

# 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.

## System Requirements

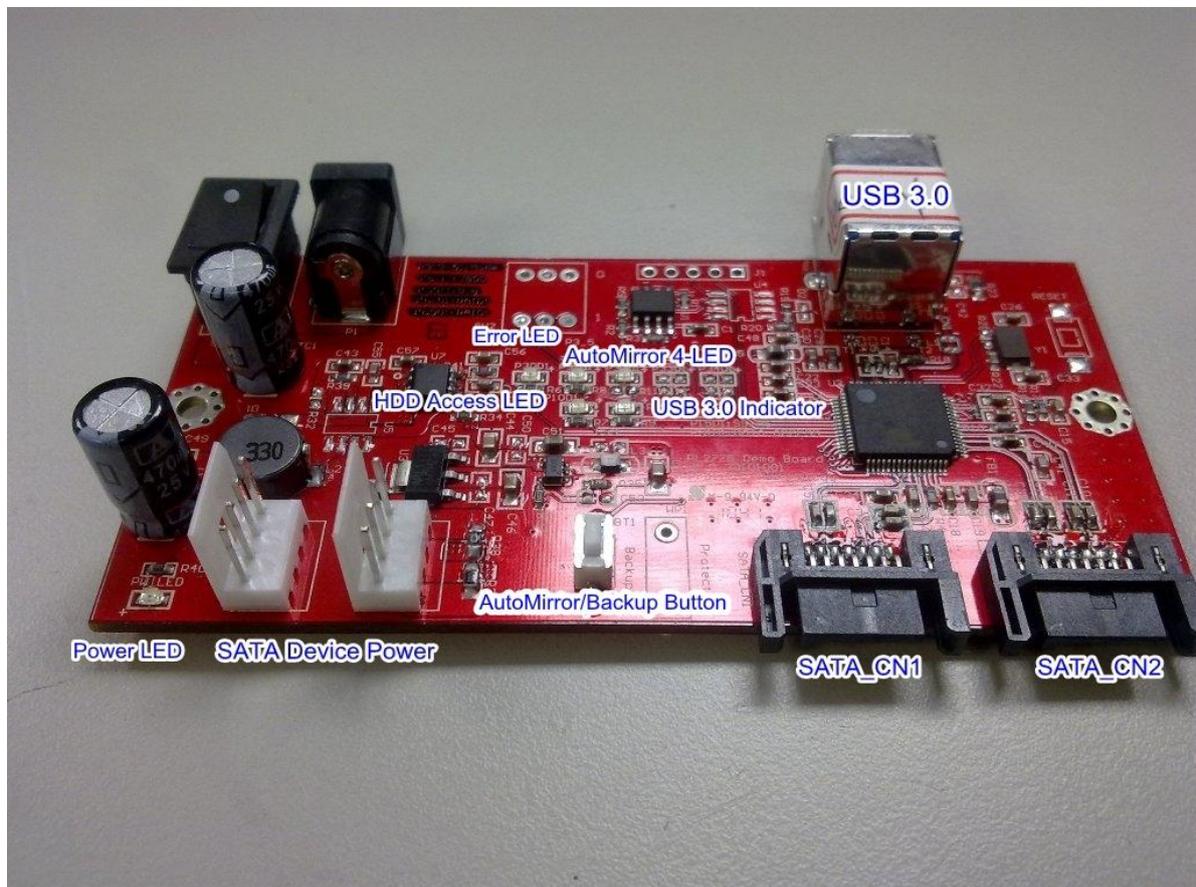
This application requires the following:

- 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**

## JBOD/AutoMirror Features

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

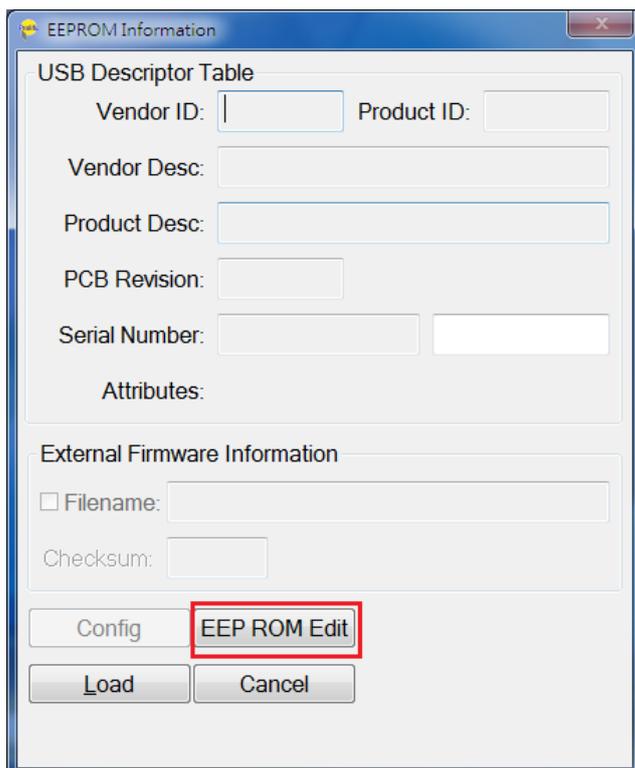
No.	Features	Descriptions																														
1	Power LED	<ul style="list-style-type: none"> <li>➤ LED will turn ON when power supply and switch is ON.</li> </ul>																														
2	USB 3.0 LED Indicator (GPIO P1_5)	<ul style="list-style-type: none"> <li>➤ This LED will turn ON if PL2773 device is detected in USB 3.0 mode (JBOD mode).</li> </ul>																														
3	SATA1 (Source) HDD LED (GPIO P3_0)	<ul style="list-style-type: none"> <li>➤ LED will turn ON when PC (JBOD mode) or PL2773 (AutoMirror mode) detects SATA1/Source HDD.</li> <li>➤ LED flashes when PC is accessing SATA1 HDD (JBOD mode).</li> </ul>																														
4	SATA2 (Destination) HDD LED (GPIO P1_0)	<ul style="list-style-type: none"> <li>➤ LED will turn ON when PC (JBOD mode) or PL2773 (AutoMirror mode) detects SATA2/Source HDD.</li> <li>➤ LED flashes when PC is accessing SATA2 HDD (JBOD mode).</li> </ul>																														
5	Backup Button (GPIO P1_7)	<ul style="list-style-type: none"> <li>➤ Pressing this button in JBOD mode (connected to PC) will run the Prolific Backup software if installed.</li> <li>➤ 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.</li> </ul> <p><b>NOTE-1: All original data in the SATA2 Destination HDD will be destroyed when running AutoMirror backup function.</b></p> <p><b>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 Source HDD.</b></p>																														
6	Error LED (GPIO P3_5)	<ul style="list-style-type: none"> <li>➤ If the capacity of the SATA2 Destination HDD is smaller than the SATA1 Source HDD, Error LED will flash at 1Hz.</li> <li>➤ If AutoMirror operation fails, Error LED will turn ON.</li> </ul>																														
7	AutoMirror 4-LED Progress Bar (GPIO P3_1: 25%) (GPIO P3_2: 50%) (GPIO P3_3: 75%) (GPIO P3_4: 100%)	<ul style="list-style-type: none"> <li>➤ 4 LEDs to indicate the AutoMirror progress.</li> <li>➤ Uses LED scrolling behavior during automirror.</li> </ul> <table border="1"> <thead> <tr> <th>Progress</th> <th>P3_1 LED 1</th> <th>P3_2 LED 2</th> <th>P3_3 LED 3</th> <th>P3_4 LED 4</th> </tr> </thead> <tbody> <tr> <td>&lt; 25%</td> <td colspan="4">Scrolling</td> </tr> <tr> <td>&gt; 25%</td> <td>ON</td> <td colspan="3">Scrolling</td> </tr> <tr> <td>&gt; 50%</td> <td>ON</td> <td>ON</td> <td colspan="2">Scrolling</td> </tr> <tr> <td>&gt; 75%</td> <td>ON</td> <td>ON</td> <td>ON</td> <td>Flash 1Hz</td> </tr> <tr> <td>100%</td> <td>ON</td> <td>ON</td> <td>ON</td> <td>ON</td> </tr> </tbody> </table>	Progress	P3_1 LED 1	P3_2 LED 2	P3_3 LED 3	P3_4 LED 4	< 25%	Scrolling				> 25%	ON	Scrolling			> 50%	ON	ON	Scrolling		> 75%	ON	ON	ON	Flash 1Hz	100%	ON	ON	ON	ON
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> 75%	ON	ON	ON	Flash 1Hz																												
100%	ON	ON	ON	ON																												

8	AutoMirror Performance	➤ 500GB < 3 hours (mirror entire 500GB partition)
9	AutoMirror Partition	<ul style="list-style-type: none"> <li>➤ AutoMirrors single or multiple partitions.</li> <li>➤ 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.</li> </ul>
10	Write Protect Switch (GPIO P1_6)	<ul style="list-style-type: none"> <li>➤ This switch adds Write Protect (Read-Only) function when set and activates when switch is turn ON.</li> <li>➤ This feature is set during device configuration using MFG Kit software.</li> </ul>

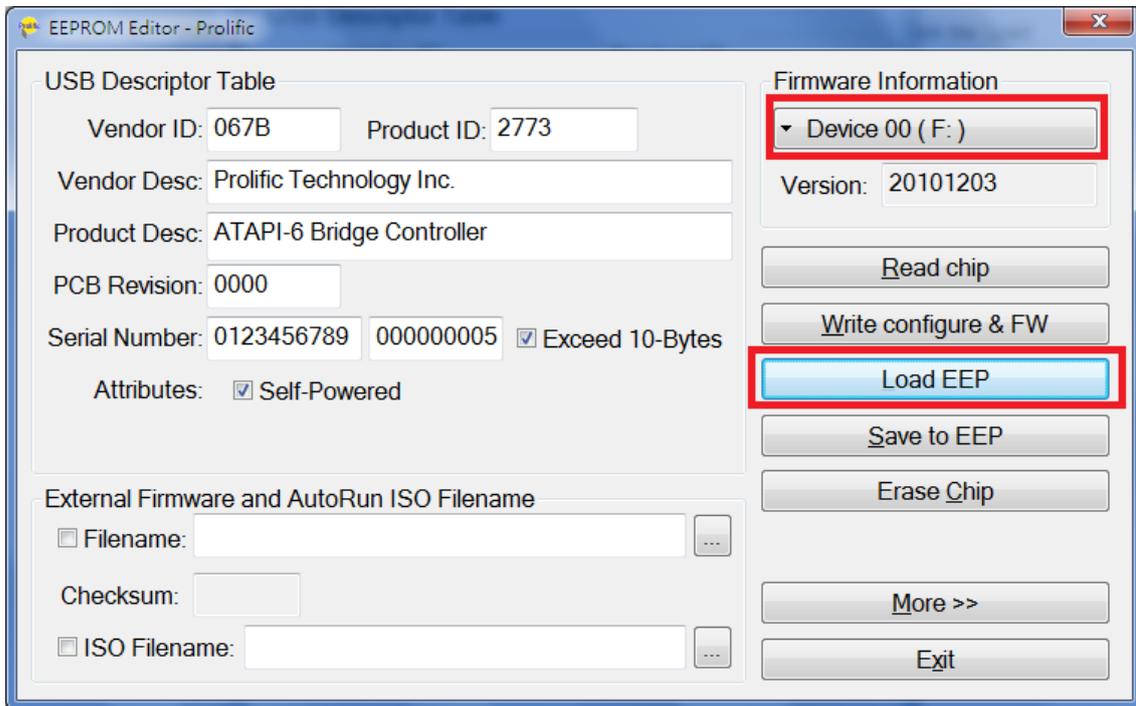
### Updating to JBOD/AutoMirror Firmware

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:

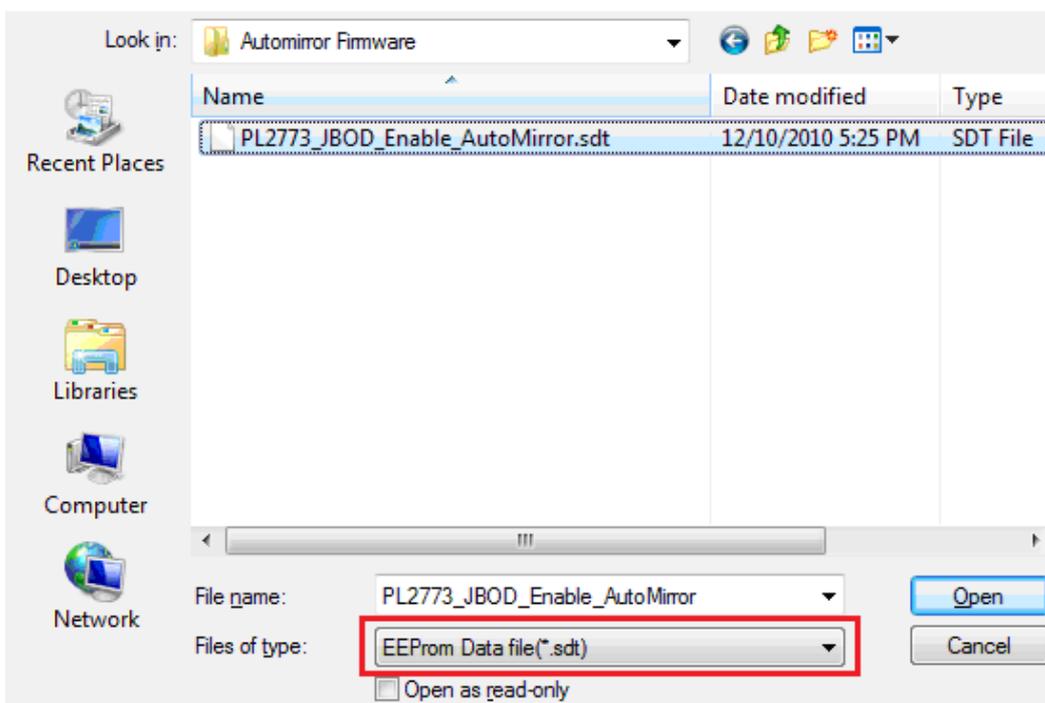
1. Plug the device to the USB port and run the Prolific Storage MFG Kit program and click on the EEP ROM Edit button.



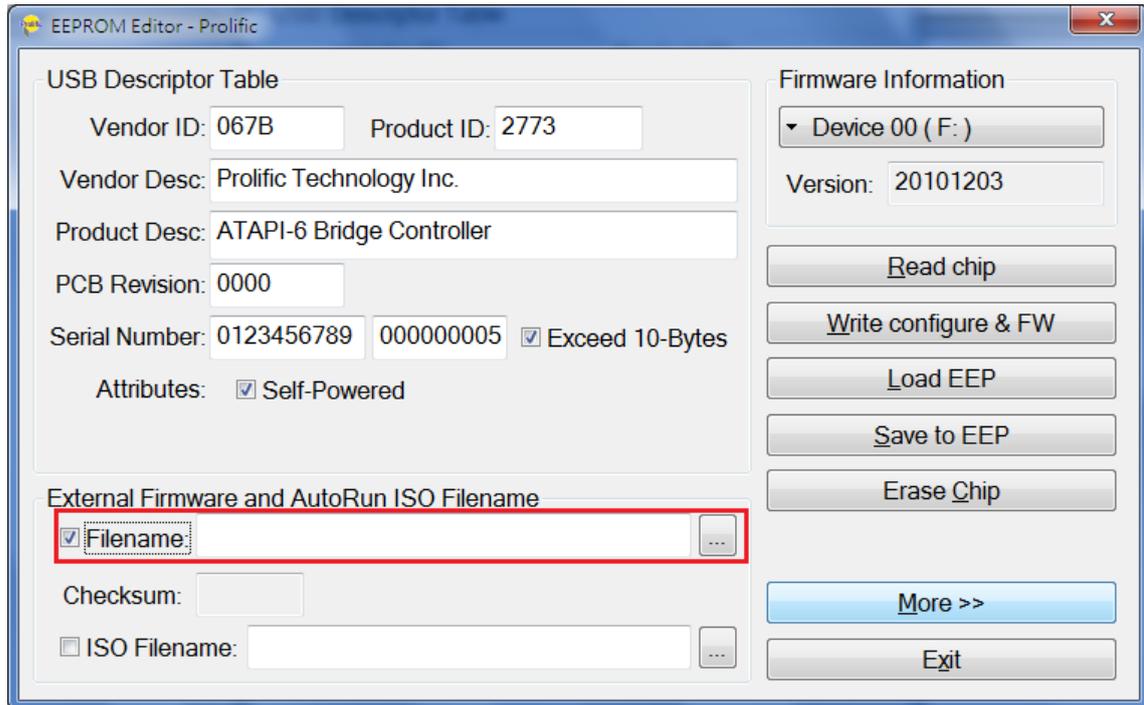
2. Make sure the device drive is detected before you can write the configuration. Click the Load EEP button first to load the AutoMirror SDT configuration file. If you do not want the AutoMirror function and only need the JBOD function, you can skip loading the EEP/SDT File.



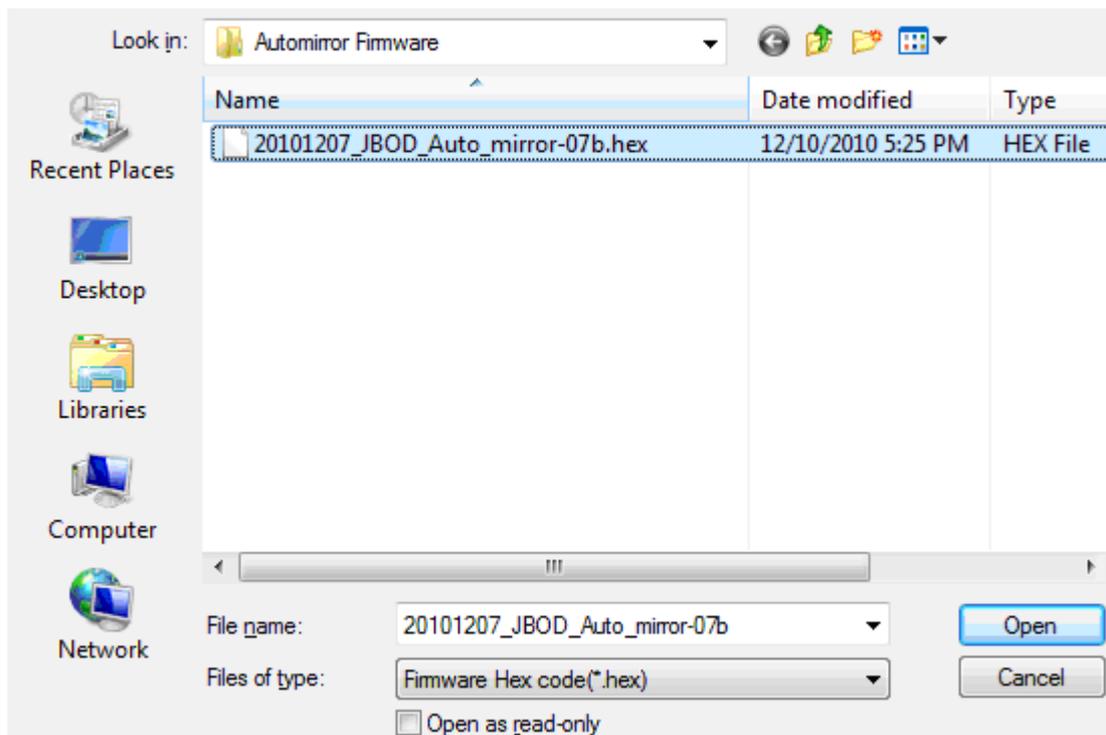
3. Browse to where the PL2773 JBOD/Automirro SDT file is located. You will need to first set the file type \*.sdt in order to see the SDT file. You can skip this file if you just want the JBOD feature and do not want the AutoMirror feature.



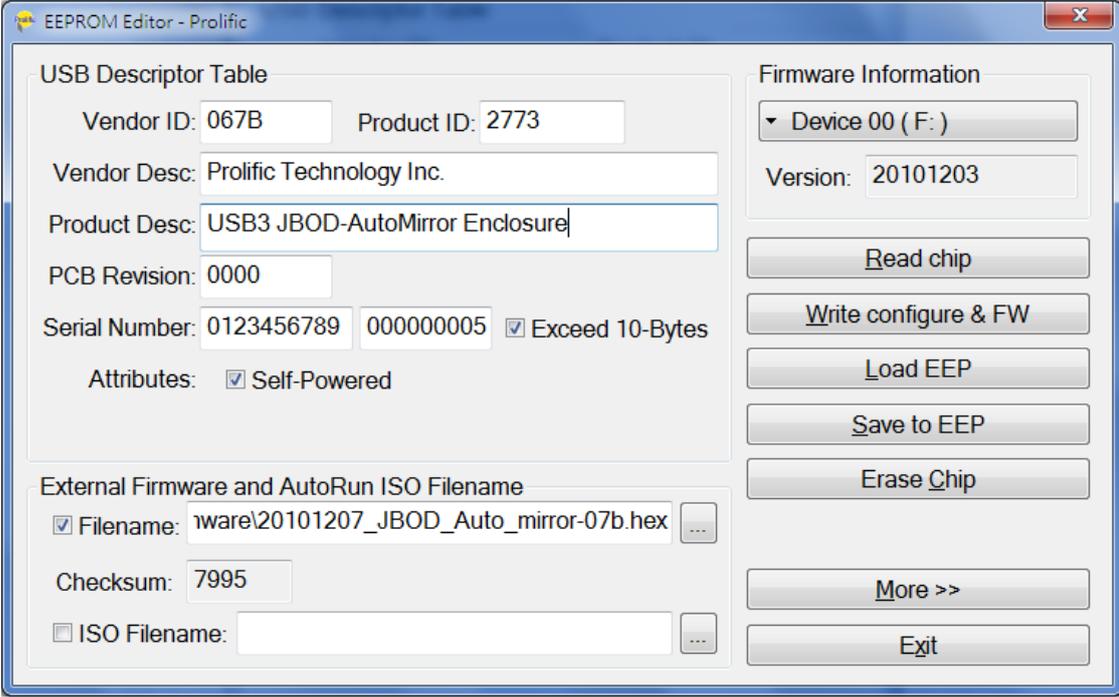
- Click on External Firmware Filename box to browse for the JBOD firmware hex file.



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

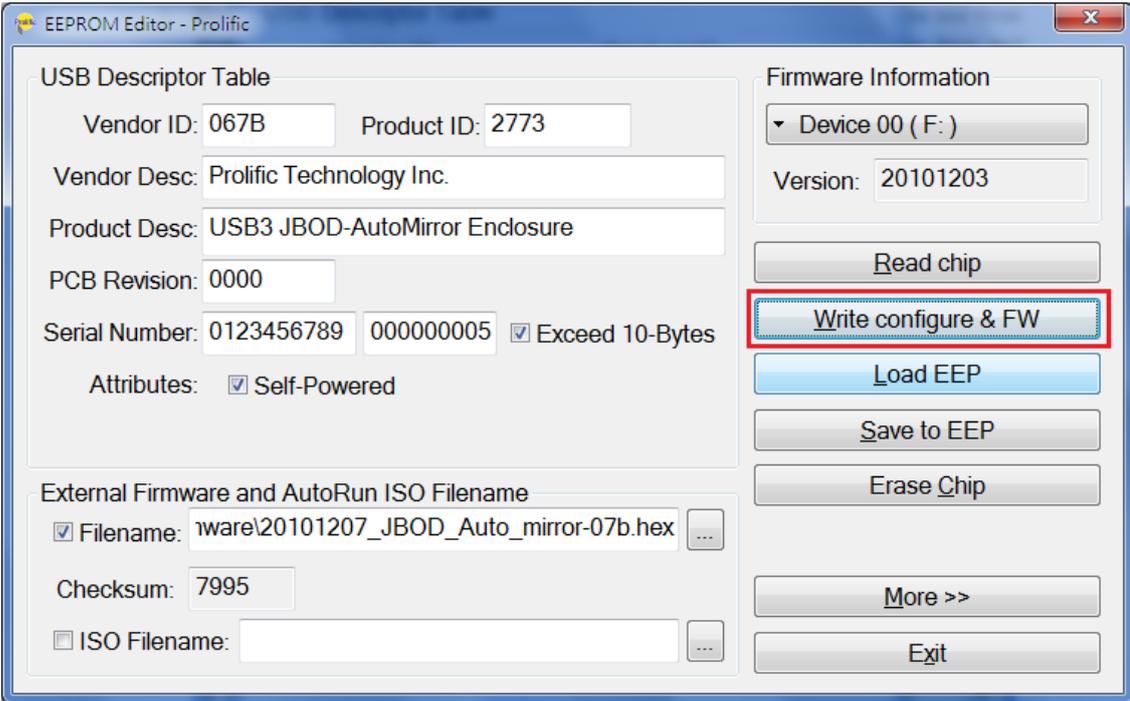


6. After loading both SDT file and firmware hex file, you can also choose to configure the USB Descriptor Table according to your product description.



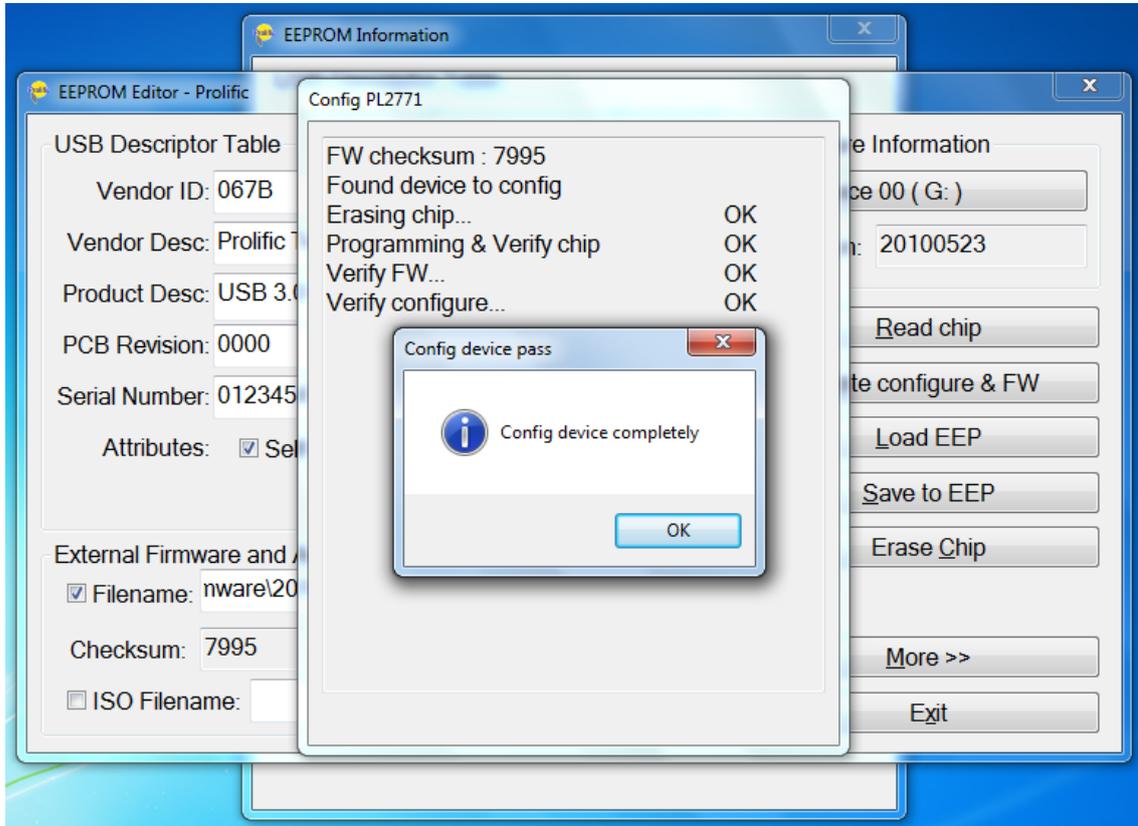
The screenshot shows the EEPROM Editor - Prolific software interface. The USB Descriptor Table section is configured with the following values: Vendor ID: 067B, Product ID: 2773, Vendor Desc: Prolific Technology Inc., Product Desc: USB3 JBOD-AutoMirror Enclosure, PCB Revision: 0000, Serial Number: 0123456789 000000005, and Attributes: Self-Powered. The External Firmware and AutoRun ISO Filename section shows the filename: \ware\20101207\_JBOD\_Auto\_mirror-07b.hex and Checksum: 7995. The Firmware Information section shows Device 00 (F:) and Version: 20101203. The Write configure & FW button is highlighted with a red box.

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



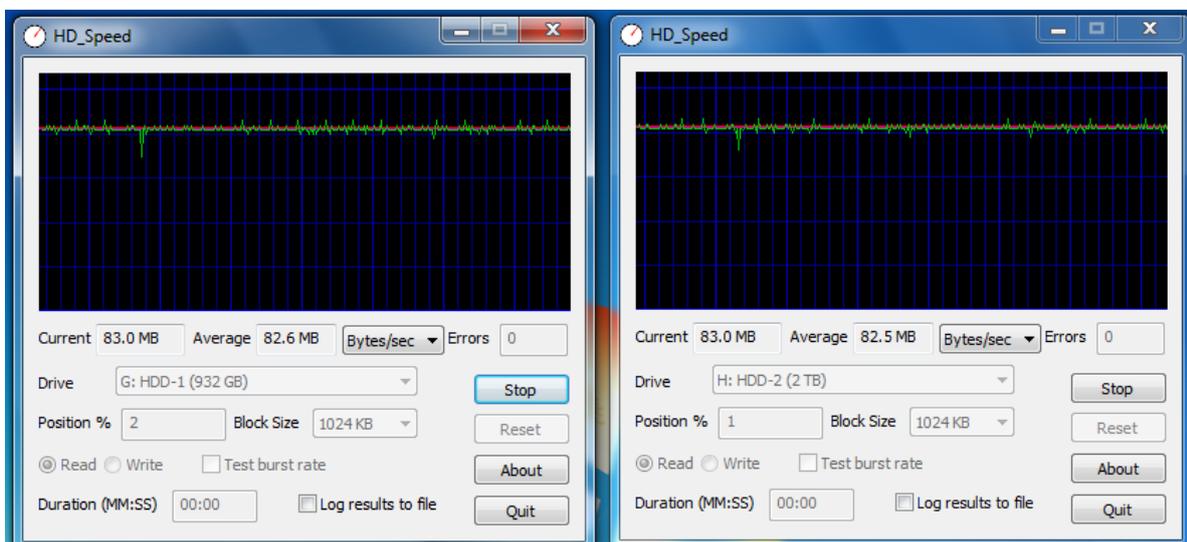
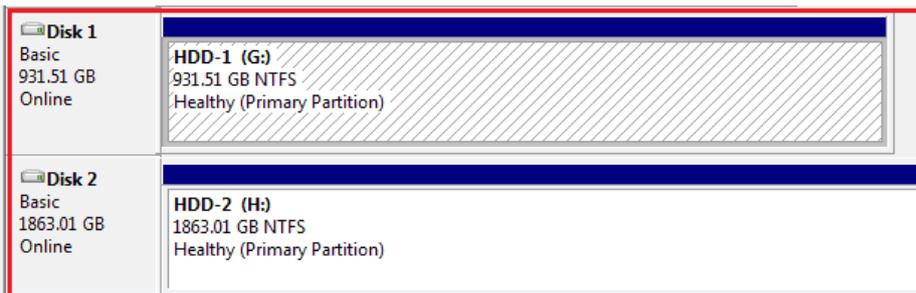
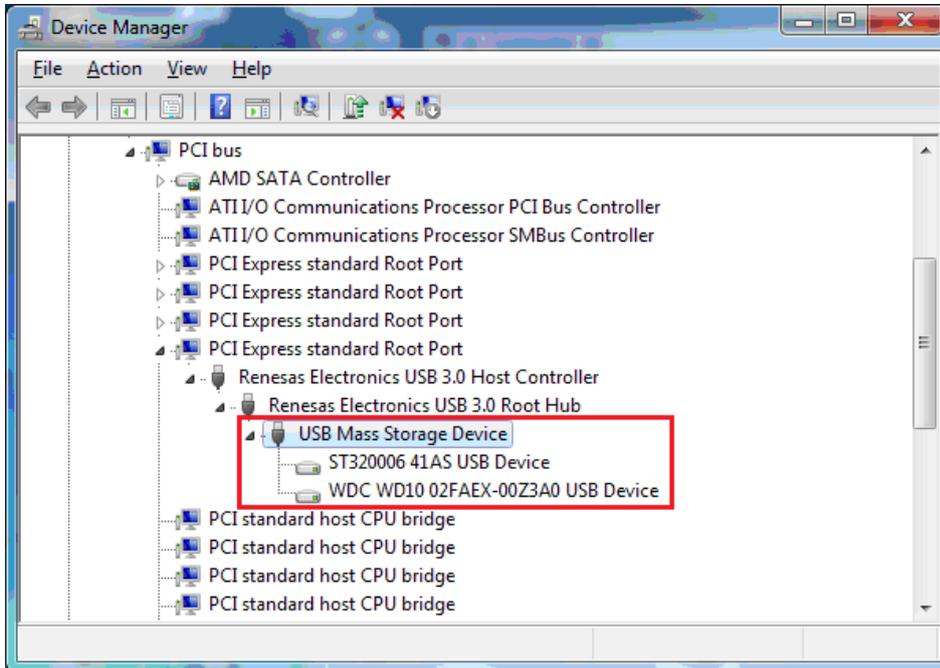
The screenshot shows the EEPROM Editor - Prolific software interface, identical to the previous one. The Write configure & FW button is highlighted with a red box, indicating it is the next step in the process.

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.



## 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).



## 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.

<b>Disk 1</b> Basic 232.88 GB Online	<b>1 (G:)</b> 1.95 GB FAT Healthy (Primary Pa	<b>2 (I:)</b> 29.30 GB FAT32 Healthy (Primary Partition)	<b>3 (J:)</b> 201.63 GB NTFS Healthy (Primary Partition)
<b>Disk 2</b> Basic 698.64 GB Online	<b>1 (H:)</b> 1.95 GB FAT Healthy (Prim	<b>2 (K:)</b> 29.30 GB FAT32 Healthy (Primary Pa	<b>3 (L:)</b> 201.63 GB NTFS Healthy (Primary Partitic 465.75 GB Unallocated