



CATC
USB 2.0 4-Port Tester
and
USB 2.0 8-Port Tester
(UPT2)
User's Manual

For Software Version 1.4
Manual Version 1.4
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Part Number 730-0025-00

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1 OVERVIEW

This manual applies to the USB2.0 4-Port Tester (UPT2-4) and the USB2.0 8-Port Tester (UPT2-8). When no distinction is required, the unit is referred to as the USB 2.0 Port Tester, Port Tester, or UPT2.

The CATC USB 2.0 Port Tester (UPT2) is a USB test tool designed for use on the production line to test the USB ports on PC motherboards or stand-alone USB hubs, according to the USB 1.1 and 2.0 specifications. UPT2 supports USB host controller implementations for the UHCI, OHCI and EHCI. The UPT2 tool consists of a hardware box that provides connections for ports under test, and a DOS application that controls the test process by communicating directly with the PC USB Host Controllers.

1.1 CATC UPT2 Features

The features of UPT2 are:

- DOS-based software program verifies functionality of the USB system under test
- Simple DOS-based user interface to control test operation and configuration
- Supports UHCI, OHCI and EHCI USB host controller implementations
- Testing of four USB root ports in 10 to 30 seconds or eight USB root parts in 40 to 60 seconds
- Tests low-, full- and high-speed port operation as applicable for the port type
- Tests internal or stand-alone USB hub
- Enclosure-mounted LEDs for visual status
- Can be incorporated into customer system test platforms
- Tested for compliance with the USB 1.1 and 2.0 specification
- Uses BIOS allocated memory addresses to support EHCI and OHCI controllers connected on Southbridge PCI architectures.

1.2 CATC UPT2 Port Tests

The UPT2 application automatically detects the port types and based on test configuration settings executes the correct tests for the connected ports. The available tests are:

- Connection Test
- Disconnection Test
- Control Transfer Test
- Bulk Data Transfer Test
- Interrupt Data Transfer Test
- Isochronous Data Transfer Test
- VBUS Voltage Test
- D+/D- Voltage Test
- Selective Suspend/Resume Test
- Device Generated Remote Wakeup Test

The table below shows the UPT2 capabilities contrasted with CATC's previous USB port test products.

Support	UPT2	UPT	HPT
Host Controller	UHCI , OHCI, EHCI	UHCI, OHCI	UHCI, OHCI
Speed Capability	Low-, Full- and High-Speed	Low- and Full-Speed	Low- and Full-Speed
USB Hub Tests	Yes	Yes	No
Connection Test	Yes	Yes	Yes
Disconnection Test	Yes	Yes	Yes
Control, Bulk, Isochronous, and Interrupt Data Transfer Tests	Yes	Yes	No
Interrupt Transfer Test	Yes	Yes	No
Isochronous Transfer Test	Yes	Yes	No
VBUS Voltage Test	Yes	Yes	No
D+/D- Voltage Test	Yes	Yes	No
Selective Suspend/Resume Test	Yes	Yes	No
Device Generated Remote Wakeup Test	Yes	Yes	No

1.3 Stand-Alone Hub Testing

The UPT2 system is designed to test the one upstream port and up to 8 of the downstream ports of the hub under test. See the "Installing UPT2" section for details about how to setup the hardware for testing external hubs.

The software provides at the end of the test listing of on-screen results. If all tests were successful, the software declares the hub under test to be functional. In case of a faulty device, the software provides a detailed description of the test results in a text file. It also accumulates the failure rate for the entire testing day in a file.

The UPT2 performs the following tests on hub ports:

- Connection Test
- Disconnection Test
- Control Transfer Test
- Bulk Data Transfer Test
- Interrupt Data Transfer Test
- Isochronous Data Transfer Test
- VBUS Voltage Test
- D+/D- Voltage Test
- Selective Suspend/Resume Test
- Device Generated Remote Wakeup Test

The hub-specific tests conducted by UPT2 are:

- Hub power switching
- Hub over current
- Hub generated remote wakeup
- Downstream propagation of remote wakeup

1.4 System Components

The DOS-based UPT2 application communicates with the UPT2 box via the USB host controllers on the PC motherboard. For each port, the UPT2 software checks for proper operation in low-, full- and high-speed modes as applicable for the port type. When all tests are successful, the software declares the unit to be functional. The CATC Tracer/Trainer, Advisor and Chief USB Bus & Protocol Analyzers can be used to debug and rework units that fail these tests.

The CATC UPT2 package includes these components:

- A sturdy metal box housing the UPT2 electronic test circuitry based on the Cypress FX2 USB 2.0 controller.
- An AC-to-DC converter.
- Four USB cables (UPT2 – 4) or eight USB Cables (UPT2 – 8).
- A diskette containing the CATC UPT2 DOS application program file UPT2.EXE, and a README.TXT file that provides useful information about the product.
- The front of the UPT2 – 4 box has four female B-type USB connectors and two LEDs. The UPT2 – 8 box has 8 female B-type USB connectors and two LEDs.
- The rear of the UPT2 box has a +9V DC @ 1000mA power connector.

The USB connectors (marked as **CH1** through **CH4** for UPT2 – 4 or as **CH1** through **CH8** for UPT2 – 8) connect the UPT2 box to the unit under test. The power connector powers the box from the AC-to-DC power converter. When power is applied, the red LED (marked **PWR**) is illuminated. The green LED (marked **STATUS**) is a status indicator that blinks rapidly to indicate that the UPT2 on-board microcontroller is functioning properly.

1.5 Connectors and Cables

All connectors have a limited life (i.e. number of connect/disconnects before failure). When testing multiple units, be sure to **plug and unplug cables at the unit under test side and not at the UPT2 box**. Forceful or otherwise improper connection and disconnection of USB cables can damage the cables and connectors on the CATC UPT2 box or the USB system.

Note: The CATC Warranty specifically excludes damage caused by product misuse. There is generally no need to disconnect the B-type USB connectors from the UPT2 box. There is also no need to power down the UPT2 box between tests.

2 Installing UPT2

The UPT2 installation involves setting up the hardware, installing the software and creating a configuration file.

2.1 Installing the Hardware

The following describes installation procedures for installing hardware for testing ports on a host PC and hardware setup for testing an external hub and hub ports.]

2.1.1 Testing PC Ports

This hardware setup is for testing the ports on the host PC.

- Step 1** Connect the DC plug of the AC-to-9V DC @ 1000mA power converter to the +9V receptacle of the CATC UPT2 box.
- Step 2** Plug the AC power cable into an outlet.
- Step 3** Connect a USB cable between the USB connector labeled CH1 on the UPT2 box and a USB port of the unit under test.
- Step 4** If the unit has additional ports, use other USB cables to connect them to the USB connectors labeled CH2, CH3, and CH4 on the UPT2 – 4 or CH2, through CH8 on the UPT2 – 8 box as needed.

Note: Channels must be used in order. Channels cannot be skipped.

The CATC UPT2 hardware is now ready for operation.

2.1.2 Testing External Hubs and Ports

This hardware setup is for testing external hub and hub ports. When applying tests for hub power switching, hub generated remote wakeup and hub propagation of remote wakeup, at least two hub downstream ports must be connected to the UPT2.

- Step 1** Connect the DC plug (s) of the AC to 9V DC @ 100mA power converter to the +9V receptacle of the UPT2 box, and plug the AC adapter into an appropriate electrical outlet.
- Step 2** Connect a USB cable between the upstream port of the USB hub under test and the USB port of the host PC.
- Step 3** Connect USB cables between the hub downstream ports and the UPT2 USB connectors, starting with the connector marked "CH1." Do not skip any connectors on the UPT2.

The CATC UPT2 external hub is now ready for testing.

2.2 Installing the Software

- Step 1** Make a backup copy of the CATC application diskette.
- Step 2** Create a working directory (e.g. CATC_UPT2) on the hard drive of the PC under test. For example:
C:>md CATC_UPT2
- Step 3** Switch to A drive
C:>a:
- Step 4** Copy the contents of the CATC diskette to the working directory.

```
A:> copy *.* c:\CATC_UPT2
```

Step 5 Switch to C drive and check the directory for the CATC UPT2 software files:

UPT2.EXE	Executable code of the CATC UPT2 program
README.TXT	Text file containing useful information about UPT2
TOP.RBF	BusEngine code binary file
UPT2FW4.HEX	Firmware file for UPT2-4
UPT2FW8.HEX	Firmware file for UPT2-8

```
A:>C:
```

```
C:>cd CATC_UPT2
```

```
C:\CATC_UPT2>dir
```

2.3 Creating A Configuration File (UPT2.CFG)

Prior to operating the UPT2 application, a test configuration file must be created to reflect the required test configuration. To do this, run the UPT2 application and use the UPT2 Configuration Screen to specify the configuration data. Refer to section "UPT2 Command Line Switches" on how to start the UPT2 application and section "UPT2 User Interface Screens" on how to use the UPT2 screens to create the configuration file. To initially create a configuration file:

Step 1 Start the UPT2 application without using any of the command line switches.

```
C:>cd CATC_UPT2
```

```
C:\CATC_UPT2>UPT2
```

Step 2 Use the "File->View/Edit Configuration" option to show the UPT2 Configuration Screen. It contains the default test configuration values built into the UPT2 application.

Step 3 Change the test configuration parameter values by using the user interface described in section "Configuration Screen" to fit the required test environment. Exit the Configuration Screen back to the Main Screen.

Step 4 From the Main Screen use the "File->Save Configuration" to save the configuration to the UPT2.CFG file. UPT2 always loads the test defined by UPT2.CFG when it is started from the DOS prompt.

2.4 Updating UPT2 Firmware

The UPT2 box contains two firmware elements that might need updating as directed by CATC. CATC will provide two firmware files required for the update: 1) ASCII-hex file “upt2fw4.hex” for UPT2 - 4 or “upt2fw8.hex” for UPT2 - 8 and 2) binary file “top.rbf”. The firmware update instructions that follow are for updating both firmware elements in the UPT2 box. You might, however, update just one, depending on the request from CATC. The steps for updating the UPT2 firmware are:

- Step 1** Put installation diskette into A drive and set current director to A.
Connect the UPT2 box to power and your USB port, and power-on the UPT2 box.
- Step 2** Execute command "upt2 /F" to update the UPT2 controller firmware.
Check screen output in Test Detail pane to verify the download worked properly, and then exit UPT2 by pressing Esc key.
- Step 3** Execute command "upt2 /L" to update the UPT2 low speed BusEngine firmware. Check screen output in Test Detail pane to verify the download worked properly, and then exit UPT2 by pressing Esc key
- Step 4** Cycle the power on the UPT2 box, and check the behavior of the status LED. The firmware update is successful if the status light starts blinking rapidly almost immediately when power is applied. If the status light, at power-on, starts out with a slow blink and then starts blinking rapidly the firmware download failed, and you should contact CATC.

3 Operating the UPT2 Application

Operating the UPT2 application involves starting the UTP 2.0 DOS based program (UPT2.EXE) with the UPT2 command as described in the section "UPT2 Command Line Switches," and then using the user interface screens described in section "UPT2 User Interface Screens" to control the test, view test results and set up test configuration data. The test configuration file (UPT2.CFG) should be created as described in section "Creating A Configuration File" to reflect the test environment. Otherwise, tests might fail.

3.1 UPT2 Command Line Switches

Start the UPT2 application by executing the "UPT2" command at the DOS prompt. The default directory must be set to the directory containing UTP2.EXE. The UPT2 application command line switches are used to define the start-up functional options. The UPT2 command line switches are:

UPT2 [/R[:n] or /F or /K or /L or /M:K or /X or /?]

[/R[:n]] Start program and run test automatically, where n is the number of times to run test. To run test unlimited times, use /R:0. . "n" can be set to any value between 1 and 32,000, e.g. /R:1000. When n is not specified, e.g. /R, the program will run the test one time.

[/F] Update firmware controller. See section "Updating UPT2 Firmware" for more information about using this switch.

[/K] Enable USB keyboard support. Default = disabled.

Note: For USB keyboard support, after each test, UPT2 program will try to release USB control back to the BIOS. Due to insufficient documentation in the USB specification on this matter (i.e., the release of USB control from an application to the BIOS), this feature does not support EHC and OHC USB host controllers. It only supports SOME UHC USB host controllers.

[/L] Update UPT2 low-speed BusEngine firmware. See section "Updating UPT2 Firmware" for more information about using this switch.

[M:K] Reserves K*1024 bytes of storages for use by UPT2 as data transfer buffers. The default is 15.

[/X] Operate in real mode addressing and use 0xD0000 as the base address for OHC and EHC controllers. This was the default operating mode prior to UPT2 version 1.3. Starting with UPT2 version 1.3, the default is for UPT2 to operate in "flat mode" and use BIOS allocated operational base memory for EHC and OHC controllers.

[/?] Display help message for command line usage.

3.2 UPT2 User Interface Screens

When started as described in the previous section, the UPT2 application connects to the UPT2 box and brings up the UPT2 Main Screen. The screen menus are used to run tests in several different modes, and to specify and view test configuration data. The UPT2 application can also be run by using the "/R:n" command line switch to run "n" tests immediately upon start up (See section "UPT2 Command Line Switches").

Tests are run for the connected ports based on the test configuration defined in the UPT2.CFG file (See section "Creating A Configuration File"). When a test configuration file is not present in the default directory, the default configuration built into the UPT2 application is applied. As the UPT2 application executes the tests, results are written to the Main Screen, and results are written to a log file. The log file name is based on the current date (mmddy) and has an extension of ".UPT", e.g., 100501.UPT. Furthermore, the UPT2 application lists information about the detected host controllers in the UPT2.CON file.

The UPT2 application provides two DOS screens. A Main Screen that provides menus to execute application functions and view test results, and a Configuration Screen used for editing test configuration parameters. These screens are described below.

3.2.1 Main Screen

The Main Screen (Figure 3-1) is the first screen displayed when the UPT2 application is executed from the DOS prompt. The File pull down menu is shown in Figure 3.2 and is used to run tests and to setup and save test configuration data.

The windowpanes show the test results as follows:

Summary	(Left Pane) Lists for each port the number, controller type and pass or fail for each speed. The pane is updated as test progress for each port. The screen is scrollable using the PgUp and PgDn keys.
Detail	(Right Pane) Test results and details are listed as the UPT2 progresses through the port tests. This screen can be scrolled using the up and down arrows keys.
Overall Result	(Lower Left Pane) Displays the overall status of the test case. Displays "TESTING" during test execution, "PASSED" when all port tests complete without error, or displays "FAILED" when any individual port test fails.
Status Bar	(Bottom of window) The bottom border of the Main Screen displays error messages and a run count of the current test sequence. Errors are displayed on the left. The right side displays a count of executed tests. Three types of counts will display: Single Run - a one-time test run; #x - the number of tests (=x) that have been run in a sequence set to continue indefinitely or until an error occurs; and #x/y - the number of tests (=x) that have been run in a pre-specified set (=y).

The Main Screen key controls are:

Left/Right Arrows Move left and right between the File and Help menus.

- Enter** Causes highlighted menu to pull-down the options menu, or when a menu is pulled down press Enter to execute the option.
- Up/Down Arrows** Once a menu is pulled down use the up and down arrows to move between the options. When a menu is not pulled down the up and down arrow keys are used to scroll the detail pane.
- PgUp/PgDn** Scroll the Summary pane up or down.
- Esc** Exit from a pull-down menu, or exit from the UPT2 application

Figure 3-1 UPT2 Main Screen



3.2.1.1 File Pull Down Menu

The File Pull Down menu (Figure 3-2) provides options associated with running tests, and establishing configuration data that customizes the UPT2 operation to fit the test requirements. The File Pull Down menu options are:

- Run Test (Single Run)** Execute a single test run based on the current connections and the prevailing configuration data.
- Run Test...** Pops up a dialog window (Figure 3-3) that allows the user to setup different run scenarios: 1) Run test until it fails or 2) Run test a specified number of time or until test fails or until Esc pressed.
- Load Configuration** Load test configuration data from the UPT2.CFG file. The loaded configuration is now the prevailing configuration and is the basis for any executed test

- cases.** This provides a mechanism to “undo” configuration edits which have not been saved.
- Save Configuration** Save the prevailing test configuration data to the UPT2.CFG file.
- View/Edit Configuration** Activate the Configuration Screen to view or edit the prevailing test configuration data. Exiting the configuration screen does not automatically save the configuration data to file. You must use the "File->Save Configuration" option from the Main Screen.
- Quit** Exit the UPT2 application and return to DOS.

Figure 3-2 UPT2 File Pull Down Menu

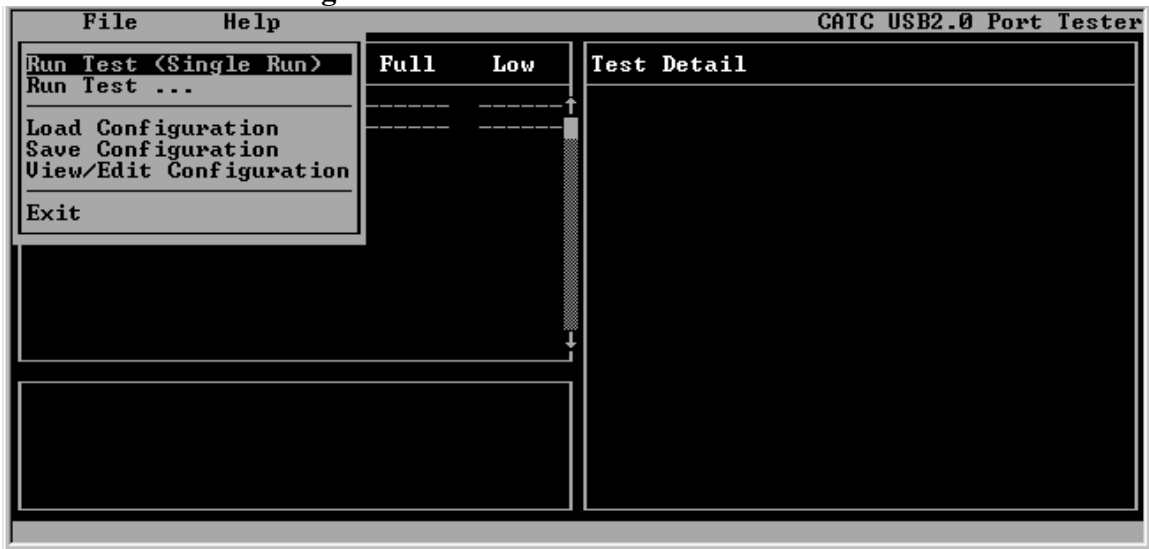


Figure 3-3 File->Run Test Dialog



3.2.1.2 Help Pull Down Menu

The Help pull down menu (Figure 3-4) contains the About option that displays information about the installed version of the UPT2 application, firmware, low-speed BusEngine, and channels available. This information is useful when contacting CATC support. Figure 3-4 shows the Help->About display for an 8-port UPT2 device.

Figure 3-4 Help->About Windows



3.2.2 Configuration Screen

The configuration screen shown in Figure 3-5 provides a user interface for changing test configuration parameters. The screen provides one-line help text at the bottom as each parameter is selected. The up and down arrow key are used to move between the parameter fields. The screen provides "list fields" for text values, "numeric fields" for number fields and "select fields" for on/off or "yes/no" values. These fields operate as follows:

- "list field"** Press Enter to show the list, use the up/down arrows to move selection bar and PRESS ENTER to enter the current selection, and move to the next field.
- "numeric field"** Type numbers and PRESS ENTER, up arrow or down arrow to enter the value and move to the next field. Use the left and right arrow to move within the numeric field
- "select field"** Use the left and right arrows to toggle between on "[x]" or off "[]" for a parameter setting. Press left/right arrow or Enter to accept the current setting and move to the next field.

Use the "Esc" key to exit from the Configuration Screen. This does NOT save the configuration values. The test configuration values are saved from the Main Screen using the "File->Save

Configuration" menu option. The test configuration values shown by the Configuration Screen are applied to the next test run executed.

3.2.2.1 Configuration Parameters

Configuration parameters are provided on the Configuration Screen that might apply to later versions of the UPT2 product. Parameters that apply for this unit are highlighted on the Configuration Screen. The configuration parameters that apply to the unit are:

Return to DOS	Three settings for this parameter are No , Always , and PassOnly . Setting this parameter to No causes UPT2 to return to screen control after executing a test run. Setting this parameter to Always causes UPT2 to exit or return to DOS after completing a test run. Setting this parameter to PassOnly Causes UPT2 to exit or return to DOS after executing a test that passed and returning to screen control after executing a test that fails. The After field of this parameter specifies the delay before returning to DOS. Minimum value for this parameter is 100 ms.
End of Test Sound	Setting this parameter to "Yes" causes UPT2 to make a sound upon test completion. The sound is different depending whether the test passed or failed. A "No" setting results in UPT2 not making any sounds when a test completes.
Log ASCII	This parameter controls writing to a test results log file during test runs. See section "UPT2 Test Results Log File" for an explanation of this log file. The settings for this parameter are: "Detail" causes UPT2 to write summary and test detail data to the log file; "Summary" causes UPT2 to write the summary lines; "Disabled" results in no output to the log file; and, "FailureOnly" specifies to write detail data only when a test run fails.
Connection Log	Setting this parameter to "Yes" causes UPT2 to write host controller information into the Connection Log file, and setting the parameter to "No" disables this capability. See section "UPT2 Connection Log File" for information about this file.
# Ports To Test	Specify the number of ports to be tested. If the number of ports is more than the exact number, UPT2 can fail the test. If this happens, please go back and correct the port number for this prompt.
High Speed Capable	Select the UPT2 channels that are connected to high-speed ports. An "x" signifies the channel is connected to a high-speed port. Note: Checking a channel as high speed when it is not connected to a high speed port will cause the UPT2 to designate the high-speed transfer test as failed.

Type of HC	Select the type (UHC, OHC or EHC) of host controller to test. UPT2 automatically senses the host controllers present on the board, but will only test those selected.
Memory Base	<u>This applies only to OHCI and EHCI host controllers, and when the /X command line switch is used. The default without the /X option is for UPT2 to use BIOS allocated operational base memory for EHCI and OHCI host controllers, and employ 32-bit addressing using the flat memory model.</u> Specify the physical memory location for the on-board host controllers. This number is specified in hexadecimal. The OHCI or EHCI USB host controller needs 4K-system memory. When the /X command line switch is used, the UPT2 program maps this memory from d0000 to d7000. If these memory areas are taken by other hardware in your PC, it can fail the UPT2 test. You must choose a different base address for UPT2 manually. They must be a non-cacheable system memory location. Possible address locations are C800 to E000. Specify the base address for the operational registers of the host controller. CATC is not responsible for finding an available base address in your system. Customers should work with their BIOS engineer to find an appropriate base address for UPT2 testing.
Transfer Test	Select the type of data transfer test to be implemented for each port. The test types are bulk, interrupt and isochronous. The bulk test is ONLY good for full- and high-speed.
VBUS Voltage Test	Select, using an "x", implementation of the VBUS voltage test. Use the "Load" field to specify in milliamps the load to be placed on the VBUS line. The "Passed if" parameters give the greater than ">" and less than "<" voltage range for passing the test
D+/D- Voltage Test	Select, using an "x", implementation of the D+/D- voltage test. Use the high and low values for idle and driven modes to specify acceptable ranges for passing the test.
Over-Current Test	Select, using an "x", implementation of the hub over current test. Set the Test Mode to "Automatic" to have UPT2 automatically increase the VBUS current draw until the hub detects an over current condition (or fails the test when maximum current draw is reached) and disconnects the UPT2 channel. The automatic over-current test steps the current from 100 milliamps to 5 amps in 50 milliamp increments using a 50 millisecond interval. Set Test Mode to "Regular" to draw current as specified by the "Value" parameter for a duration as specified by "Duration" parameter. The "Protection

Mode” specifies the UPT2 method for verifying the hub produced the correct over current response. “Individual” signifies to verify that the hub reported over current on the correct individual port, “Global” signifies to verify that the hub reported an over-current as a summation across all ports. “Descriptor” signifies to verify hub over-current reporting based on the method specified in the Hub Descriptor.

Suspend/Resume Test

Select, using an "x", implementation of the Port Suspend/Resume Test. This test sets the port under test to Suspend mode. It then sets the port under test to Resume mode. UPT2 then reads and verifies the number of Suspend/Resumes detected during the test. Test results are displayed as "Pass" or "Fail."

Remote Wakeup Test

Select, using an “x”, the type of hub remote wakeup test. Select “Device Generated” to test a hub’s handling of a resume signal from a connected device. Select “Hub Generated” to test a hub’s ability to signal a remote wakeup, and select “Downstream Propagation” to verify a hub propagates resume to connected devices. The “Downstream Propagation” must be set to perform the Power Switching test.

Other Test

Select, using an “x”, implementation of the Hub Power Switching test that verifies a hub’s ability to switch power on individual ports. The hub’s power switching mode bits in the Hub Descriptor must be set for individual port power switching; otherwise, the Power Switching test is not run.

Figure 3-5 Configuration Screen UPT2 - 8

General Control				HC Configuration		
Return to Dos	No	After	1000mS	Type of HC	<input checked="" type="checkbox"/>]UHC	<input checked="" type="checkbox"/>]OHC
End of Test Sound	Yes				<input checked="" type="checkbox"/>]EHC	
Log ASCII	Detail	Binary	Disabled	Memory Base		IRQ
Console Mode	No	Connection Log	Yes	HC1	ff8fb00	11
Type of Ports	[]Hub(Classic)	[]Hub2.0		HC2	ff8fa000	x
# Ports To Test	8	Hub Embedded Ports		HC3	ff8f9000	x
High Speed Capable				HC4	000d3000	x
<input checked="" type="checkbox"/>]CH1	<input checked="" type="checkbox"/>]CH2	<input checked="" type="checkbox"/>]CH3	<input checked="" type="checkbox"/>]CH4	HC5	000d4000	x
<input checked="" type="checkbox"/>]CH5	<input checked="" type="checkbox"/>]CH6	<input checked="" type="checkbox"/>]CH7	<input checked="" type="checkbox"/>]CH8	HC6	000d5000	x
				HC7	000d6000	x
				HC8	000d7000	x
Test Control						
Transfer Test	<input checked="" type="checkbox"/>]Bulk	<input checked="" type="checkbox"/>]INT	<input checked="" type="checkbox"/>]ISO			
VBUS Voltage Test	<input checked="" type="checkbox"/>]	Load	100 mA	Passed if	>4.80V	& <5.20V
D+/D- Voltage Test	<input checked="" type="checkbox"/>]	Passed if		Idle High	>2.70V,	Low <0.30V
Over_Current Test	<input checked="" type="checkbox"/>]	Test Mode	Automatic	Protection Mode	Descriptor	
		Value	3.00A	Duration	100 mS	
Suspend/Resume Test	<input checked="" type="checkbox"/>]Selective					
Remote Wakeup Test	<input checked="" type="checkbox"/>]Device Generated	<input checked="" type="checkbox"/>]Hub Generated				
Other Test	<input checked="" type="checkbox"/>]Hub Power Switching					
ESC-Exit	++Select	↑↓Move	:) Specify high speed capable channels			

3.3 UPT2 File Outputs

The UPT2 application generates two files in the current directory when it starts up and as tests are executed. The two files are the Connection Log file and the test results log file.

3.3.1 UPT2 Connection Log File (UPT2.CON)

The UPT2 application on start-up detects the host controllers resident on the computer under test and generates a Connection Log text file describing each controller present. Figure 3-6 provides an example of a Connection Log file. The configuration parameter “Connection Log” is used to enable (“Yes”) or disable (“No”) this capability. The information shown for each host controller is:

Hc	Host controller type: UHCI for Universal Host Controller Interface, OHCI for Open Host Controller Interface and EHCI for Enhanced Host Controller Interface.
VendorId	Vendor identification code of the host controller.
DeviceId	Device identification code of the host controller
IRQ	Interrupt Request number used for the host controller.
NumberOfPorts	Number of host ports controlled by the Host Controller
Base Address	Base memory address used by the host controller.

Figure 3-6 Example Connection Log File

Hc	VendorId	DeviceId	IRQ	NumberofPorts	BaseAddress
EHCI	1033	e0	b	5	d0000
OHCI	1033	35	a	3	d1000
OHCI	1033	35	b	2	d2000
OHCI	1045	c861	b	2	d3000
UHCI	8086	2442	b	2	N/A
UHCI	8086	2444	9	2	N/A

3.3.2 UPT2 Test Results Log File (“MMDDYY-2”.UPT)

The UPT2 application provides the capability to capture in a text file test results for all testing conducted on a given day. Figure 3-7 shows an example test results log file generated for two test runs. The first two lines, called the summary, lists the number of units tested, number units passed, number units failed, and on the second line the time of the last test case for the day. Subsequent data, after the summary, gives a time tag for the start of a test run and then lists the test details.

The name of the log file is “MMDDYY-2”.UPT, where MMDDYY represents the month (MM), day (DD) and year (YY) corresponding to the day the tests were conducted.

Figure 3-7 Example Test Results Log File

Total # of Units Tested: 2 Passed: 2 Failed: 0	
Last test: 16:37:09	
Detail Log:	
=====	
12:36:45 Unit #1	
HC 1, PORT 1, SPEED HS, UPT2 CH 1	
Connect	Passed
Control transfer	Passed
Disconnect	Passed
HC 3, PORT 1, SPEED FS, UPT2 CH 1	
Connect	Passed
Control transfer	Passed
Disconnect	Passed
HC 3, PORT 1, SPEED LS, UPT2 CH 1	
Connect	Passed
Control transfer	Passed
Disconnect	Passed
12:37:10 Unit #2	
HC 1, PORT 1, SPEED HS, UPT2 CH 1	
Connect	Passed
Control transfer	Passed
Disconnect	Passed
HC 3, PORT 1, SPEED FS, UPT2 CH 1	
Connect	Passed
Control transfer	Passed
Disconnect	Passed
HC 3, PORT 1, SPEED LS, UPT2 CH 1	
Connect	Passed
Control transfer	Passed
Disconnect	Passed

3.4 UPT2 Error Level Output

UPT2 returns an exit code to DOS upon return from execution within a DOS batch file. DOS puts this code into the ERRORLEVEL parameter that can be checked by the batch file. When running UPT2 from a batch file the configuration parameter “Return To DOS” should be set to “Always” so UPT2 returns back to DOS once a run is completed. UPT2 returns a zero when the requested function or test executed without error, and returns a non-zero value when an error occurs. The UPT2 return codes are:

- 0 – SUCCESS, UPT2 application accomplished requested function or test without error.
- 1 – ERROR, invalid switch in UPT2 command line, no function or test conducted.
- 2 – ERROR, UPT2 application was not able to detect PCI BIOS.
- 3 – ERROR, UPT2 application was not able to allocate memory for test configuration data.
- 4 – ERROR, UPT2 application was not able to allocate memory for generating test log file.
- 5 – ERROR, UPT2 application was not able to allocate memory for data transfer.
- 6 – ERROR, UPT2 application was not able to allocate memory for USB device data structures.
- 7 – ERROR, UPT2 application was not able to detect a host controller.
- 8 – ERROR, UPT2 application was not able to initialize at least one host controller.
- 9 – ERROR, UPT2 application was not able to allocate memory for UPT2 object.
- 10 – ERROR, UPT2 application conducted the specified test case and the test failed.
- 11 – ERROR, UPT2 application was not able to allocate memory for USB host controller.
- 12 – ERROR, UPT2 application was not able to allocate memory for USB hub object.
- 13 – ERROR, UPT2 application failed to set CPU to 32-bit addressing mode (flat mode).

The example below shows an example batch script for using the UPT2 to run a test and then printing success or failure of the run based on the ERRORLEVEL parameter.

Figure 3-8 UPT2 Error Level Example

```
:test1

echo off
UPT2 /r:1
if errorlevel 1 goto test1_bad
echo Test 1 Success!
goto test2

:test1_bad
echo Test 1 Failed!

:test2
```


3.5 Appendix: Setting BIOS Options and Using Config.sys File

BIOS and memory options can affect the performance of UPT2.

3.5.1 BIOS Settings

If you enable Legacy device support and/or Plug and Play support, the UPT2 might fail to identify devices. If this happens, try disabling Legacy device and/or Plug and Play support.

Furthermore, UPT2 uses, as default, BIOS allocated memory and 32-bit addressing for use with the EHCI and OHCI controllers. This is not compatible with the Emm386 application. Use the /X command switch to revert to an application allocated memory pool and 16-bit addressing when using the Emm386 application. Refer to the Memory Space configuration parameter described in the “Configuration Parameters” section.

3.5.2 Config.sys Settings

Emm386.exe and himem.sys might cause UPT2 to not function properly (for example, it might not identify USB host controllers because it does not have the memory it needs.) If you are using emm386.exe and himem.sys, you might need to exclude a range of memory addresses or manually assign memory addresses to UPT2.