

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



<u>Note</u>: 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	ОК	DDR2 cannot initialize. Please check DDR2 on ML505/506
		board.
ERR1	Error from SDXC-IP.	ОК
ERR2	1-hour timeout	ОК
	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.

🛄 Tera Term - COM1 VT
<u>File Edit Setup Control Window H</u> elp
Card Capacity : 64277HB
SD host demo menu [Ver = 1.1] 1. REFRESH CARD 2. HRITE SDCARD 3. READ SDCARD 4. DUMP DATA IN DDR
Figure 6 Initialize complete
🛄 Tera Term - COM1 ¥T



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], 0000000H[2], and FFFFFFH[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.

<u>Note</u>: 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



T m	era T	erm - C	OM1 VT				
File	Edit	Setup	Control	Window	Help		
H	RITE D	ATA sele	cted +++				·
Enter	Start Block	Block A Count :	ddress : 1 - 1255	0 - 125534 34208 (0×7	207 (0x7 788000)	787FFF) =>	0
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2. HR	ITE SD	CARD					
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JIII T	era T	erm - C	OM1 VT	-			
File	Edit	Setup	Control	Window	Help		
+++ µ Enter Enter Hrite Prepa Execu	RITE D Start Block Patte re Dat te Hri	ATA sele Block A Count : rn ? : [a Dat te	cted +++ ddress : 1 1 - 1255 DJInc32 [: a ready	0 - 125534 34208 (0x7 1)Dec32 [2	207 (0x7787FFF 788000) => 125 JA11_0 [3JA11_) => 0 534208 1 => 0	1
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SD ho	st den	о непи (Ver = 1.1]			
1. RE 2. HR 3. RE 4. DU	FRESH ITE SD AD SDC MP DAT	CARD Card Ard A IN DDR					-
•	1						•

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.

<u>Note</u>: 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



🔤 Tera Term - COM1 VT	Tera Term - COM1 VT
File Edit Setup Control Window Help	Eile Edit Setup Control Window Help
+++ READ DATA selected +++ Enter Start Block Address : 0 - 125534207 (0x7787FFF) => 0 Enter Block Count : 1 - 125534208 (0x7788000) => 262144 Total = 131[MB] , Tine = 2871[ms] , Transfer speed = 46[MB/s] Nerify Pattern ? : [0]Inc32 [1]Dec32 [2]All_0 [3]All_1 => 0 Verify Data Success	
SU host deno nenu lVer = 1.1] 1. REFRESH CARD 2. URITE SDCARD 3. READ SDCARD 4. DUHP DATA IN DDR	SD host deno nenu [Ver = 1.1] 1. REFRESH CARD 2. URITE SOCARD 3. READ SDCARD 4. DUMP DATA IN DDR

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-9FFFFFFH. 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.

<u>File</u>	dit g	etup C <u>o</u> r	ntrol	Window	w <u>H</u> elp		
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0x98000	0001	00000000	DC	0000001	00000002	000000	03
0x98000	0101	00000004	OC	1000005	00000006	000000	07
0x98000	0201	00000008	00	1000009	000000A	000000	JB
0x98000	0301	0000000C	OC	100000D	0000000E	000000	OF
0x98000	0401	00000010	00	1000011	00000012	000000	13
0x98000	0501	00000014	00	0000015	00000016	000000	17
0x98000	0601	00000018	00	1000019	0000001A	000000	18
0x98000	0701	00000010	OC	100001D	0000001E	000000	1F
0x98000	0801	00000020	00	1000021	00000022	000000	23
0x98000	0901	00000024	00	1000025	00000026	000000	27
0x98000	OAD 1	00000028	00	1000029	0000002A	000000	2B
0x98000	0B0 1	0000002C	00	100002D	0000002E	000000	2F
0x98000	0001	00000030	00	0000031	00000032	000000	33
0x98000	0001	00000034	OL	0000035	00000036	000000	37
0x98000	OEO 1	00000038	00	1000039	ododoo3a	000000	3B
0x98000	OFOI	00000030	00	100003D	0000003E	000000	3F -
Gloto [NJext	[P]rev [H	Irbuf	[R]dbuf	[C]learbuf	?	
4							•

- '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.



🛄 Tera Term - COM1 ¥T	💶 🖾 🛄 Tera Te	erm - COM1 VT	
File Edit Setup Control Window Help	<u>File</u> dit	Setup Control Window Help	
Tera Term - COM1 VT File Edit Setup Control Window Help [0x98000000] 0000000 00000001 0000000 00000001 0000000 [0x98000020] 00000004 00000005 00000006 00000006 00000006 [0x98000030] 00000000 00000000 00000000 00000000 00000000 [0x98000030] 00000010 00000011 00000012 00000012 00000012 [0x98000050] 00000114 00000115 00000016 00000012 00000012 [0x98000050] 00000120 00000011 0000012 00000020 00000020 [0x98000070] 00000012 00000012 00000020 00000020 00000020 [0x98000080] 00000020 00000020 00000020 00000020 00000020 [0x98000080] 00000020 00000031 00000032 00000032 00000032 [0x980000001] 00000034 00000035 00000038 00000038 00000038 00000038 00000038	Image: Second	Setup Control Window Help 2etup Control Window Help 1 00000040 00000041 00000042 0000004 1 00000044 00000045 00000044 0000004 1 00000048 00000040 00000044 0000004 1 00000040 00000041 00000044 00000044 1 00000041 00000044 00000044 00000044 1 00000050 00000051 00000052 00000051 1 00000050 00000050 00000056 00000051 1 00000050 00000050 00000052 00000051 1 00000050 00000050 00000052 00000051 1 00000050 00000050 00000066 00000051 1 00000074 00000075 00000076 0000007 1 00000074 00000070 00000074 0000007 1 00000074 000000070 00000074	3 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7
[0x98000150] 00000054 00000055 00000056 [0x98000160] 00000058 00000059 00000058 [0x98000170] 00000050 00000059 00000058 [0x98000170] 00000050 00000050 00000052 [0x98000180] 00000060 00000061 00000062 [0x98000180] 00000064 00000069 00000064 [0x98000180] 00000060 00000069 00000064 [0x98000180] 00000060 00000069 00000064 [0x98000180] 00000070 00000071 00000072 [0x98000100] 00000070 00000071 00000072 [0x980001100] 00000074 00000075 00000076 [0x980001100] 00000078 00000079 00000078 [0x980001160] 00000070 00000079 00000078 [0x980001160] 00000070 00000079 00000078 [0x980001160] 00000070 00000079 00000078 [0x980001160] 00000070 000000079 000000078	00000057 (0×98000050) 00000058 (0×98000000) 00000056 (0×98000000) 00000063 (0×98000000) 00000066 (0×98000000) 00000067 (0×98000000) 00000068 (0×98000000) 00000073 (0×98000000) 00000077 (0×98000000) 00000078 (0×98000000) 00000078 (0×98000000) 00000078 (0×98000000) 00000078 (0×98000000) 00000078 (0×98000000) 00000074 (0×98000000) 00000074 (0×98000000) 00000078 (0×98000000) 00000078 (0×98000000) 00000074 (0×98000000) 00000075 (0×98000000) 00000076 (0×98000000) 00000078 (0×98000000) 00000078 (0×98000000) 00000075 (0×98000000) 00000076 (0×98000000) 00000078 (0×98000000) 00000078 (0×98000000) <t< td=""><td>OD000014 00000015 00000016 0000000 O0000018 0000019 0000001A 0000001 O0000020 00000011 00000022 0000002 O0000020 00000025 00000026 0000002 O0000028 00000020 0000002E 0000002 O0000028 00000021 0000002E 0000002 O0000028 00000025 00000028 0000002 O0000028 00000025 00000028 0000002 O0000028 00000025 00000028 0000002 O0000038 00000031 00000038 0000003 O0000038 00000035 00000036 0000003 O0000038 00000030 00000038 0000003 O0000038 00000030 00000038 0000003 O0000038 00000038 0000003 O0000038 00000038 0000003 O0000038 00000030 00000038 0000003 O0000038 00000030 00000038 0000003 O0000038 00000030 00000038 0000003 O0000038 00000030 00000038 0000003</td><td>7 B F 3 7 B F 3 7 7 B F</td></t<>	OD000014 00000015 00000016 0000000 O0000018 0000019 0000001A 0000001 O0000020 00000011 00000022 0000002 O0000020 00000025 00000026 0000002 O0000028 00000020 0000002E 0000002 O0000028 00000021 0000002E 0000002 O0000028 00000025 00000028 0000002 O0000028 00000025 00000028 0000002 O0000028 00000025 00000028 0000002 O0000038 00000031 00000038 0000003 O0000038 00000035 00000036 0000003 O0000038 00000030 00000038 0000003 O0000038 00000030 00000038 0000003 O0000038 00000038 0000003 O0000038 00000038 0000003 O0000038 00000030 00000038 0000003 O0000038 00000030 00000038 0000003 O0000038 00000030 00000038 0000003 O0000038 00000030 00000038 0000003	7 B F 3 7 B F 3 7 7 B F

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.

🛄 Tera Te	rm - COM1	VT				🛄 Tera Ter	m - COM1	VT			
<u>File E</u> dit	Setup Co	ntrol <u>W</u> indov	/ <u>H</u> elp			Eile Edit S	etup C <u>o</u> n	trol <u>W</u> indov	v <u>H</u> elp		
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[0x90000000]	00000000	00000005	00000000	00000007		[0x98000010]	00000000	00000005	00000002	00000007	
[0x90000020]	00000008	00000009	0000000A	0000000B		[0x98000020]	00000008	00000009	0000000A	0000000B	
[0x90000030] [0x90000040]	000000010	00000011	000000012	00000013		[0x98000040]	000000000	00000011	00000012	000000013	
[0x90000050]	00000014	00000015	00000016	00000017		[0x98000050]	00000014	00000015	00000016	00000017	
[0x900000070]	00000018	00000019	0000001H	0000001B		[0x98000070]	00000018	00000019	0000001E	0000001F	
[0x90000080]	00000020	00000021	00000022	00000023		[0x98000080]	00000020	00000021	00000022	00000023	
[0x90000090]	00000024	00000029	00000028 00000028	00000028		[0x98000090]	00000024	00000029	00000020	00000027 00000028	
[0x90000080]	00000020	00000020	0000002E	0000002F		[0x980000B0]	00000020	00000020	0000002E	0000002F	
[0x90000000]	00000030	00000035	00000032	00000037		[0x98000000]	00000030	00000035	00000032	00000037	
[0x900000E0]	00000038	00000039	0000003A	0000003B		[0x980000E0]	00000038	00000039	0000003A	00000038	
LGJOTO LMJex	t LPJrev LH	rbut [K]dbut	ICI learbut	7	Ţ	IGJoto INJext	IPIrev [H]	rbut LKJdbut	ICITearbut	2 0000003P	-
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		Eigurg	17 Doc	d 256 h	to do	to at top a	f write /r	and huff	or		



- '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.

🛄 Tera Ter	m - COM1 '	VT		1	
<u>File Edit</u>	jetup Cont	rol <u>W</u> indow	v <u>H</u> elp		
[G]oto [N]ext Clear Hrite B Clear Read Bu SD host deno	[P]rev [H]r uffer ? [Y/N ffer ? [Y/N] Henu [Ver =	buf [R]dbuf] =>y: Cle =>y: Clea 1.1	[C]learbuf ? ar Hrite Buf m Read Buffe	C fer r	•
1. REFRESH CA 2. HRITE SDCA 3. READ SDCAR 4. DUMP DATA	RD RD D IN DDR				
[0x98000000]	00000000	0000000	00000000	00000000	
[0x98000010]	00000000	00000000	00000000	00000000	
102980000201	00000000	00000000	00000000	00000000	
10x980000301	00000000	00000000	00000000	00000000	
[0x98000050]	00000000	00000000	00000000	00000000	
[0x98000060]	00000000	00000000	00000000	00000000	
[0x98000070]	00000000	00000000	00000000	00000000	
[0x98000080]	00000000	00000000	00000000	00000000	
LUX980000901	00000000	DUDUDUDUU	00000000	DUDUUUUUU	
LUX980000H01	000000000	00000000	000000000	00000000	
102020000000000000000000000000000000000	00000000	00000000	00000000	00000000	
10x9800000001	00000000	00000000	00000000	000000000	
[0x980000E0]	00000000	00000000	00000000	00000000	
[0x980000F0]	00000000	00000000	00000000	00000000	
IGJoto INJext	IPJrev IHJr	but [K]dbut	ICI learbut ?	1	
					• //

Figure 18 Clear buffer to be zero

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

🔤 Tera Term - COM1 ¥T	
File Edit Setup Control Window Help	
[Gloto [N]ext [P]rev [H]rbuf [R]dbuf [C]learbuf ?[x]	
SD host demo menu [Ver = 1.1]	
1. REFRESH CARD	
3. READ SDCARD	
4. DUMP DATA IN DOR	-
	• //

Figure 19 Exit dump menu



dg_sdxc_ip_raw_demo_instruction_en.doc **4 Revision History**

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