



Application Note PL2773 USB 3.0 to SATA Bridge Controller JBOD and AutoMirror Application Design Guide

Introduction

This application note guides you on how to design and configure the PL2773 USB 3.0-to-SATA Bridge Controller for Dual SATA Hard Drive (JBOD) and standalone AutoMirror solution.

The PL2773 JBOD solution allows you to design your enclosure product with a USB 3.0 to Dual SATA Hard Drive JBOD interface. This allows users the advantage of connecting one or two independent physical SATA HDDs to one USB port where each drive being mapped to a different logical volume.



The PL2773 JBOD solution also allows you to add another unique standalone feature called AutoMirror. This automirror solution does not require any PC connection and works by simply pressing the Backup Button for 3 seconds which will automatically mirror the entire SATA1 Source HDD sector by sector (including boot sector, partition table and file system format) to the SATA2 Destination HDD. (NOTE: All original data in the Destination HDD will be destroyed.)



Evaluation demo boards, PCB reference schematic, firmware, and tools are all provided by Prolific for designing this application product.

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System Requirements

This application requires the following:

- PL2773 JBOD/AutoMirror Demo Board
- PL2773 JBOD Firmware and AutoMirror SDT Configuration Files
- Prolific Storage MFG Kit Tool Software
- Two SATA Hard Drives
 - For AutoMirror mode, Source HDD should be equal or smaller than Destination HDD.

Please check with Prolific FAE for the latest versions of firmware and software tools.

PL2773 JBOD/AutoMirror Demo Board

Note below the following PL2773 JBOD/AutoMirror demo board connectors and LED location. Contact Prolific Sales or FAE for this evaluation demo board.



PL2773 JBOD-AutoMirror Evaluation/Demo Board

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JBOD/AutoMirror Features

Note the following important features of the AutoMirror Backup Solution based on the PL2773 JBOD/AutoMirror Reference PCB Design Schematic:

No.	Features	Descriptions					
1	Power LED	LEDON.	will turn Ol	N when po	ower supply	/ and switch	is
2	USB 3.0 LED Indicator (GPIO P1_5)	ThisUSB	LED will tur 3.0 mode (n ON if PL JBOD mod	2773 devic e).	e is detected	l in
3	SATA1 (Source) HDD LED (GPIO P3_0)	 LED (Auto LED (JBO 	will turn ON Mirror mod flashes wh D mode).	N when PC e) detects t nen PC is	(JBOD mo SATA1/Sou accessing	ode) or PL27 urce HDD. 9 SATA1 HE	73 70
4	SATA2 (Destination) HDD LED (GPIO P1_0)	 LED (Auto LED (JBO 	will turn ON Mirror mod flashes wh D mode).	N when PC e) detects t nen PC is	(JBOD mo SATA2/Sou accessing	ode) or PL27 urce HDD. g SATA2 HE	73 DD
5	Backup Button (GPIO P1_7)	 Pressing this button in JBOD mode (connected to PC) will run the Prolific Backup software if installed. Pressing this button over 3 seconds in Automirror mode (not connected to PC) will run the Automirror function which will automatically mirror the entire SATA1 Source HDD to the SATA2 Destination HDD. NOTE-1: All original data in the SATA2 Destination HDD will be destroyed when running AutoMirror backup function. NOTE-2: AutoMirror will mirror the entire SATA1 Source HDD including boot sector, partition table, file system, and data files. So the duration will depend on how large is the 					
6	Error LED (GPIO P3_5)	 If the capacity of the SATA2 Destination HDD is smaller than the SATA1 Source HDD, Error LED will flash at 1Hz. If AutoMirror operation fails, Error LED will turn ON 					
7	AutoMirror 4-LED Progress Bar (GPIO P3_1: 25%) (GPIO P3_2: 50%)	4 LEIUses	Ds to indica LED scrolli	te the Auto ing behavio	Mirror prog or during au	jress. itomirror.	
	(GPIO P3_2: 30%) (GPIO P3_3: 75%) (GPIO P3_4: 100%)	Progress	P3_1 LED 1	P3_2 LED 2	P3_3 LED 3	P3_4 LED 4	
		< 25%		Scr	olling		
		> 50%		ON	Scrolling	ollina	
		> 75%	ON	ON	ON	Flash 1Hz	
		100%	ON	ON	ON	ON	

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8	AutoMirror Performance	٨	500GB < 3 hours (mirror entire 500GB partition)
9	AutoMirror Partition	٨	AutoMirrors single or multiple partitions.
		\succ	If SATA1 Source HDD has multiple partitions, it will
			mirror the exact same partitions and files to the
			SATA2 Destination HDD. If the size of SATA2
			Destination HDD is greater than the SATA1 Source
			HDD, the remaining partition will be converted as
			unallocated partition.
10	Write Protect Switch	\triangleright	This switch adds Write Protect (Read-Only) function
	(GPIO P1_6)		when set and activates when switch is turn ON.
		\succ	This feature is set during device configuration using
			MFG Kit software.

Updating to JBOD/AutoMirror Firmware

You will need to use the JBOD/AutoMirror demo board or your own designed PCB to load the required firmware and configuration SDT file. Using Prolific Storage MFG Kit EEPROM Editor program, follow the steps below:

1. Plug the device to the USB port and run the Prolific Storage MFG Kit program and click on the EEP ROM Edit button.

😤 EEPROM Informat	ion 📃
USB Descriptor	Table
Vendor I	D: Product ID:
Vendor Des	2
Product Des	2:
PCB Revision):
Serial Numbe	r:
Attributes	5.
-External Firmwa	are Information
□ Filename:	
Checksum:	
Config	EEP ROM Edit
Load	Cancel

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2. Make sure the device drive is detected before you can write the configuration. Click the Load EEP button first to load the AutoMirror SDT configuration file. If you do not want the AutoMirror function and only need the JBOD function, you can skip loading the EEP/SDT File.

🕐 EEPROM Editor - Prolific	X
USB Descriptor Table	Firmware Information
Vendor ID: 067B Product ID: 2773	✓ Device 00 (F:)
Vendor Desc: Prolific Technology Inc.	Version: 20101203
Product Desc: ATAPI-6 Bridge Controller	
PCB Revision: 0000	<u>R</u> ead chip
Serial Number: 0123456789 000000005 V Exceed 10-Bytes	Write configure & FW
Attributes: Self-Powered	Load EEP
	Save to EEP
External Firmware and AutoRun ISO Filename	Erase <u>C</u> hip
E Filename:	
Checksum:	More >>
ISO Filename:	Exit

3. Browse to where the PL2773 JBOD/Automirro SDT file is located. You will need to first set the file type *.sdt in order to see the SDT file. You can skip this file if you just want the JBOD feature and do not want the AutoMirror feature.

Look <u>i</u> n:	\mu Automirror Fin	mware 👻	G 🤌 📂 🛄 -	
(Pa)	Name	*	Date modified	Туре
Recent Places	PL2773_JBO	D_Enable_AutoMirror.sdt	12/10/2010 5:25 PM	SDT File
Desktop				
Libraries				
Computer	4			
				,
Network	File <u>n</u> ame:	PL2773_JBOD_Enable_AutoMirror		<u>O</u> pen
	Files of type:	EEProm Data file(*.sdt)		Cancel
		Open as read-only		

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4. Click on External Firmware Filename box to browse for the JBOD firmware hex file.

🕐 EEPROM Editor - P	EEPROM Editor - Prolific				
USB Descriptor Table Firmware Information					
Vendor ID:	067B	Product ID: 2773	 Device 00 (F:) 		
Vendor Desc:	Prolific Techn	ology Inc.	Version: 20101203		
Product Desc:	ATAPI-6 Brid	ge Controller			
PCB Revision:	0000		<u>R</u> ead chip		
Serial Number:	0123456789	000000005 V Exceed 10-Bytes	Write configure & FW		
Attributes:	Self-Pow	ered	Load EEP		
			Save to EEP		
External Firmwa	are and AutoR	un ISO Filename	Erase <u>C</u> hip		
Filename:					
Checksum:			<u>M</u> ore >>		
🗆 ISO Filenar	ne:		Exit		

5. Browse to the JBOD-Automirror firmware hex file and click Open to load the file.

Look in:	🔒 Automirror Firm	ware 👻	G 🤌 📂 🛄 -	
œ	Name	*	Date modified	Туре
Recent Places	20101207_JBC	DD_Auto_mirror-07b.hex	12/10/2010 5:25 PM	HEX File
Necent Places				
<u></u>				
Desktop				
Libraries				
Computer				
	•			ł
Network	File <u>n</u> ame:	20101207_JBOD_Auto_mirror-07b	-	Open
NELWOIK	Files of type:	Firmware Hex code(*.hex)	•	Cancel
		Open as read-only		

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6. After loading both SDT file and firmware hex file, you can also choose to configure the USB Descriptor Table according to your product description.

🕐 EEPROM Editor - P	Prolific	and the second se	×
-USB Descripto	r Table		Firmware Information
Vendor ID:	067B	Product ID: 2773	✓ Device 00 (F:)
Vendor Desc:	Prolific Techn	ology Inc.	Version: 20101203
Product Desc:	USB3 JBOD-	AutoMirror Enclosure	
PCB Revision:	0000	,	Read chip
Serial Number:	0123456789	000000005 V Exceed 10-Bytes	Write configure & FW
Attributes:	Self-Pow	Load EEP	
			Save to EEP
External Firmwa	External Firmware and AutoRun ISO Filename Erase Chip		
Filename:	ware\2010120	7_JBOD_Auto_mirror-07b.hex	
Checksum:	7995		<u>M</u> ore >>
🗆 ISO Filenan	ne:		Exit

7. If all configuration settings are done, click on Write configure & FW button to start the update.

🕐 EEPROM Editor - Prolific	
USB Descriptor Table	Firmware Information
Vendor ID: 067B Product ID: 2773	✓ Device 00 (F:)
Vendor Desc: Prolific Technology Inc.	Version: 20101203
Product Desc: USB3 JBOD-AutoMirror Enclosure	
PCB Revision: 0000	<u>R</u> ead chip
Serial Number: 0123456789 000000005 🗵 Exceed 10-Bytes	Write configure & FW
Attributes: Version Self-Powered	Load EEP
	Save to EEP
External Firmware and AutoRun ISO Filename	Erase <u>C</u> hip
Filename: 1ware\20101207_JBOD_Auto_mirror-07b.hex	
Checksum: 7995	More >>
ISO Filename:	Exit

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8. The EEPROM Editor will then start to write the firmware and configuration settings. Do not power off the device until the configuration is complete. Click OK when finished and then reset the device power to activate the new firmware and configuration settings.

	PROM Information	
🕐 EEPROM Editor - Prolific	Config PL2771	×
USB Descriptor Table Vendor ID: 067B Vendor Desc: Prolific Product Desc: USB 3.4 PCB Revision: 0000 Serial Number: 012345	FW checksum : 7995 Found device to config Erasing chip OK Programming & Verify chip OK Verify FW OK Verify configure OK	e Information ce 00 (G:) 1: 20100523 <u>R</u> ead chip te configure & FW Load EEP
External Firmware and A Filename: nware\20 Checksum: 7995 ISO Filename:	ОК	Save to EEP Erase Chip More >> Exit



Working under JBOD Mode

Under JBOD mode, you can attach one or two physical SATA Hard Drives to the PL2773 bridge board and connect the bridge board into the PC USB port. Your computer will detect one USB Mass Storage Device (PL2773) with two SATA hard drives (each drive being mapped to a different logical volume).

🔒 Device Manag	
<u>F</u> ile <u>A</u> ction	<u>V</u> iew <u>H</u> elp
le -	
4.1	PCI bus
	- AMD SATA Controller
	ATI I/O Communications Processor PCI Bus Controller
	ATI I/O Communications Processor SMBus Controller
Þ	📲 PCI Express standard Root Port
Þ	- 🚛 PCI Express standard Root Port
Þ	- 🚛 PCI Express standard Root Port
4	PCI Express standard Root Port
	Renesas Electronics USB 3.0 Host Controller
	🛛 🖞 Renesas Electronics USB 3.0 Root Hub
	USB Mass Storage Device
	ST320006 41AS USB Device
	WDC WD10 02FAEX-0023A0 USB Device
	PCI standard host CPU bridge
	PCI standard host CPU bridge
	PCI standard host CPU bridge
Disk 1	
Basic 021 51 GR	HDD-1 (G:)
Online	Healthy (Primary Partition)
Disk 2	
Basic 1863.01 GB	HDD-2 (H:) 1963 01 GR NTES
Online	Healthy (Primary Partition)
HD Speed	C HD Speed
marken her and	ու ու լու լու վեր վեր վեր կել եր ենքի ներ հետ հետ ու լու հետ



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Working under AutoMirror Mode

To work under the AutoMirror mode, you simply disconnect the PL2773 bridge board (power still on) from the PC and press the Backup Button (P1_7) for over 3 seconds. The AutoMirror function will automatically mirror the entire SATA1 Source HDD (boot sector, partitions, file systems, data files) to the SATA2 Destination HDD. You will need to wait until all four LEDs (P3_1, P3_2, P3_3, P3_4) are flashing to indicate AutoMirror operation is complete. After the AutoMirror operation, the Destination HDD should have the exact same partitions and data just like the Source HDD.

NOTE-1: All partition and data on the Destination HDD will be destroyed when AutoMirror function is activated. Make sure to backup all files on the Destination HDD first.

NOTE-2: After completing the AutoMirror operation and plugging back the enclosure (with the same two hard drives) to the PC USB port, you will need to go to Disk Management and right-click Online the SATA2 Destination HDD (Disk 2) because both SATA1 and SATA2 drives now have the same GUID partition table. You will not require doing this if you only plug one SATA drive.

NOTE-3: If the Destination HDD capacity is larger than the Source HDD, the remaining partition of the Destination HDD that was not used during the AutoMirror operation will be converted as an unallocated partition. You can still use the unallocated partition to repartition and format it.

Disk 1 Basic 232.88 GB Online	1 (G:) 1.95 GB FAT Healthy (Primary P	2 (I:) 29.30 GB FAT32 Healthy (Primar	2 (I:) 29.30 GB FAT32 Healthy (Primary Partition)		FS nary Partition)	
Disk 2 Basic 698.64 GB Online	1 (H:) 1.95 GB FAT Healthy (Prim	e (K:) 9.30 GB FAT32 Healthy (Primary Pa	<mark>3 (L:)</mark> 201.63 GB N Healthy (Pr	ITFS imary Partitic	465.75 GB Unallocated	