

PassMark Software

USB 3.0 Loop Back Plug

Users Guide

(Model PMUSB03 Rev1)

Introduction

When used with the PassMark™ BurnInTest or USB3Test software, the USB 3.0 Loop Back Plug can be used to test that USB2.0 or USB3.0 ports function correctly and provide the expected speed. It is possible to verify that:

- The USB port is powered.
- That a port is capable of Super-Speed (5Gb/s), High-Speed (480Mb/s) or Full-Speed (12 Mb/s). The maximum speed of the port can be benchmarked. Windows only.
- That data can be sent and received from the port.
- That data can be transferred without error.
- The system remains stable under long periods of load.
- USB 2.0/3.0 host controller has been correctly installed on the system.
- Low-level USB bus errors introduced by poor cabling, for example, are not occurring.

The USB 3.0 Loop Back Plug is software upgradeable.

General Notes

Compatibility

2008 Server, Window 7, 8, 10 and Linux are supported. *Windows:* BurnInTest Pro v7.1 (or later) or USB3Test software is required for Windows. Both 32bit and 64bit Windows drivers are available.

Linux: BurnInTest Linux v3.1 (or later) is required. The Linux 'usbli3' is required (included with most Linux distributions).

USB Hubs

While the USB loopback plug will work when connected via a self-powered hub, direct connection is the preferred method of connection when testing a computer system. Having a direct connection eliminates the hub as a point of failure. If the aim of the testing is to test the hub hardware itself, then connection via a hub may be preferable.

Cabling

Each plug comes with a 33cm (13inch) USB3 Micro B (male) to USB3 A (male) cable. There is also a USB Type-C compatible cable which can be ordered separately.

Select a short quality captive, shielded, USB cable rated for High-Speed when using other cables. Some cheaper USB cables are not well shielded and are not recommended. The cable must be shorter than the 5m allowed in the USB standard. If a USB connection is required beyond 5m one or more hubs are required to extend a USB connection.

Multiple USB plugs

Multiple USB plugs can be connected and simultaneous loopback testing carried out.

It should be noted that maximum speed reduces as the number of USB devices are connected. To determine the maximum speed of a USB port, it is recommended only one plug to USB ports managed by a single USB host controller.

Each USB plug is unique and has its own serial number. For this reason, the windows plug and play software will attempt to re-install the drivers every time a new Loop back plug is connected. You can view the serial number and firmware version of each plug on the plug's display or from within USB3Test application or BurnInTest Professional.

Speed

On a well-configured USB3.0 port directly connected to the PC motherboard (not via a PCI card for example) speeds between 2.4-3.5Gb/s can be expected on a system that is functioning correctly.

Windows 7, 8 & 10 Installation

Un-install any previous version of the USB 3.0 Loopback plug device driver before installing a new version.

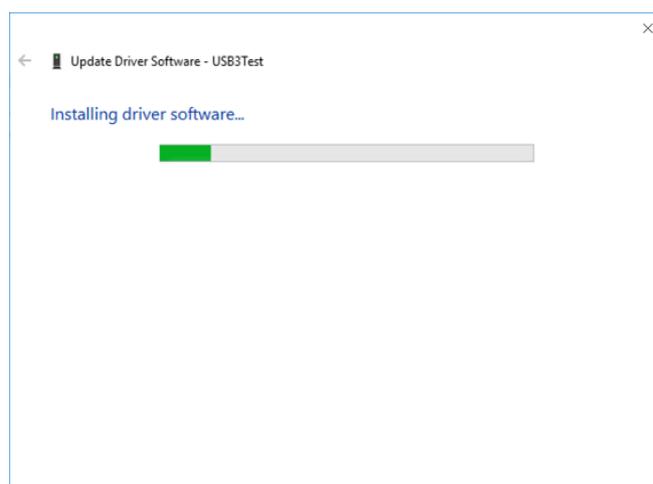
Step1 – connect the device

With the computer turned on and running, connect the USB 3.0 Loopback Plug to the USB port on the computer to be tested. The orange power light on the USB plug should illuminate when connected.

For Win7 users, the "Installing device driver software" bubble should be displayed.



For Win10 users, the Device Setup windows will be displayed.



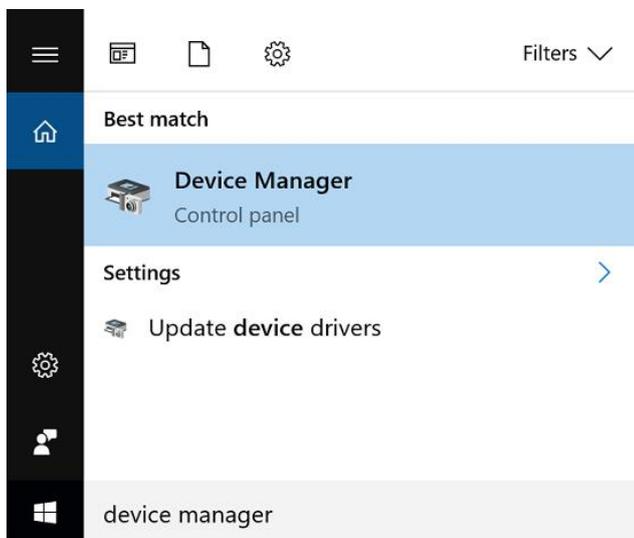
If a USB 3.0 Loopback plug has been installed on the system previously the device drivers will be automatically installed and the installation is complete.

Step 2 – Install the device driver

Download the latest driver from the following address and extract the package.

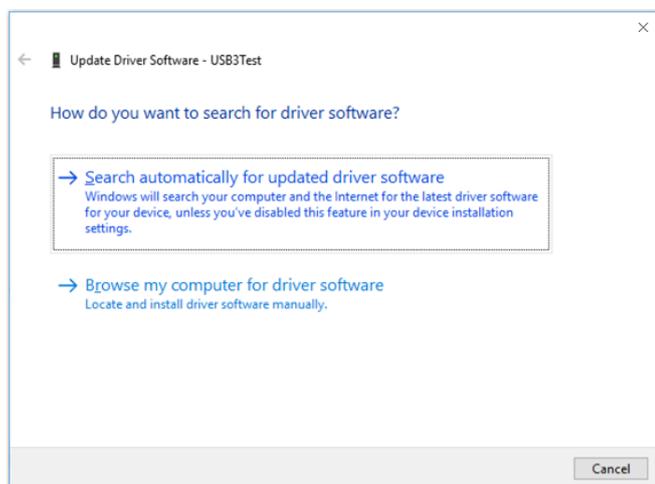
http://www.passmark.com/download/usb3test_download.htm

Start Device Manager by selecting Windows Start and typing “Device Manager”.



From within Device Manager, select the “PassMark USB3.0 Loopback Plug” device and select “Update Driver Software...”

Select “Browse my computer for driver software” and enter the location of the device drivers. Select Next.



After successful installation, a Window will be displayed indicating that “Windows has successfully updated your driver software”.

Step 3 – starting the test software

The USB 3.0 Loopback plug can be used to test USB ports with USB3Test or BurnInTest software. To run USB3Test, download the utility from the following address:

http://www.passmark.com/download/usb3test_download

Unzip the file and double click on “USB3Test.exe”. See the software help files for details of using USB3Test or BurnInTest.

Uninstalling in Windows 7, 8 and 10

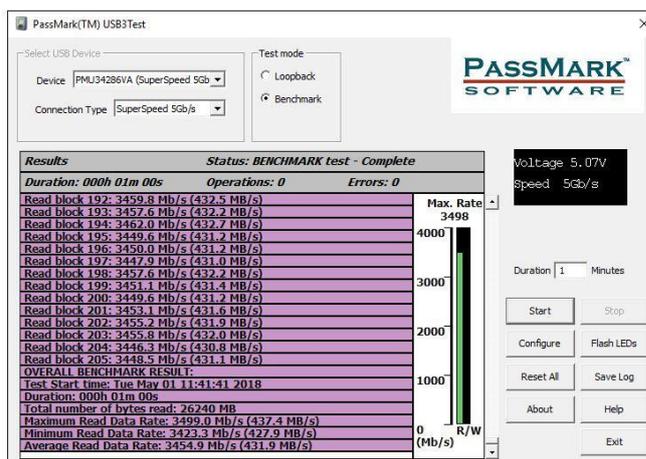
From the Windows "Start" option, select *Control Panel*→*System*→*Hardware* →*Device Manager* from the "Universal Serial Bus controllers" branch of the device tree, select the "PassMark USB3.0 Loopback plug" device and from the menu select *Action*→*Uninstall*.

Linux Installation

No specific USB installation is required as the USB 3.0 Loopback plug uses the usbliib as a standard USB device. With the computer turned on, connect the USB 3.0 Loop Back Plug to the USB port to be tested. The orange power light on the USB plug should illuminate when connected. That's it, you are ready to test with BurnInTest for Linux

USB3Test Software

USB3Test is a Windows based application that can be used to quickly run and configure tests from a computer with a USB 3.0 Loop Back Plug connected. To run a test, select the USB 3.0 Loop Back Plug to use in the “Select USB Device” block and the type of test in the “Test Mode” block found in the top left, and then hit the Start button to begin the test.



Loopback testing

A loopback test is used to ensure that data sent out from the USB port is error free, as well as that data received is read correctly. This is done by continuously sending out a message followed by reading back a copy of that message and then checking that it has not been altered. This test can also be adjusted through the menu from the “Configure” button.

Test adjustments include changing the endpoint under “Endpoint Options”, the data message used under “USB transfer options” and how often data is sent out under “Loopback load”. There are also three check boxes to adjust the error checking done: “Verify data transferred” checks that data sent out matches the data read back in after, “Check bus errors” will check and display any low-level errors that occur, and “Verbose logging” adds more detailed messages to the test log.

Test configuration

Endpoint Options
In No 1
Out No 1
Type BULK
Burst Length 16

Loopback Options
Loopback load 100 %
 Check bus errors

USB transfer options
Transfer Size 64KB
Queue Size 1
 Constant 140
 Incrementing sequence
 Random numbers
 Verify data transferred

Verbose logging

OK Cancel

Benchmark testing

A benchmark test is used to find the actual maximum speed the USB port can transfer data at. This test is done by continuously sending data as quickly as possible without checking for bus errors. When in benchmark mode the adjustments to the test can be made similarly to a Loopback test, however, there are two main differences.

The first is the transfer size (the amount of data sent in a single message) and the queue size (number of messages queued up by the device driver) can be changed. The default values provide the best results on most computers; although, some computers are not able to queue up this amount of data and the values must be reduced. The other adjustment that can be made is choosing if it is a read or write operation being benchmarked.

Test configuration

Endpoint Options
In No 1
Out No 1
Type BULK
Burst Length 16

Benchmark Options
 Read
 Write
 Read then Write
 Read and Write

USB transfer options
Transfer Size 2MB
Queue Size 64
 Constant 140
 Incrementing sequence
 Random numbers
 Verify data transferred

Verbose logging

OK Cancel

Command Line Configurations

If the USB3Test Software is opened through the command line, then the following command line arguments can also be passed to configure the software.

/L – Automatic logging of each test run to a file. File name will be date + serial number (if available). File path will be the current folder of the USB3Test tool.

/S – Adds an extra field in the USB3Test software to enter a serial number, this serial number will appear in the log file name. The “Clear Serial” button can be used to instantly clear the serial number entered in the field with a single click.

Trouble shooting

Symptom: No orange power light on USB plug

The computer USB port should provide a 5 Volt power supply. There is most likely a fault with the computer.

Symptom: Power, but no Found New Hardware window

The basic USB device enumeration process could not be completed. This could be a fault in the Windows O/S installation or with the USB hardware in the computer.

Symptom: Slow transfer speed or errors

Again, this could be the USB hardware in the computer or be also caused by external interference, a poorly shielded cable.

Technical Specifications

USB standard:	USB 3.0 (and USB 2.0)
Plug and play:	Compliant
Physical connector:	10 wire USB3
Transfer modes:	Bulk, Isochronous
Voltage:	4.6V – 6.0V (No external power req'd)
Current:	170mA (Typical USB3 Operation), 110mA (Typical USB2 Operation)
Clock speed:	19.2 MHz
Case:	High impact ABS plastic
Size:	85mm x 45mm x 12mm (3.4 x 1.8 x 0.5 inches)
Weight:	40g (1.4oz)
EMC standards:	AS/NZS 3548:1995, EC
Storage Temperature:	-30 °C to + 80 °C
Usage Temperature:	0 °C to + 70 °C
Model number:	PMUSB03
Product Code:	PM065
RoHS (Lead free):	Yes



From Left to Right:

Red LED = USB Bus Error
Yellow LED = Receive data
Green LED = Transmit data
Orange LED = Power

Electrostatic Discharge Precautions

USB3 plugs are not designed to be exposed to repeated high voltage spikes. The protection components degrade with ESD events and therefore prolong exposure to ESD events could eventually damage the plug.

USB3 loopback plugs protection against ESD events, overvoltage is as follow:

USB3 Lines (SSTx-, SSTx+, SSRx-, SSRx+) are ESD protected as per IEC61000-4-2 standard
± 20kV contact discharge
± 20kV air discharge

There is no external protection over USB2 lines (D+ and D-), however the Cypress microcontroller that is used in the plug has some internal protection on the D+, D-, and GND pins on the USB interface. The ESD protection levels provided on these ports are:

± 6kV contact discharge and ±8-kV air gap discharge based on IEC61000-4-2 level 3A

± 8kV contact discharge and ±15-kV air gap discharge based on IEC61000-4-2 level 4C

Notes

If a USB port has insufficient power to start the USB3Test device in High-Speed mode, you will receive a HID device driver error message “This device cannot start (code 10)”.

Disconnect other devices from the same USB root hub.

Benchmark tests should be stopped prior to placing a PC in a Sleep state.

Additional Information

For more information, please see the [USB 3.0 Loopback plug FAQ](#) page.

Disclaimer

This product is not warranted nor intended to be used for medical, life support, life saving, critical control or safety applications, unless pursuant to an express written agreement with PassMark Software. Furthermore, PassMark Software does not authorize this product for use as critical components in life-support systems where a malfunction or failure may reasonably be expected to result in significant injury to the user. The inclusion of this PassMark Software product in life-support systems application implies that the manufacturer assumes all risk of such use and in doing so indemnifies PassMark Software against all charges.