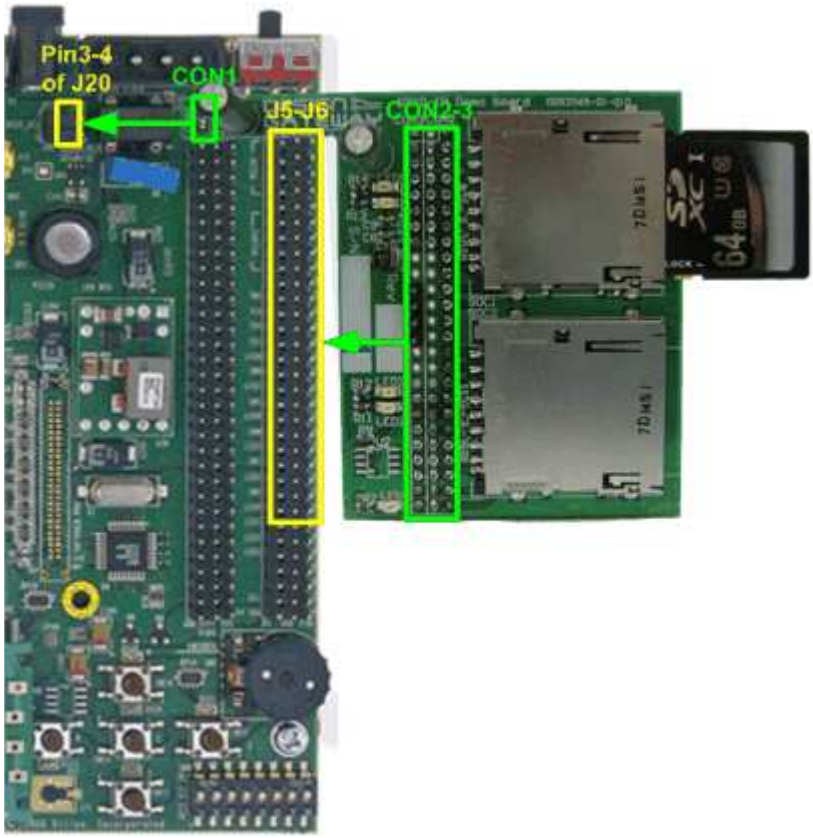

Figure 2 SDXC-IP demo board connection with ML505/506 board

- Insert SD Card to SDXC-IP Demo board.
- Power up ML505/506 board and open serial monitoring software such as HyperTerminal. Terminal settings should be Baud Rate=115,200 Data=8 bit Non-Parity Stop=1.
- Download bit-file to ML505/506 by using iMPACT Software.
- After FPGA start operation, LED on SDXC-IP Demo board will be ON, as shown in Figure 3.
- Check LED status on ML505/506 board at LED0-2 which should be all ON and ERR LEDs are all OFF, as shown in Figure 4. Each LED description is described as follows.

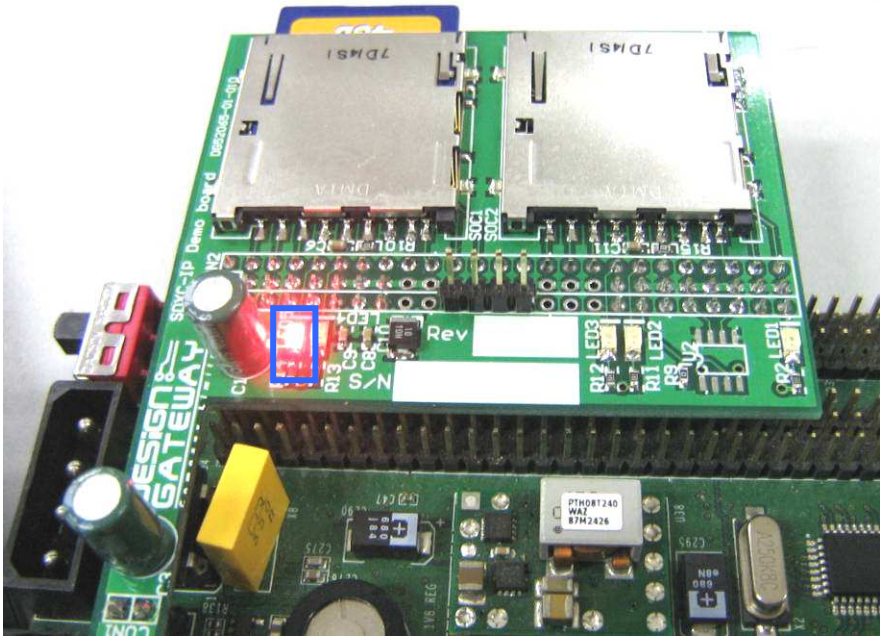

Figure 3 RED LED on SD mini board turn-on after configuration

LED	ON	OFF
LED0	OK	No SD Card is detected. Please re-insert card to SD slot or check SD card.
LED1	Idle	SDXC-IP is busy status from initialize, read, or write command.
LED2	OK	DDR2 cannot initialize. Please check DDR2 on ML505/506 board.
ERR1	Error from SDXC-IP.	OK
ERR2	1-hour timeout	OK

Table 1 LED Status of SDXC-IP Raw data design on ML505/506 board

Note:
- Please see in SDXC-IP datasheet for more details about IP error when ERR1 LED ON.
- ERR2 LED is ON after 1-hour timeout. Please re-configuration FPGA to re-run system.

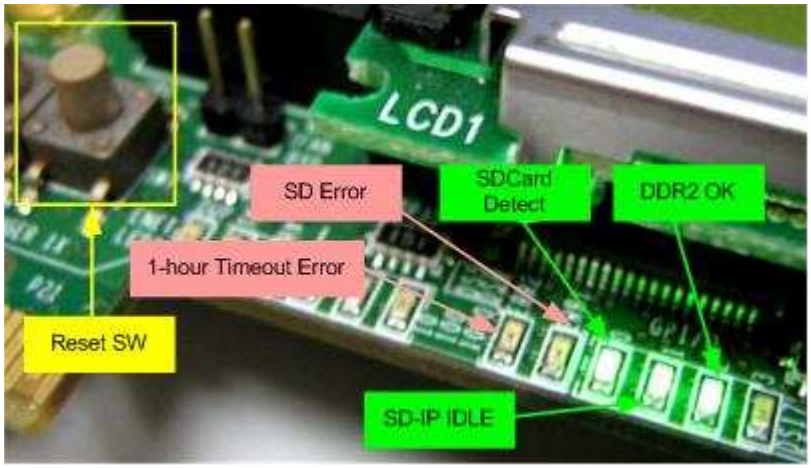

Figure 4 Reset Switch and LED status on ML505/506 board

- At serial console on PC, main menu will be displayed as shown in Figure 5. Then, user can execute each command operation. Please check serial-cable connection if this menu is not displayed on console.

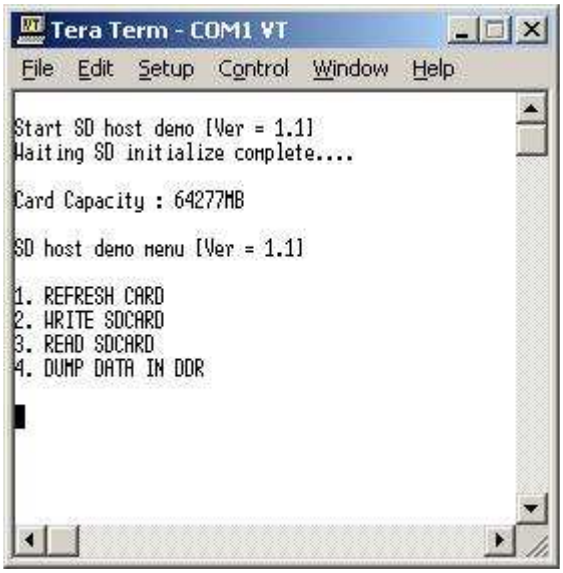

Figure 5 Main Menu of SD Raw format demo

3 Main Menu

3.1 REFRESH SD

Select '1' to send reset and refresh SD Card status. SDXC-IP will re-initialize and update card size to display to Serial Console. Disk capacity will be displayed when initialize complete as shown in Figure 6. If SD Card cannot detect, "Please insert SDCARD" message will be displayed as shown in Figure 7.

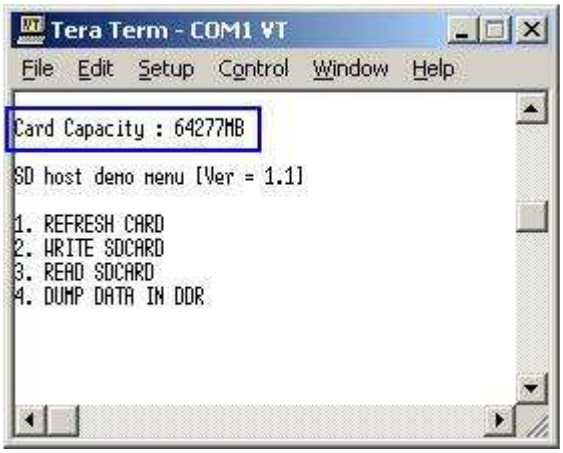

Figure 6 Initialize complete

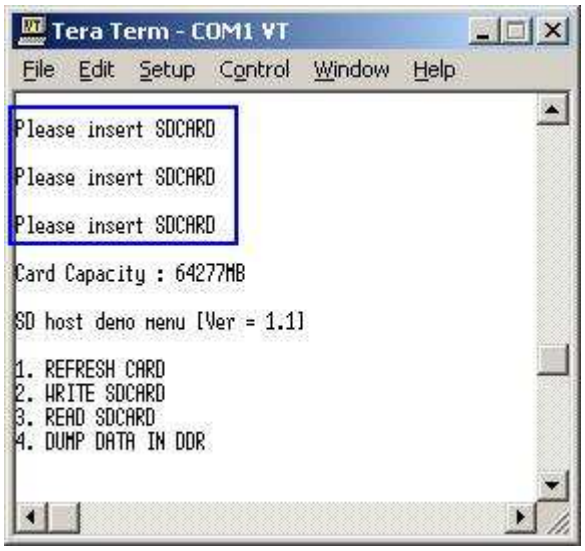

Figure 7 Warning when no SD Card is inserted

3.2 WRITE SDCARD

Select '2' to send write request to SDXC-IP. Three inputs are required for this menu, i.e.

- Start Block Address: this value is used to be start block address (1 block = 512 byte) to write data to SD Card.
- Block Count: this value is used to be total transfer size in block unit (512 byte) to write SD Card. If this value is more than 262,144, data written to SD Card will be repeated every 262144 blocks from write buffer limitation (128 MB).
- Write Pattern: this value is used to select test pattern to write to buffer and SD Card. There are four test patterns in this demo, i.e. 32-bit increment pattern[0], 32-bit decrement pattern[1], 00000000H[2], and FFFFFFFFH[3].

After Software receives all inputs correctly,
- "Prepare data" will be displayed during CPU writing test pattern data to write buffer.
- "Execute Write" will be displayed during CPU sending write request to SDXC-IP and wait until operation complete.
- Transfer speed will be displayed after write operation complete.

Figure 8 shows the example of test result when operation complete. Write operation will be canceled from two cases, i.e. receiving error input or receiving any input from user during CPU processing this operation, as shown in Figure 9 and Figure 10.

Note: If cancel operation is found, user needs to select Menu '1' to reset system and clear all status before starting next read/write operation.

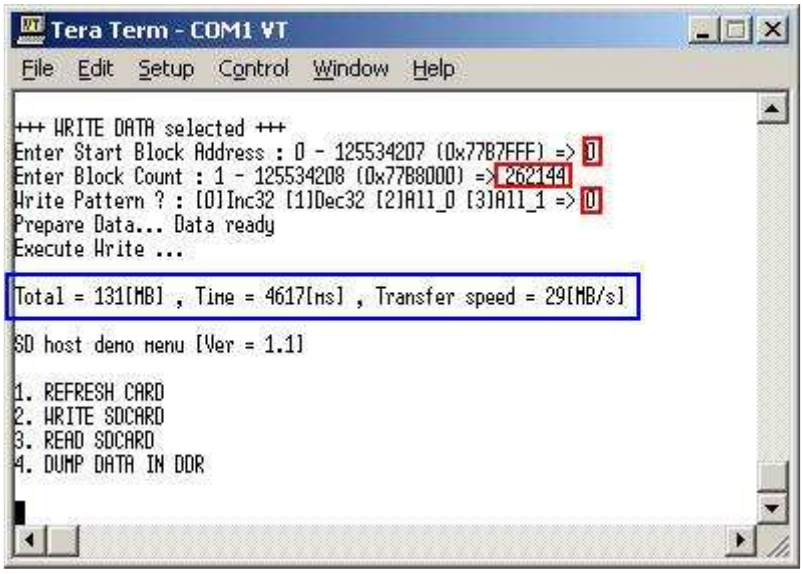

Figure 8 WRITE Operation input and output

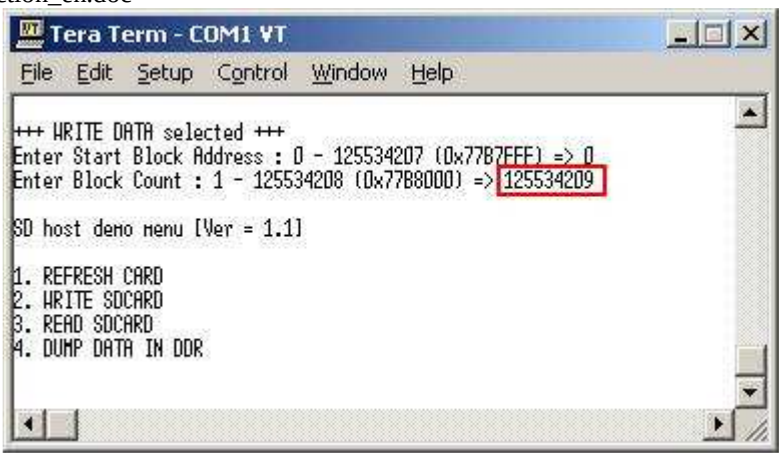

Figure 9 Write Operation canceled from error input

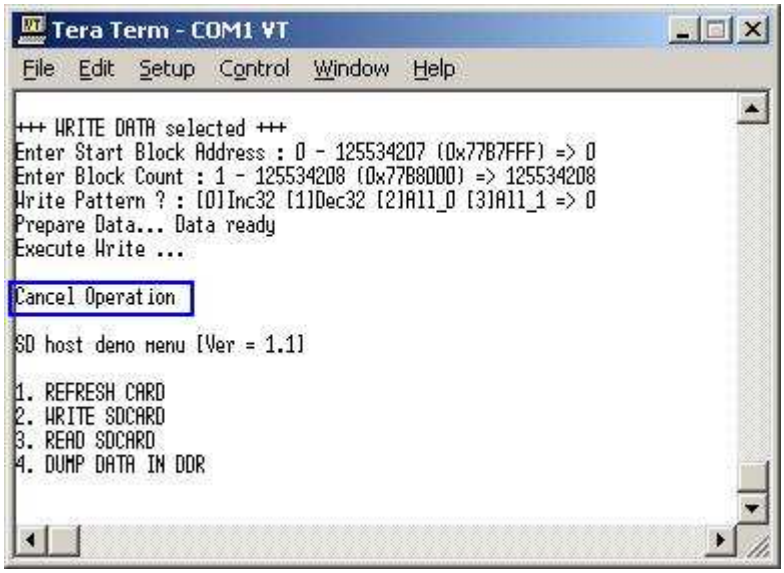

Figure 10 Write Operation canceled from receiving user input during operation

3.3 READ SDCARD

Select '3' to send read request to SDXC-IP. Two or three inputs are required for this menu, i.e.

- Start Block Address: this value is used to be start block address (1 block = 512 byte) to read data from SD Card.
- Block Count: this value is used to be total transfer size in block unit (512 byte) to read SD Card. If this value is more than 262,144 which is read buffer size (128 MB) value, transfer speed will be displayed as output without verify, as shown in Figure 11.
- Verify Pattern: this menu will be displayed if Block Count is less than or equal 262,144. Four verify pattern can be selected, like in WRITE SDCARD menu. "Verify Data … Success" will be displayed if all data in read buffer are equal to check pattern, but "Data Mismatch with failure value" will be displayed instead if any data is not equal, as shown in Figure 12.

Similar to WRITE SDCARD menu, Read operation will be canceled if receiving error input or receiving any input from user during CPU processing, as shown in Figure 13 and Figure 14.

Note: If cancel operation is found, user needs to select Menu '1' to reset system and clear all status before starting next read/write operation.

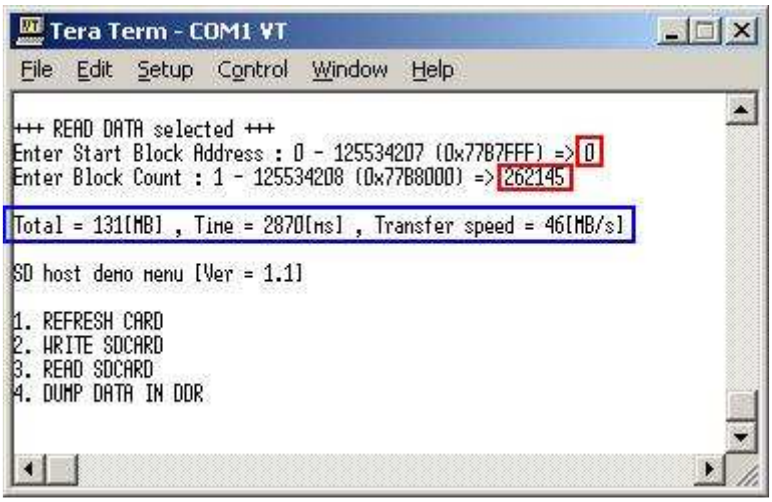

Figure 11 READ Operation without verify

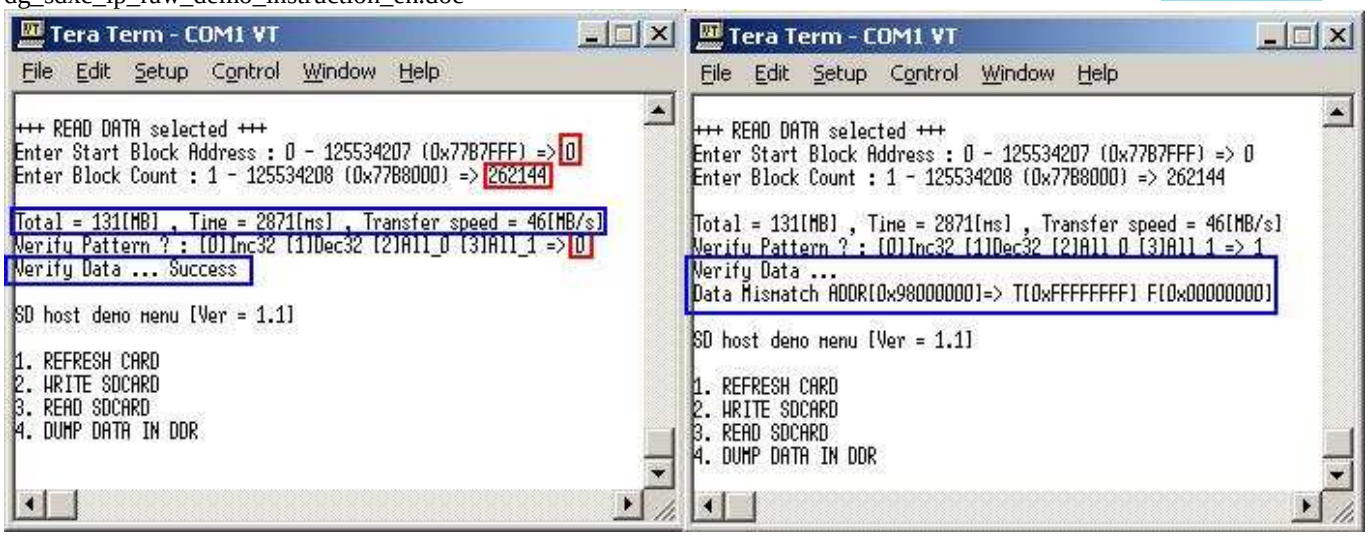

Figure 12 READ Operation with verify process

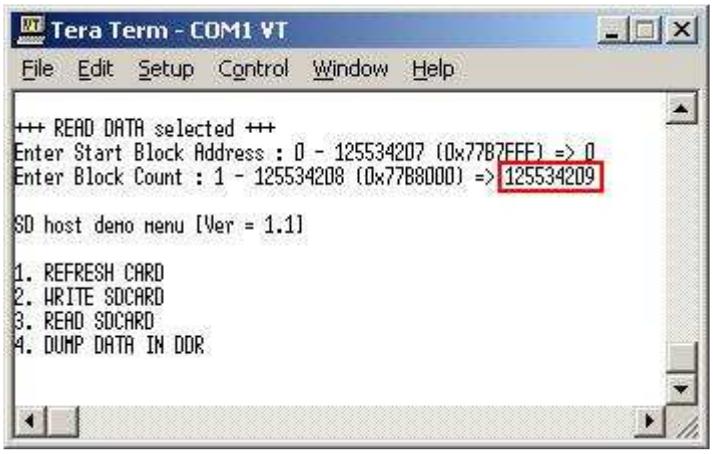

Figure 13 Read Operation canceled from error input

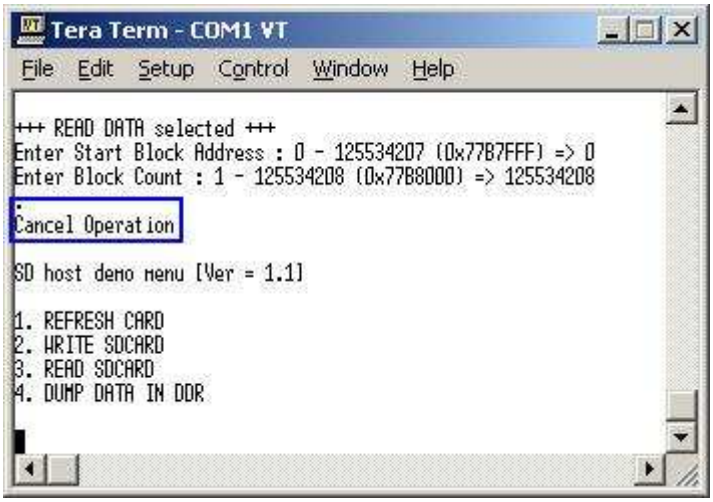

Figure 14 Read Operation canceled from receiving input during operation

3.4 DUMP DATA IN DDR

Select '4' to dump data from buffer to display on Serial Console. In this demo, DDR2 is mapped to address = 90000000H-9FFFFFFFH. Six submenus can be selected, i.e.

- 'G': this submenu is used to select the address to read, as shown in Figure 15. The address can be input to be hex value by adding prefix "0x", so normally input will be received in decimal value.

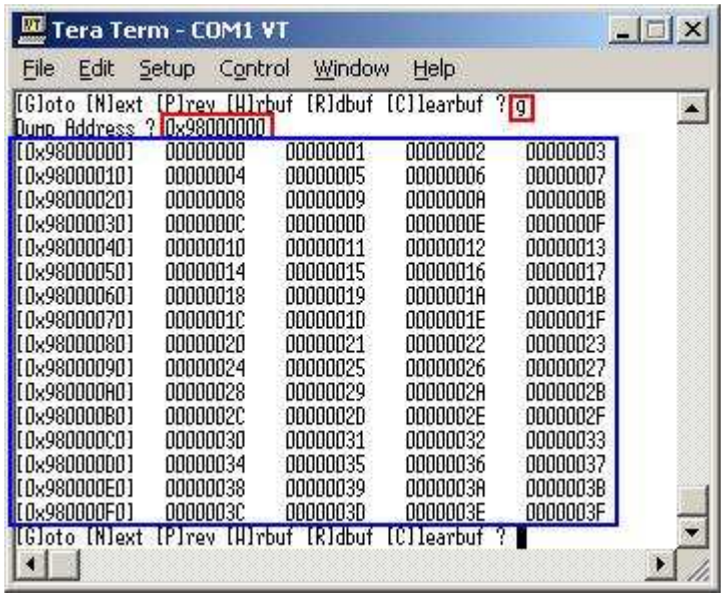

Figure 15 Goto submenu example

- 'N': this submenu is used to read next 256 byte data in buffer, as shown in Figure 16.
- 'P': this submenu is used to read previous 256 byte data in buffer, as shown in Figure 16.

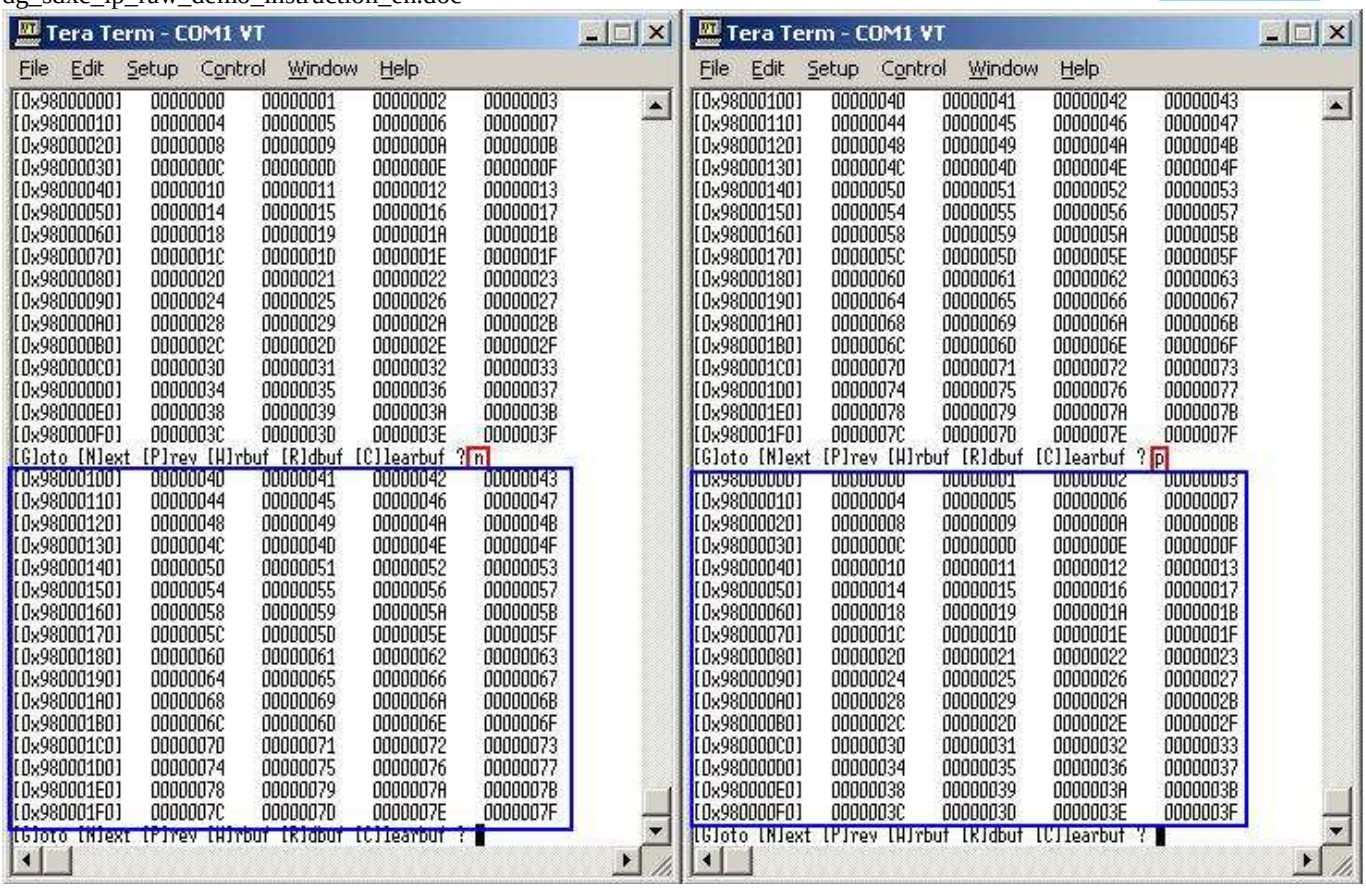

Figure 16 Read Next/Previous 256 byte data in buffer

- 'W': this submenu is used to read 256 byte data at top of write buffer, as shown in Figure 17.
- 'R': this submenu is used to read 256 byte data at top of read buffer, as shown in Figure 17.

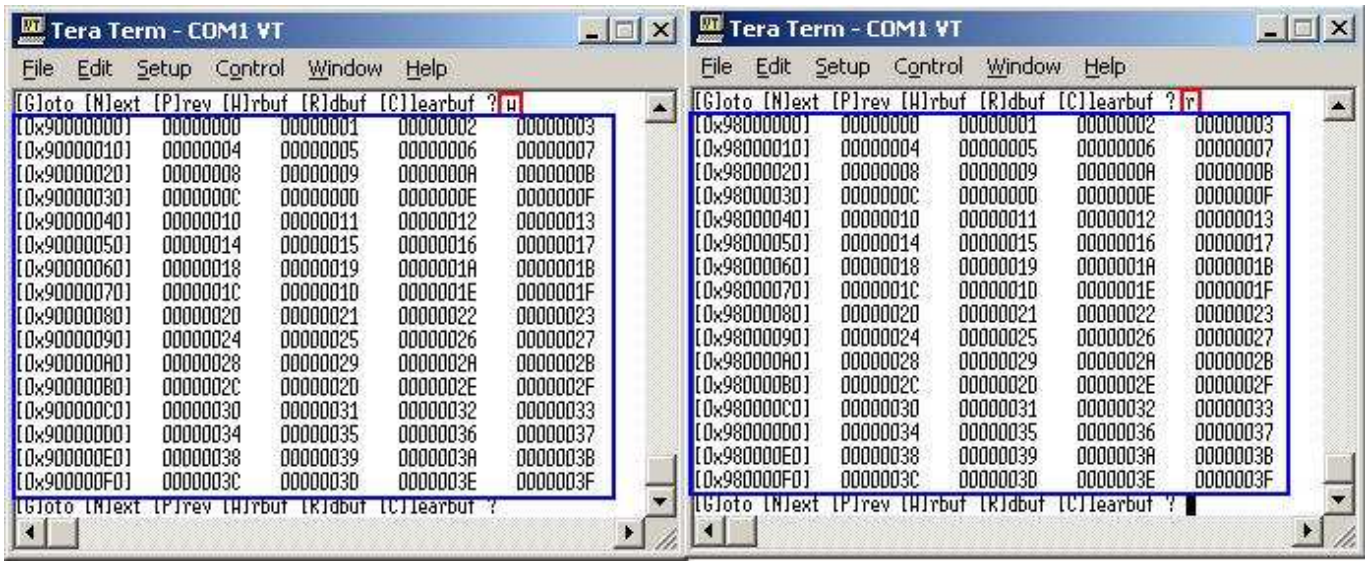

Figure 17 Read 256 byte data at top of write/read buffer

- 'C': this submenu is used to clear data in write/read buffer to be zero value. Select 'Y' to confirm for clear write/read buffer, but user can select 'N' to not clear the current buffer.

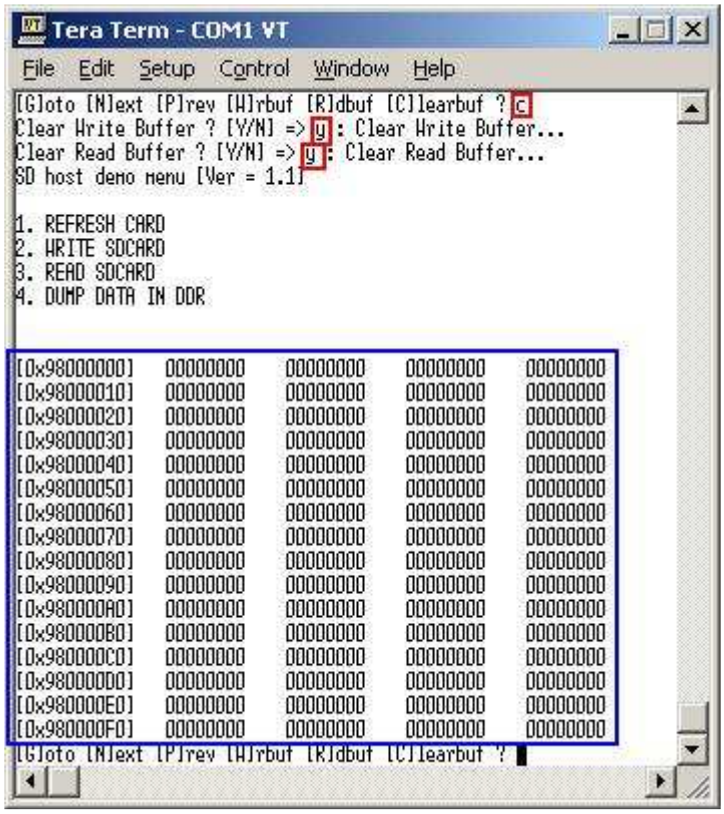

Figure 18 Clear buffer to be zero

- User can exit this menu by input other key, such as 'x'.

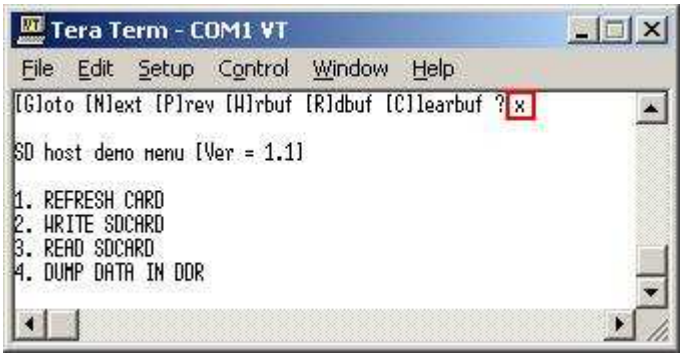

Figure 19 Exit dump menu

4 Revision History

Revision	Date	Description
1.0	11-Nov-10	Update to support SDXC