

SATA-IP exFAT Demo Instruction on KC705

Rev1.1 9-Sep-13

This document describes how to evaluate SATA-IP exFAT demo bit file on KC705 board.

1 Environment

For real board evaluation of exFAT reference design, environment shown in Figure 1-1 is required.

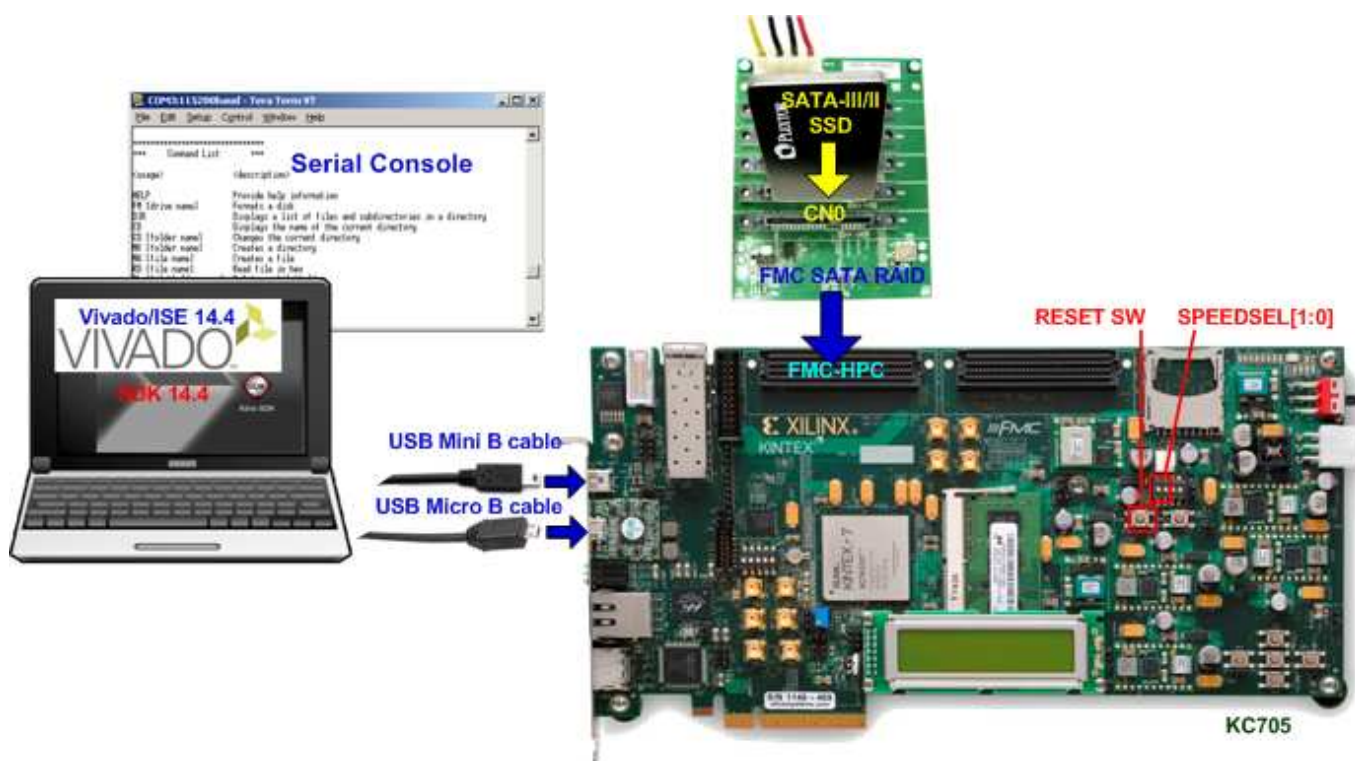


Figure 1-1 Evaluation environment using reference design bit-file

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 FMC SATA RAID board to FMC-HPC connector (J22)
Note: FMC SATA RAID board is provided by Design Gateway.
- Connect power to power connector on FMC SATA RAID board
- Connect SATA3/SATA2 Device to CN0 on FMC SATA RAID board
- Set DIPSW bit [2:1] at GPIO DIP SW4 position, as shown in Figure 2-1 to select SATA speed mode. The description is described in Table 1.



Figure 2-1 DIPSW setting for selecting auto-negotiation mode

DIPSW[2]	DIPSW[1]	Description
'1'	'1'	Fixed-speed at SATA3 (6.0 Gbps)
'1'	'0'	Fixed-speed at SATA2 (3.0 Gbps)
'0'	'X'	Auto-speed negotiation mode

Table 1 DIPSW setting to select SATA speed

- Connect USB mini B cable from J6 on KC705 to USB Port on PC for Serial Console
- Connect USB micro B cable on U29 of KC705 to USB Port on PC for JTAG programming
- Connect Power cable to KC705 board and then power up.
- 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 KC705 by using iMPACT Software.
- After FPGA start operation, check GPIO LEDs status on KC705 board at LED0-LED1. Both LEDs must be ON, as shown in Figure 2-2 and Figure 2-3. LED2 status depends on SATA speed mode. Each LED description is described as follows.



Figure 2-2 LED status after system set up complete on SATA-3 speed



Figure 2-3 LED status after system set up complete on SATA-2 speed

LED	ON	OFF
LED0	OK	150 MHz of SATA clock on FMC SATA RAID cannot lock. Please check 150 MHz clock source on FMC SATA RAID board.
LED1	OK	SATA-IP cannot detect SATA device. Please check SATA device and the connection.
LED2	SATA-III	SATA-II
LED3	BLINK : 1-hour timeout	

Table 2 LED Status of host reference design on SP605 board

- At serial console on PC, main menu will be displayed as shown in Figure 2-4. Please check serial connection if this menu is not displayed on console. The step on boot screen is follows.
 - (1) Disk information is displayed to show name and size.
 - (2) Ask user to set date which is the created date when creating file/directory. Press 'y' to set date, or press other keys to skip setting and use default value instead (Default is 1 Mar 2013).
 - (3) a. Show File system information if exFAT file system has already detected on this disk.
b. If no exFAT file system on disk, user needs to press 'y' to confirm and start format process, as shown in Figure 2-5.
 - (4) Information about exFAT file system on disk is shown in next line.
 - (5) Main Menu to show all supported command in this demo is displayed on last line.

After that, user can start testing any operation by typing command, following main menu. More details about each command are follows.

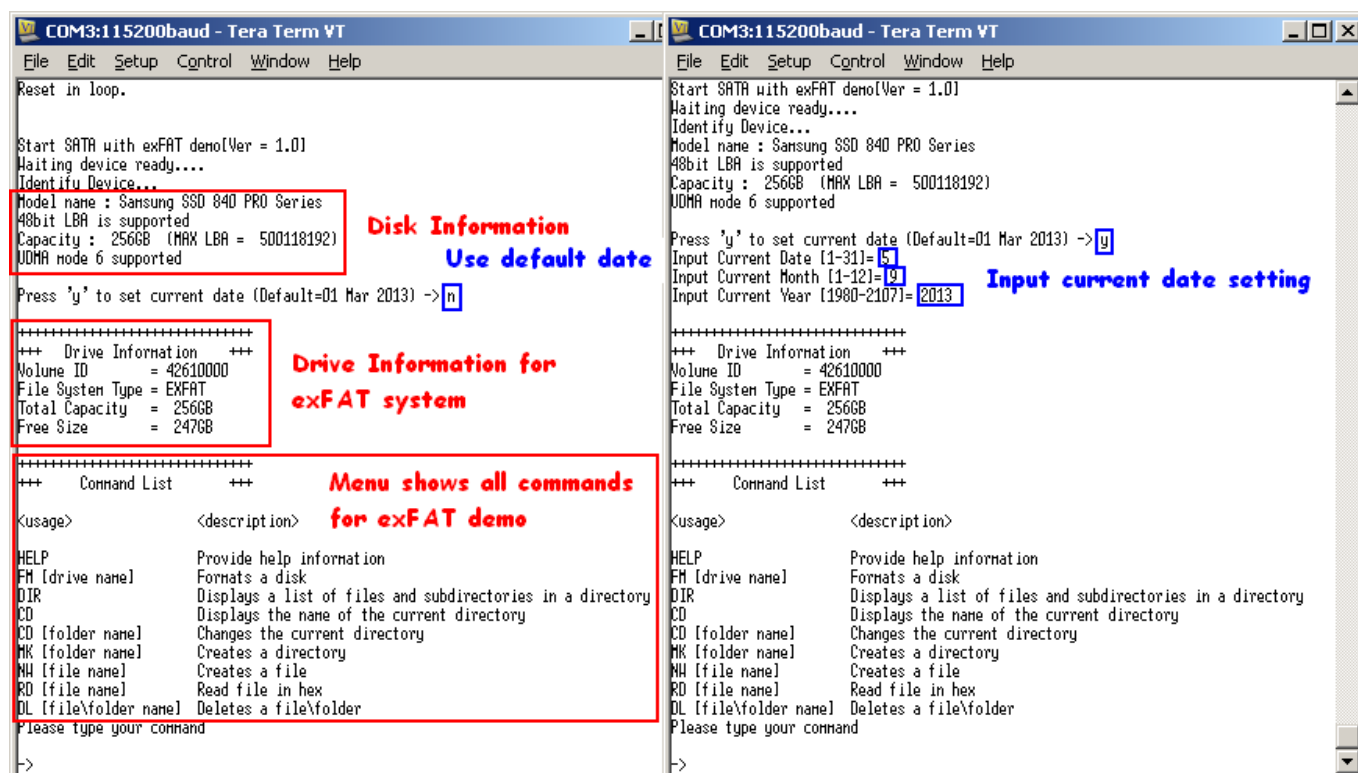


Figure 2-4 Main Menu when exFAT detect in disk

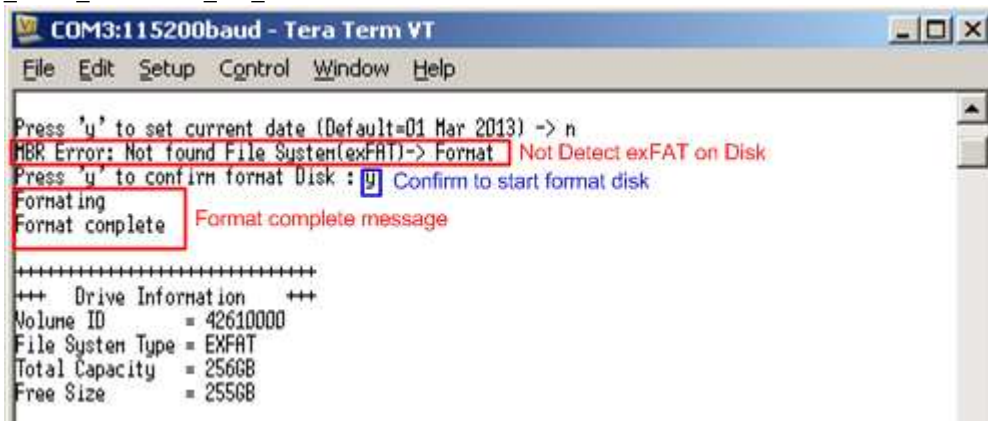


Figure 2-5 Format menu when exFAT file system not found in disk

3 Main Menu

3.1 HELP

Command -> help

Select this command to display all support commands on console with its description. The example result is shown in Figure 3-1.

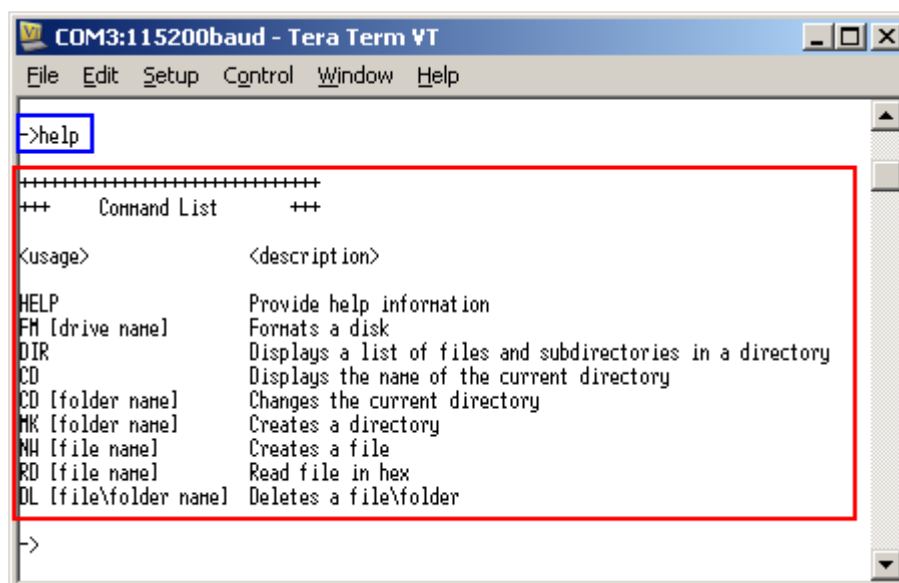


Figure 3-1 HELP command

3.2 FORMAT

Command -> fm [drive name]

Select this command to format disk to exFAT file system. User needs to input

- (1) Drive Name: This input can receive up to 11 Characters. Only 1st – 11th Character will be used if too long length is received.
- (2) Press 'y' to confirm operation and start format. Then, wait until "Format complete" and drive information are displayed after operation end. If press other inputs, operation will be cancelled.

Figure 3-3 and Figure 3-4 shows the error when Drive name includes invalid Characters and too long file name length sequentially.

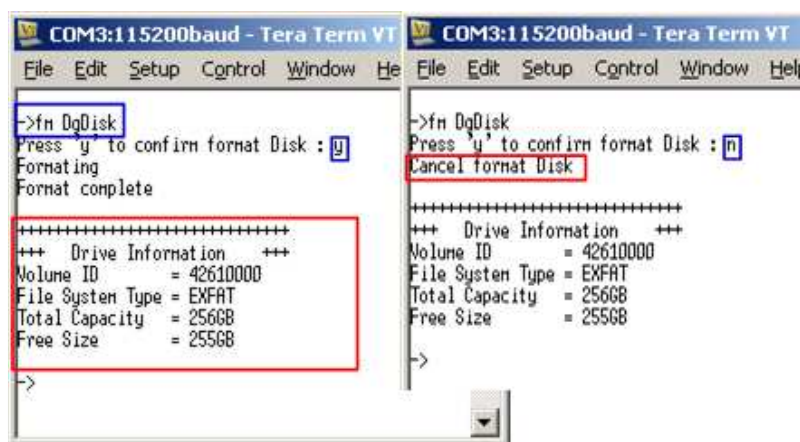


Figure 3-2 FORMAT command

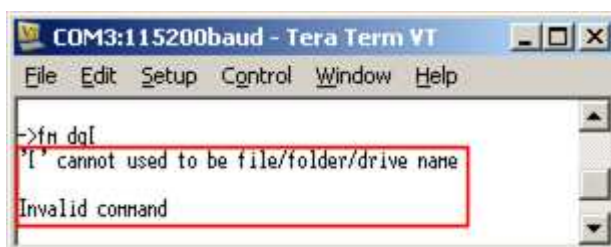


Figure 3-3 Error from invalid character

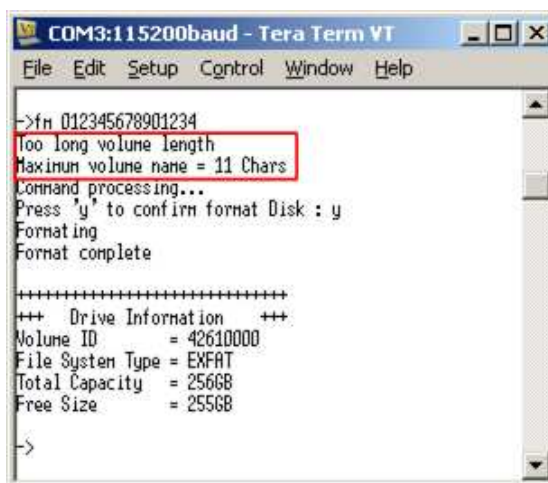


Figure 3-4 Error from too long name

3.3 DIR

Command -> dir

Select this command to display list of all files and sub-directories within current directory. The output of this command is

- (1) Path of current directory. If space is found, it means current directory is root directory.
- (2) Modified date and time of each file and sub-directory.
- (3) File size in case of file type or <DIR> in case of directory type.
- (4) File/Directory Name
- (5) Free Space size in disk

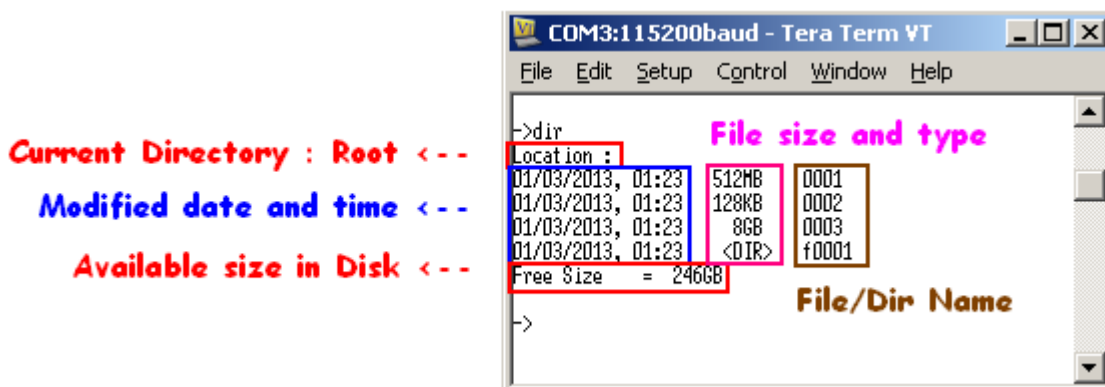


Figure 3-5 DIR command

3.4 CD

Command -> cd, cd .., or cd [sub-directory name]

Select this command to change current directory to parent by “cd ..” or to sub-directory by “cd [sub-directory name]”. In case of only “cd” input, path of current directory will be displayed. The examples of the three commands are displayed in Figure 3-6 to Figure 3-8.

“[sub-directory name] Not Found” message will be displayed if name input is not matched with any directory within current directory, as shown in Figure 3-9.



Figure 3-6 CD command

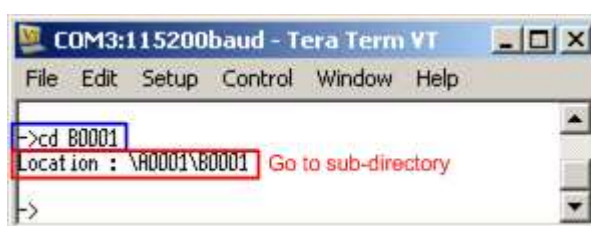


Figure 3-7 Go to sub-directory

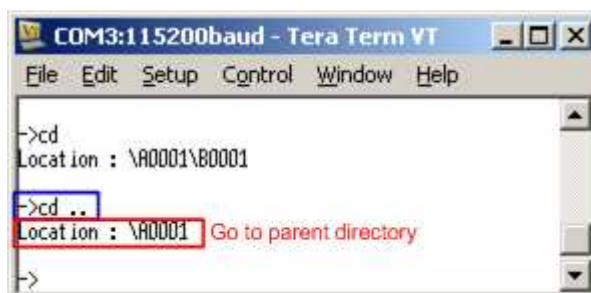


Figure 3-8 Go to parent directory



Figure 3-9 Directory Not Found

3.5 MAKE

Command -> mk [folder name]

Select this command to create new directory within current directory.

- Name input can support up to 255 Characters, following exFAT specification.
- User can select to set time of new file by press 'y'. If press other inputs, it will use default time (01.23), as shown in Figure 3-10.

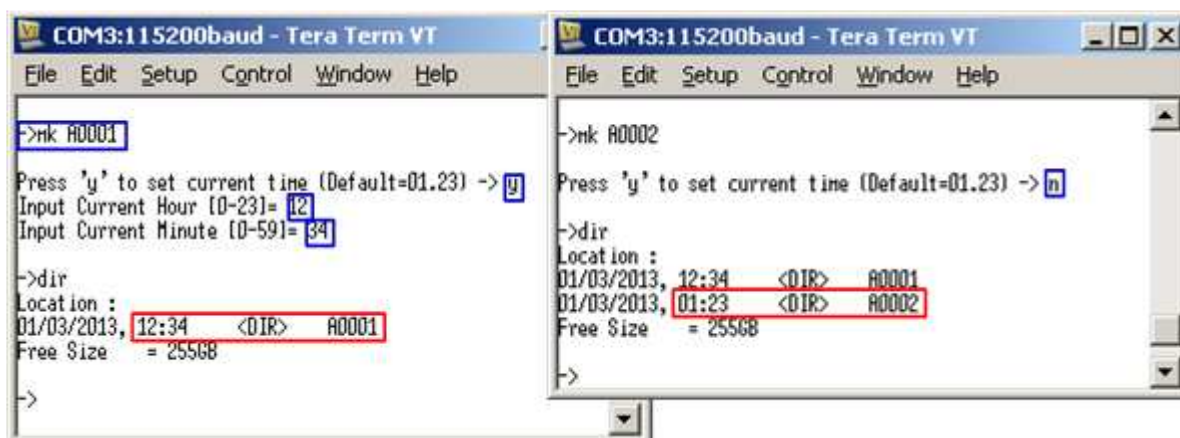


Figure 3-10 MAKE command

Three errors are shown in the example, i.e.

- (1) Error from invalid character to be directory name, as shown in Figure 3-11
- (2) Error from directory name already exist in current directory, as shown in Figure 3-12
- (3) Auto-running when directory name input is equal to 255 Character, as shown in Figure 3-13.

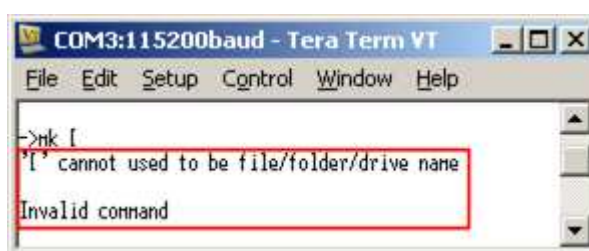


Figure 3-11 Error from invalid character

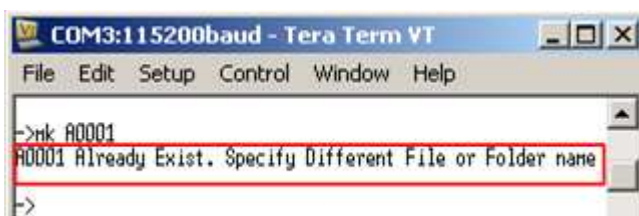


Figure 3-12 Error from exist name in directory

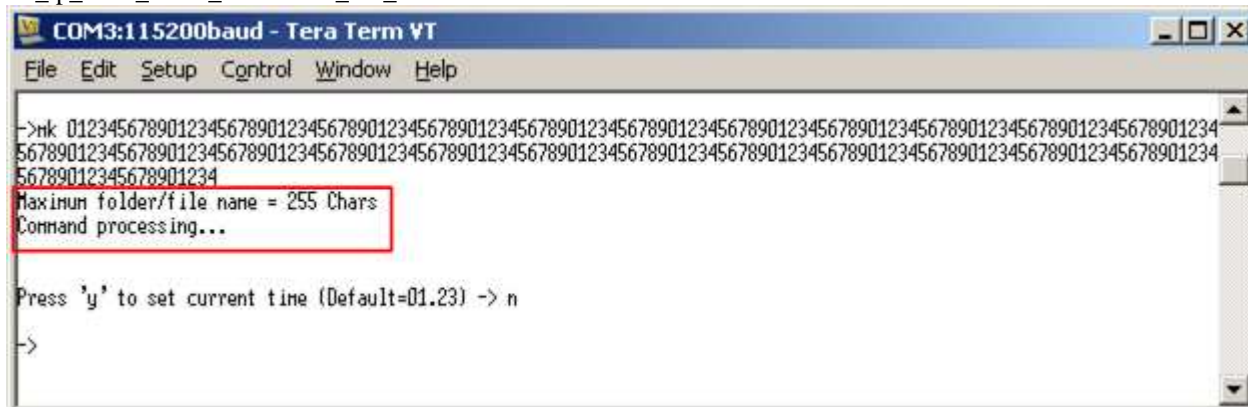


Figure 3-13 Maximum character received

3.6 NEW

Command -> nw [file name]

Select this command to create new file within current directory. The input of this command is follows.

- (1) File name: The input can receive up to 255 Characters.
- (2) Time setting: Press 'y' to set up created time for new file, or press other inputs to use default time.
- (3) File size: The input unit is sector size (512 byte size).
- (4) Test pattern format: 5 patterns can be selected, i.e. [0] 32-bit Increment, [1] 32-bit Decrement, [2] All Zero, [3] All One, and [4] LFSR counter. Test pattern is filled in buffer up to 64 MB as maximum size. If file size is more than 64 MB, the next 64 MB will be similar to the first 64 MB.

There are two modes for writing data to disk, i.e. Burst and Single. If free cluster to store data is contiguous, it will run in Burst mode which will achieve good performance. On the contrary, run on Single mode with transfer size = 1 cluster when free cluster is not contiguous. Smaller transfer size in Single mode makes performance worse than Burst mode which transfer size in each transaction is bigger, as shown in Figure 3-15.

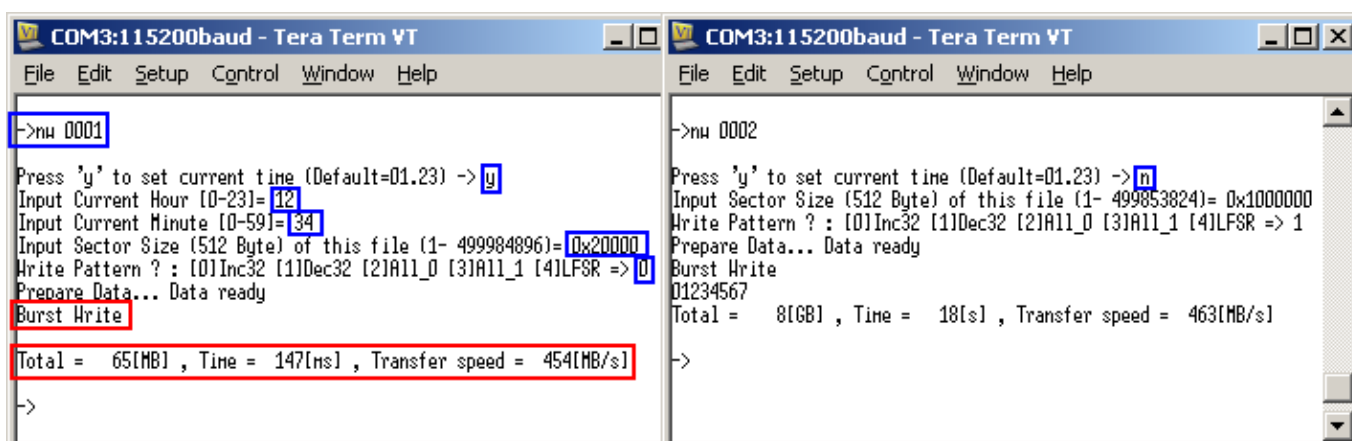


Figure 3-14 NEW command

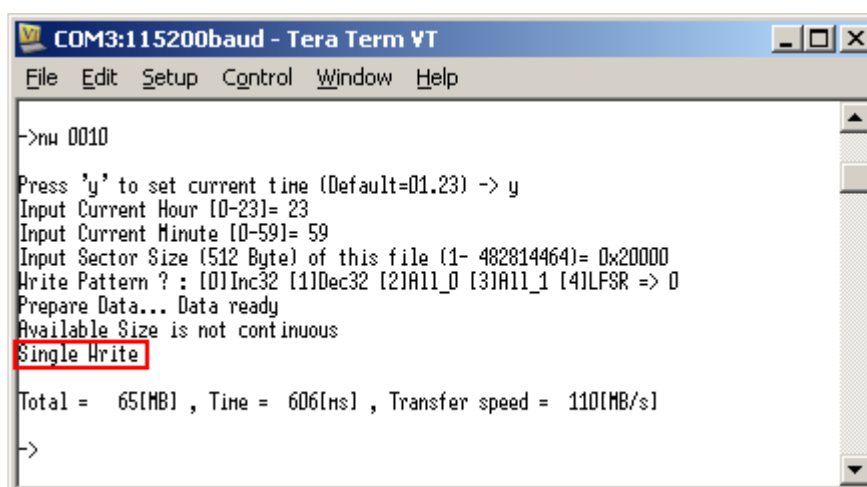


Figure 3-15 NEW command with Single mode

3.7 READ

Command -> rd [file name]

Select this command to read/verify or dump data in request file. The input of this command is follows.

- (1) File name: Input request file name in current directory
- (2) Mode: Select operation by [1]-Read/Verify data [2]-Dump data to console.

In Read/Verify mode, data will be verified by user selected test pattern when data size in file is 64 MB at most, as shown in the left window of Figure 3-19, while “No verification” will be displayed for file size more than 64 MB.

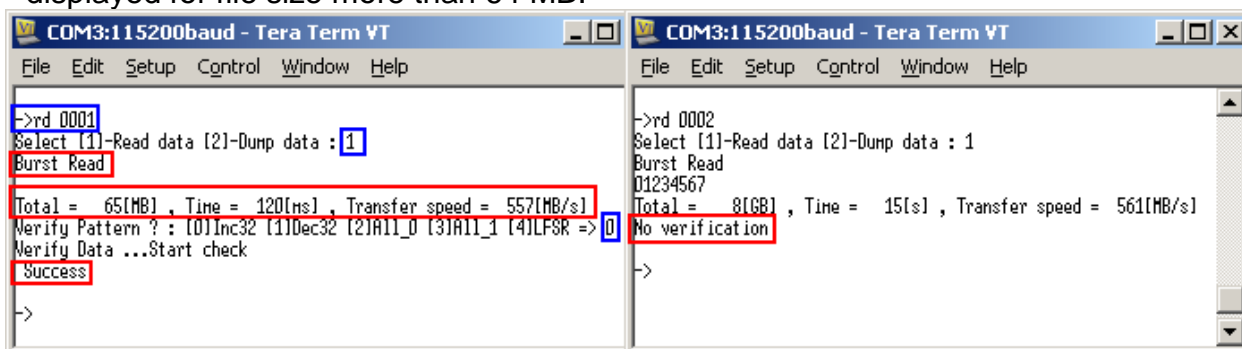


Figure 3-19 READ command

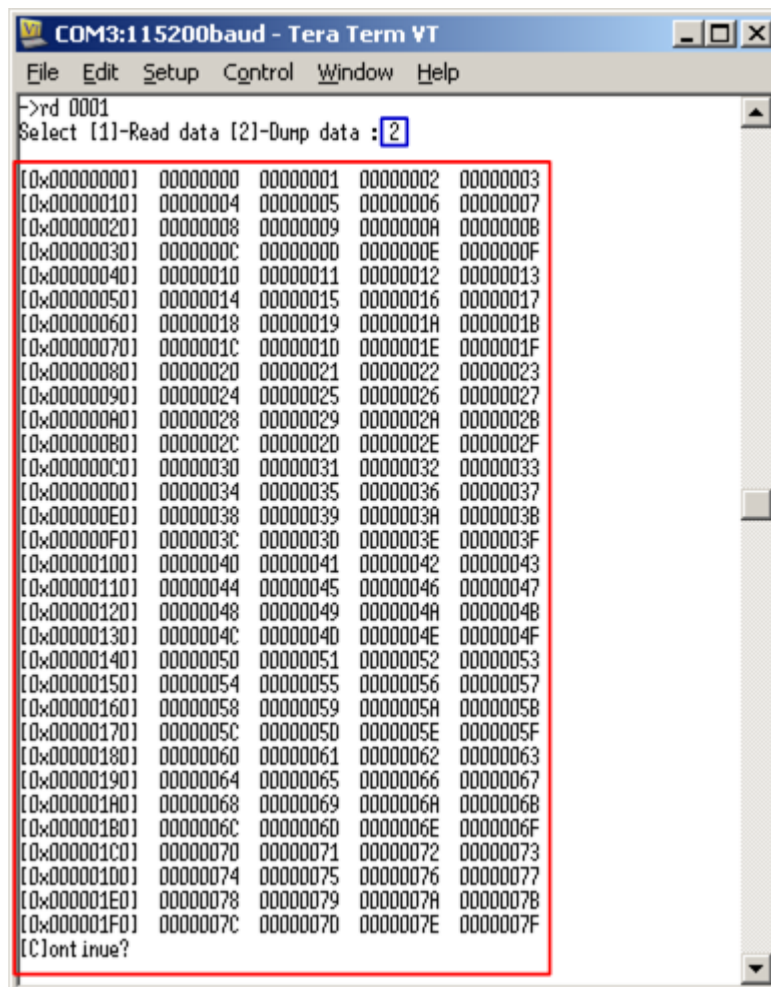


Figure 3-20 Dump mode

As shown in Figure 3-20, 512-byte data within file will be displayed on Serial console when selecting dump mode. Press 'C' to continue dumping in next sector, or press other inputs to exit operation.

Similar to new command, if FAT chain is detected in request file, it will run in Single mode which performance will be less than burst mode from slower transfer size in each transaction, as shown in Figure 3-21.

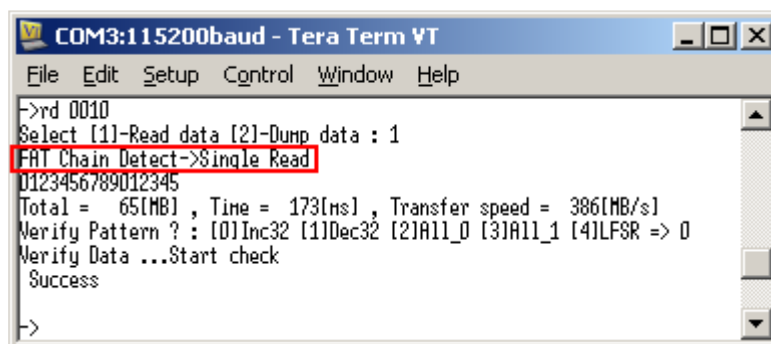


Figure 3-21 READ command with Single mode

Two errors are shown in the example, i.e.

- (1) Verify Error when data in file is different from expect pattern during verification, as shown in Figure 3-22.
- (2) Error when request file name is not found within current directory, as shown in Figure 3-23.

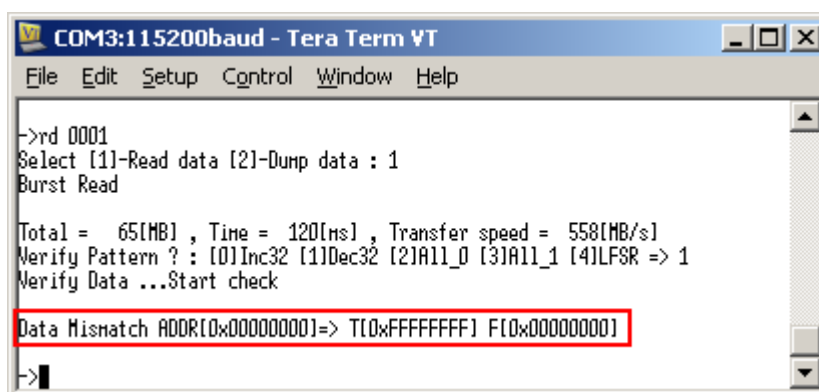


Figure 3-22 Verify Error



Figure 3-23 File Not Found

3.8 DELETE

Command -> dl [file name or folder name]

Select this command to delete request file or folder within current directory. User input

- (1) File/Folder name to delete
- (2) Press 'y' to confirm deleting command.

If deleted name is directory name, all internal files and sub-directories will be also deleted.

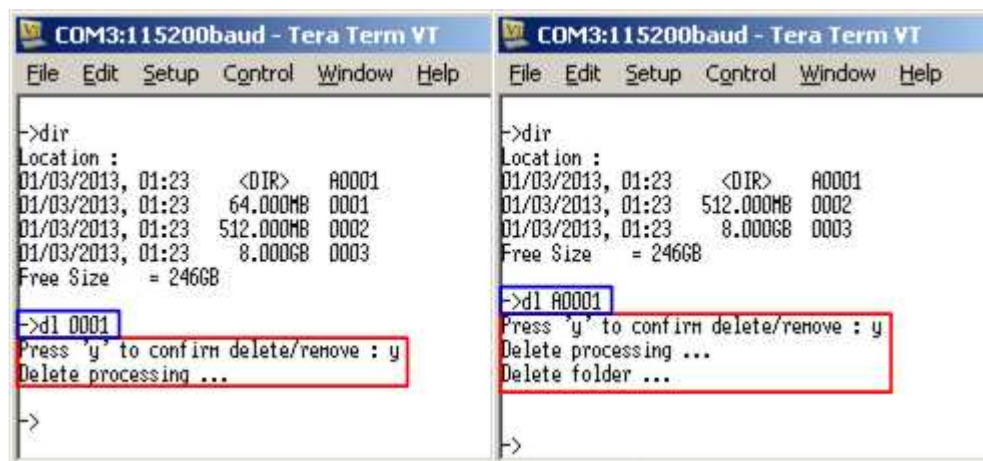


Figure 3-24 DELETE command

Error message is displayed when request directory/file name is not found in current directory, as shown in Figure 3-25.

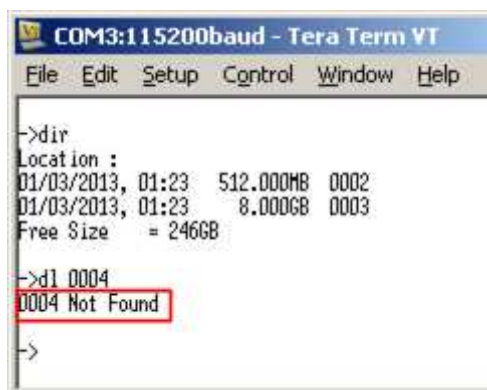


Figure 3-25 Not Found Request File/Directory

4 Revision History

Revision	Date	Description
1.0	14-Mar-13	Initial version release
1.1	9-Sep-13	Remove TEST command which not available for multi-platform firmware code