TUSB6250 FAQ

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ABSTRACT

This document is a compilation of frequently asked questions regarding the TUSB6250 USB 2.0 to ATA/ATAPI Bridge Controller.

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General

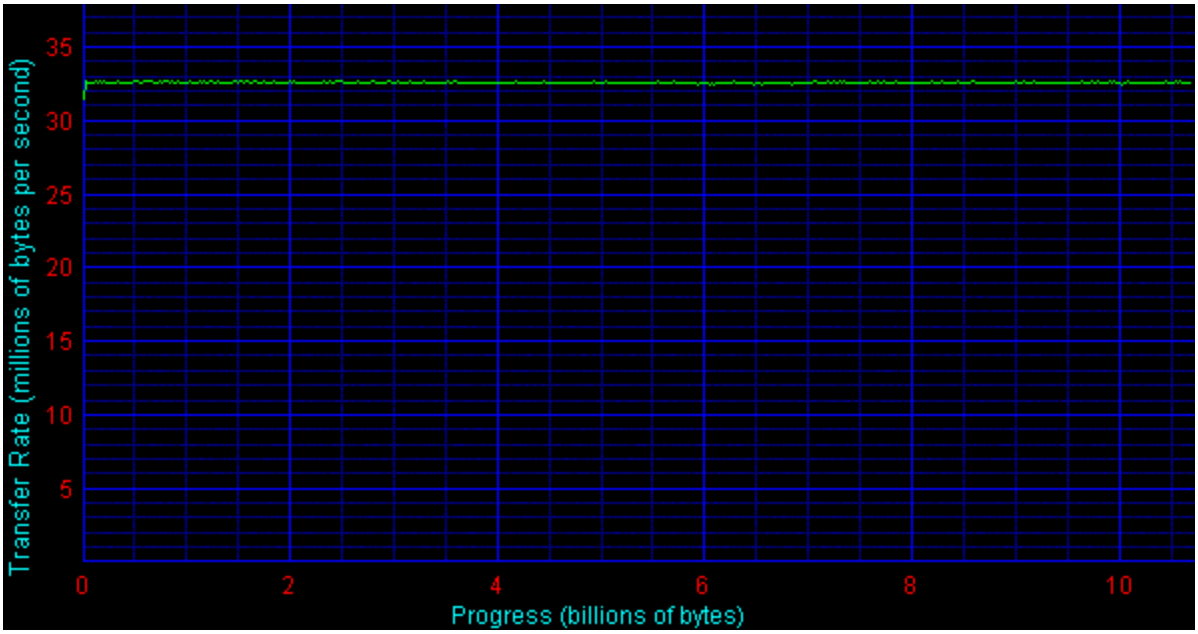
Question: What is the maximum data throughput rate of the TUSB6250?

Answer: The maximum attainable throughput for the TUSB6250 is approximately 30 MB/s for writes and 33 MB/s for reads. The information below was measured on a Windows XP system with a 1.8 GHz processor, 256 MB of RAM and an ICH4 USB 2.0 controller on the motherboard using the TUSB6250 and a Maxtor ATA-133 40 GB HDD.

Results from WinBench 99, Version 2:

Disk Transfer Rate
- Beginning 32.4 MB/s
- End 32.6 MB/s

Disk Access Time 11.4 ms



Results from SiSoftware Sandra Unicode 2004.2.9.104, File System Benchmark:

Buffered Read	26 MB/s
Sequential Read	31 MB/s
Random Read	22 MB/s
Buffered Write	25 MB/s
Sequential Write	26 MB/s
Random Write	26 MB/s
Access Time	13 ms

Question: What types of devices can the TUSB6250 support on the ATA/ATAPI interface?

Answer: The TUSB6250 can act as a USB 2.0 bridge controller for ATA devices such as HDDs, MO drives, ZIP drives or ATAPI devices such as CD-RW drives, DVD-RW drives or compact flash cards that support the true IDE interface operation. ATA and ATAPI devices are supported by the same default firmware build. Compact flash card applications require a different firmware build available from Texas Instruments. Applications involving more than one device on the ATA/ATAPI interface also require a modified firmware build available from Texas Instruments.

Question: Which crystals can be used with the TUSB6250?

Answer: The Texas Instruments application note, SLLA122, is the crystal selection guide for USB high speed devices. Crystal vendors that supply devices that meet these specifications are Crystek, part number CYSD6F51B-24, and Fox Crystal, part number FOXSD,240F-20.

Power Consumption / Suspend

Question: What are the power requirements for a design containing the TUSB6250 and the and the serial EEPROM?

Answer: A design with both the TUSB6250 and the serial EEPROM typically requires the Input Supply Current (Idd) at 3.3V shown below:

USB high speed, ATA/ATAPI UDMA-4	90 mA
USB high speed, ATA/ATAPI UDMA-2	85 mA
USB high speed, ATA/ATAPI PIO-4	82 mA
USB high speed, ATA/ATAPI PIO-0	80 mA
USB high speed, ATA/ATAPI idle	75 mA
---	---
USB high speed, Compact Flash read/write	108 mA†
USB high speed, Compact Flash ejected	100 mA*
USB high speed, Compact Flash idle	80 mA†
---	---
USB full speed, ATA/ATAPI idle	60 mA
USB full speed, ATA/ATAPI active	68 mA
---	---
USB enumeration with Compact Flash	90 mA†
USB enumeration with ATA/ATAPI	80 mA
USB enumeration w/o device	75 mA
---	---
USB device unconfigured (bus-powered)	75 mA
USB unattached (self-powered)	60 mA
Device in reset	53 mA
---	---
Suspend state with USB remote wakeup enabled	221 uA

†Includes the SN74TVC16222A voltage clamp device and/or the Compact Flash card.
*Includes the SN74TVC16222A voltage clamp device.

Question: When does the TUSB6250 enter suspend?

Answer: The USB devices begin the transition to the suspend state after they see a constant idle state on their upstream facing bus lines for more than 3 ms. The device must actually be suspended, drawing only suspend current from the bus after no more than 10 ms of bus inactivity on its port. The specification also requires that a device with remote wakeup capability may not generate resume signaling unless the bus has been continuously in the idle state for 5 ms. The specification allows all USB devices to enter suspend at any time between 3 ms to 10 ms after bus idle. For USB high-speed capable devices, since there is an additional 0.125 ms revert wait time from high speed to full speed after 3 ms high speed bus idle, the actual time it can enter suspend is between 3.125 ms and 10 ms. See section 8.3.1 of the datasheet for more information

Question: Is it possible to force the TUSB6250 to enter suspend mode?

Answer: Due to the USB 2.0 specification, firmware cannot force the TUSB6250 to enter suspend mode while it is enumerated on the USB bus if the device does not detect USB bus idle for 3 ms. It is possible to force the TUSB6250 into suspend mode when it is not attached to the USB bus by adding pulldown resistors on the DP/DM signal lines.

Question: When is low power mode supported by the TUSB6250?

Answer: If the LPEN bit in the USB Control Register of the TUSB6250 is set to 1, the TUSB6250 is in the low-power mode during suspend and the core clock is shut down. It is required that the self-powered applications based on the TUSB6250 ensure this bit is cleared. In other words, the TUSB6250 does not support the low-power enable feature if the device is self-powered.

Question: Does the DVREGEN signal or VREGEN signal need to be disabled or connected to the SUSPEND terminal to allow the TUSB6250 enter low power suspend mode?

Answer: The TUSB6250 does not require either of the voltage regulators to be disabled in order to enter the low power suspend mode. Both voltage regulators should always remain enabled (tied low).

Board Layout

Question: Is there a reference design for implementing the TUSB6250 into an ATA/ATAPI storage system?

Answer: The schematics and information in the TUSB6250 Demonstration Board User's Guide (SLLU045B) can be used as a reference design.

Question: Are there layout recommendations for the TUSB6250?

Answer: TUSB6250 board layout guidelines:

- Place the TUSB6250 as near as feasible to the USB 2.0 connector.
- Keep the 24 MHz crystal and its load capacitors as close as possible to the TUSB6250 pins XTAL1 and XTAL2.
- Place any switching power circuitry away from the clock generation circuit (and the TUSB6250 in general) to avoid signal interference.
- Situate power decoupling capacitors near the TUSB6250 power supply pins.
- Try to keep the ATA/ATAPI interface traces short, less than 4 inches if practical. These signals should also all be approximately the same length, particularly the synchronous data bus, to minimize the effects of propagation delay.

Critical signal (DP/DM, XTAL1/2, ATA/ATAPI signals) routing guidelines:

- Route critical signals first, minimizing trace lengths.
- Avoid the use of vias in critical signal paths. If a via must be used, try to increase the clearance size around it to minimize its capacitance.
- Avoid using through-hole test headers on critical signals.
- Avoid stubs in the critical signal paths. If a stub is required, minimize to less than 200 mils.
- Run all critical signals on a signal plane above a solid ground or power plane layer if possible.
- Never cross power / ground plane boundaries with critical signals, particularly at a 90 degree angle.
- Avoid 90 degrees turns in traces, use 45 degree turns or bevels instead to maintain the trace impedance.
- Keep digital signals away from the differential pairs and the external crystal circuitry.

Differential pair (DP/DM) routing guidelines:

- Match the etch lengths of the differential pair traces.

- Route the differential pair traces parallel to one another and close together as much as possible.
- Route the DP/DM differential pair away from clock and power signals and circuitry.
- The differential pair traces should be designed with characteristic impedance (90 Ohms) between the complementary signals.
- The width of the differential pair traces can be modified to achieve a characteristic impedance.

Memory

Question: What type of memory is required by the TUSB6250?

Answer: A serial EEPROM is required for usage with the TUSB6250 to store VID/PID information and application firmware. Any 3.3V, two-wire serial bus I2C EEPROM of at least 256 Kbits can be used. TI uses the Microchip Technologies device: 24LC256-I/P. Other similar devices are made by Atmel and STMicroelectronics.

Question: What amount of memory is required to store the firmware source code?

Answer: Recent firmware builds of the TUSB6250 firmware require over 20 KB of ROM.

Question: How is the serial EEPROM used by the TUSB6250 programmed / reprogrammed?

Answer: The serial EEPROM can be programmed prior to installation on a board or it can be programmed initially in system using a newly developed utility (please contact TI for the utility). Once the EEPROM has been programmed, the firmware in the EEPROM can be updated in system using the TUSB6250 EEPROM Firmware Update Utility supplied by Texas Instruments. The usage of the programming utility is explained in the documentation accompanying it and also in the TUSB6250 Demonstration Board User's Guide (SLLU045B).

Question: Does a TUSB6250 system need to be power cycled after it is programmed?

Answer: The TUSB6250 requires a power reset after code is downloaded to the EEPROM.

Software

Question: Does Texas Instruments provide firmware source code royalty free?

Answer: Texas Instruments provides a clickwrapped version of the source code that includes a document that describes the projects settings, version numbering system, precompiler build options and directory structure. Compiling the source code can be accomplished with different compilers: Kiel, IAR, Tasking. The supplied source code was build and compiled using a Tasking compiler and there is some effort involved with porting the code to another compiler.

Compatibility

Question: On which operating systems has the TUSB6250 been verified ?

Answer: TUSB6250 has been validated on PCs running Windows 98SE, Windows 2000, Windows ME, and Windows XP. TUSB6250 has also been tested on Apple machines running OS X (Jaguar and Panther) and Linux Redhat 9.0. See Appendix A for more information on compatibility testing.

Question: Are custom USB 2.0 device drivers necessary?

Answer: Most TUSB6250 applications are supported by the native mass storage drivers available in Windows 2000, Windows ME, Windows XP, and Mac OS X. A driver is available from Texas Instruments for use with Windows 98SE.

Question: What cable lengths can be used with the TUSB6250?

Answer: Any cable length up to 5 meters, as specified by the USB 2.0 specification, is supported by the TUSB6250.

Question: Which USB 2.0 controllers have been tested with the TUSB6250?

Answer: The TUSB6250 has been verified with USB 2.0 controllers made by VIA, nVidia, SIS963, Intel (ICH4, ICH5), and NEC.

Question: Which test suites have been performed on the TUSB6250?

Answer: USB-IF Certification. The TUSB6250 passes USB Command Verifier (USBCV) testing. USBCV is the compliance test tool which evaluates High, Full and Low-speed USB devices for conformance to the USB device Framework (Chapter 9). Windows Hardware Quality Labs (WHQL). Please contact TI for more test results.

Question: When the TUSB6250 system is unplugged from the USB bus on a Windows 98SE, Windows 2000, Windows ME or Windows XP machines, a warning message appears stating an Unsafe Removal of Device, can this be avoided?

Answer: This warning message can be avoided by right clicking on the green arrow icon in the lower right hand corner of the screen and stopping the device prior to unplugging.

Question: What kind of Linux support is available for the TUSB6250?

Answer: There is a Quickstart Guide written by Dominic Curran in Appendix B.

ATA/ATAPI Interface

Question: Can the TUSB6250 support multiple devices on the ATA/ATAPI bus?

Answer: The TUSB6250 can support multiple LUNs or devices on the ATA/ATAPI bus.

Question: Can the TUSB6250 ATA/ATAPI interface be tristated?

Answer: The ATA/ATAPI interface of the TUSB6250 can be tristated, see section 11.2 of the datasheet (SLLS535A) for more information on how this is done.

Question: Is the ATA/ATAPI interface of TUSB6250 5V tolerant?

Answer: The ATA/ATAPI interface of TUSB6250 is 5V tolerant and 5V failsafe. 5V failsafe indicates that 5V signals can be driven into the TUSB6250 while it is powered off without harming the device.

Question: Can the TUSB6250 support slave devices on the ATA/ATAPI bus with firmware modifications?

Answer: The TUSB6250 can support a slave device on the ATA/ATAPI bus if there is also a master device on the ATA/ATAPI bus, i.e. a dual device configuration. The TUSB6250 cannot support only a slave device on the ATA/ATAPI bus.

Question: Can the TUSB6250 generate ATA/ATAPI commands?

Answer: Yes, the TUSB6250 can generate some ATA/ATAPI commands based on a GPIO input without any interaction from the USB host. However, it is not possible to generate UDMA read and write commands without USB host interaction.

Question: What are the data transfer rates of the various ATA/ATAPI modes? Which modes are supported by the TUSB6250?

Answer: The TUSB6250 supports data rates up to UDMA-4. UDMA-5 and UDMA-6 are compatible with the TUSB6250, but the ATA/ATAPI interface will operate at UDMA-4 speeds.

- PIO Mode 0 3.3 MB/s
- PIO Mode 1 5.2 MB/s
- PIO Mode 2 8.3 MB/s
- PIO Mode 3 11.1 MB/s
- PIO Mode 4 16.6 MB/s
- Multiword DMA Mode 0 4.1 MB/s
- Multiword DMA Mode 1 13.3 MB/s
- Multiword DMA Mode 2 16.6 MB/s
- Ultra DMA Mode 0 16.6 MB/s
- Ultra DMA Mode 1 25.0 MB/s
- Ultra DMA Mode 2 / ATA-33 33.3 MB/s
- Ultra DMA Mode 3 44.4 MB/s
- Ultra DMA Mode 4 / ATA-66 66.6 MB/s
- Ultra DMA Mode 5 / ATA-100 100.0 MB/s
- Ultra DMA Mode 6 / ATA-133 133.3 MB/s

Appendix A: Compatibility Testing

Validation Test Report for the TUSB6250

Test Environment:

- Device: TUSB6250 IDE to USB2.0 bridge for ATA/ATAPI applications, such as HDD / DVD-RW / CF / MO / ZIP drives
- Chip version: Released
- Firmware versions: V00.00.01.11: Default(ATA/ATAPI), Compact Flash, Dual Drive
- Driver versions: Microsoft latest default (WinXP/Win2000), Custom TI (Win98SE), Apple default (OS 10.3.4, OS 9.2.2, OS 8.6)
- Date of Report: 8/1/04

Additional Notes:

- There has been some testing on Linux Operating System that is not included in this report (see TUSB6250 FAQ for more information)
- Testing was done on earlier Mac OS X operating systems that is not included in this report.
- Additional compatibility testing was completed on a variety of USB 2.0 controllers, including VIA, NVDIA, ICH4, ICH5, SIS
- Testing has not been limited to the ATA/ATAPI devices in this report.
- Full speed and hub interoperability test was completed on this device, but is not included in this report.

Systems Used For Test			
System	**Description**	**USB Controller**	**OS**
1	P4 2GHz, 512MB	PCI: Adaptec (NEC)	Win98SE
2	P4 2GHz, 512MB	Native USB 2.0 - NEC	WinXP
3	P4 2GHz, 512MB	Native USB 2.0 - ICH4	WinME
4	P4 2GHz, 512MB	Native USB 2.0 - ICH4	WinXP
5	PII 400MHz, 256MB	PCI: Adaptec (NEC)	WinXP
6	PIII 600 MHz, 128MB	PCI: Orange Micro (NEC)	Win98SE
7	Dell 1.8GHz, 256MB	Native USB 2.0 - NEC	WinXP
8	PII 400MHz, 320MB	PCI: Orange Micro (NEC)	WinXP
9	PII 300MHz, 128MB	PCI: Adaptec (NEC)	Win2K
10	PII 200MHz, 128MB	PCI: Adaptec (NEC)	Win98SE
11	P4 2.26GHz, 500MB	Native USB 2.0 - ICH4	WinXP
12	Dell Celeron 700MHz, 128MB	Native USB 2.0 - NEC	WinXP
13	P4 1.7GHz, 256MB	Native USB 2.0 - ICH4	WinXP
14	AMD 1.26GHz, 256MB	Native USB 2.0 - SIS	WinXP
15	AMD 1.7GHz, 256MB	Native USB 2.0 - NVDIA	WinXP
16	P4 1.2GHz, 256MB	Native USB 2.0 - VIA	WinXP
17	Compaq Evo P4 2.26GHz, 512MB	Native USB 2.0 - ICH4	WinXP
18	Apple G4 Cube 450MHz, 128MB	USB 1.1 Only	Mac10.3.4
19	Apple G4 Cube 450MHz, 128MB	USB 1.1 Only	Mac 9.2.2
20	Apple Powerbook G3 400MHz, 64MB	USB 1.1 Only	Mac 9.2.2
21	Apple G4 Tower 733MHz, 256MB	PCI: Orange Micro (NEC)	Mac10.3.4
22	Apple G4 Tower 733MHz, 256MB	PCI: Orange Micro (NEC)	Mac 9.2.2
23	Apple G5 1.6GHz, 256MB	Native USB 2.0 Controller	Mac 10.3.4
24	Apple iMac 333MHz, 64MB	USB 1.1 Only	Mac 8.6.1

HDD Tests: Default Firmware

Device	Description
HDD1	Seagate 120G, Barracuda 7200.7
HDD2	Maxtor 40G, DiamondMax Plus 8
HDD3	Cornice SE, 1.5GB
HDD4	Seagate 160G
HDD5	Western Digital 200G, Caviar
HDD6	Western Digital 160G, Caviar
HDD7	Toshiba 2.5" 40G, HDD2170
HDD8	IBM 15G, Deskstar
HDD9	Seagate 40G, Barracuda 7200.7

Code	Description
X	Test Completed successfully
ns	Test not supported by device or system
\	Test not run.
n/a	Test not available, see notes.
F	Test fail, see notes.

Test #	Description
TST1	Format Drive
TST2	Read files
TST3	Write files
TST4	Play movies from HDD
TST5	Run stress test application
TST6	Reboot platform w/ device attached

This series of tests focused on Operating System compatibility:

Test: Device	System	TST1	TST2	TST3	TST4	TST5	TST6	NOTES
HDD1	20	X	X	X	X	n/a	X	Format works on partitioned drives only, later FW fix allows device to mount on 9.2.2
HDD1	21	X	X	X	X	n/a	X	Format works on partitioned drives only.
HDD1	23	X	X	X	X	n/a	X	Format works on partitioned drives only.
HDD1	2,4,5,7,8	X	X	X	X	X	X	
HDD1	9	X	X	X	X	X	X	
HDD2	20	X	X	X	X	n/a	X	Format works on partitioned drives only, later FW fix allows device to mount on 9.2.2
HDD2	18	X	X	X	X	n/a	X	Format works on partitioned drives only.
HDD2	21	X	X	X	X	n/a	X	Format works on partitioned drives only.
HDD2	2,4,5,7,8	X	X	X	X	X	X	
HDD2	9	X	X	X	X	X	X	
HDD2	1,10	X	X	X	X	X	X	
HDD2	3	X	X	X	X	X	X	
HDD3	23	X	X	X	X	n/a	X	Format works on partitioned drives only.
HDD3	21	X	X	X	X	n/a	X	Format works on partitioned drives only.
HDD3	2,4,5,7,8	X	X	X	X	X	X	
HDD3	9	X	X	X	X	X	X	
HDD3	1,10	X	X	X	X	X	X	
HDD3	3	X	X	X	X	X	X	
HDD4	18	X	X	X	X	n/a	X	Format works on partitioned drives only.
HDD4	2,4,5,7,8	X	X	X	X	X	X	
HDD4	9	X	X	X	X	X	X	
HDD4	1,10	X	X	X	X	X	X	
HDD5	2,4,5,7,8	X	X	X	X	X	X	
HDD5	9	X	X	X	X	X	X	
HDD5	3	X	X	X	X	X	X	
HDD6	22	X	X	X	X	n/a	X	Format works on partitioned drives only, later FW fix allows device to mount on 9.2.2

HDD6	20	X	X	X	X	n/a	X	Format works on partitioned drives only, later FW fix allows device to mount on 9.2.2
HDD6	23	X	X	X	X	n/a	X	Format works on partitioned drives only.
HDD6	21	X	X	X	X	n/a	X	Format works on partitioned drives only.
HDD6	2,4,5,7,8	X	X	X	X	X	X	
HDD6	9	X	X	X	X	X	X	
HDD7	23	X	X	X	X	n/a	X	Format works on partitioned drives only.
HDD7	21	X	X	X	X	n/a	X	Format works on partitioned drives only.
HDD7	2,4,5,7,8	X	X	X	X	X	X	
HDD7	9	X	X	X	X	X	X	
HDD7	1,10	X	X	X	X	X	X	
HDD7	3	X	X	X	X	X	X	
HDD8	19	X	X	X	X	n/a	X	Format works on partitioned drives only, later FW fix allows device to mount on 9.2.2
HDD8	24	ns	\	\	\	\	\	No Mass Storage Driver available, device does not mount
HDD8	2,4,5,7,8	X	X	X	X	X	X	
HDD8	9	X	X	X	X	X	X	
HDD8	1,10	X	X	X	X	X	X	
HDD8	3	X	X	X	X	X	X	
HDD9	20	X	X	X	X	n/a	X	Format works on partitioned drives only, later FW fix allows device to mount on 9.2.2
HDD9	23	X	X	X	X	n/a	X	Format works on partitioned drives only.
HDD9	21	X	X	X	X	n/a	X	Format works on partitioned drives only.
HDD9	2,4,5,7,8	X	X	X	X	X	X	
HDD9	9	X	X	X	X	X	X	

This series of tests focused on USB 2.0 host controller compatibility:

Test:		**TST1**	**TST2**	**TST3**	**TST4**	**TST5**	**TST6**	**NOTES**
Device	**System**							
HDD1	11	X	X	X	X	X	X	
HDD1	12	X	X	X	X	X	X	
HDD1	13	X	X	X	X	X	X	
HDD1	14	X	X	X	X	X	X	
HDD1	15	X	X	X	X	X	X	
HDD1	16	X	X	X	X	X	X	
HDD1	17	X	X	X	X	X	X	
HDD2	11	X	X	X	X	X	X	
HDD2	12	X	X	X	X	X	X	
HDD2	13	X	X	X	X	X	X	
HDD2	14	X	X	X	X	X	X	
HDD2	15	X	X	X	X	X	X	
HDD2	16	X	X	X	X	X	X	
HDD2	17	X	X	X	X	X	X	
HDD6	11	X	X	X	X	X	X	
HDD6	12	X	X	X	X	X	X	
HDD6	13	X	X	X	X	X	X	
HDD6	14	X	X	X	X	X	X	
HDD6	15	X	X	X	X	X	X	
HDD6	16	X	X	X	X	X	X	

HDD6	17	X	X	X	X	X	X
HDD8	11	X	X	X	X	X	X
HDD8	12	X	X	X	X	X	X
HDD8	13	X	X	X	X	X	X
HDD8	14	X	X	X	X	X	X
HDD8	15	X	X	X	X	X	X
HDD8	16	X	X	X	X	X	X
HDD8	17	X	X	X	X	X	X

ZIP / MO Tests: Default Firmware

Device	Description
ZIP1	Iomega Zip 750
MO1	Fujitsu

Test #	Description
TST1	Plug & Play w/o disk
TST2	Plug & Play w/ disk
TST3	Format disk
TST4	Read files
TST5	Write files
TST6	Run stress test application
TST7	Reboot platform w/ device attached

Code	Description
X	Test Completed successfully
ns	Test not supported by device or system
\	Test not run.
n/a	Test not available, see notes.
F	Test fail, see notes.

Test: Device	System	TST1	TST2	TST3	TST4	TST5	TST6	TST7	NOTES
MO1	1	X	X	X	X	X	X	X	
MO1	2	X	X	X	X	X	X	X	
MO1	3	X	X	X	X	X	X	X	
ZIP1	11	X	X	X	X	X	X	X	
ZIP1	12	X	X	X	X	X	X	X	
ZIP1	13	X	X	X	X	X	X	X	
ZIP1	14	X	X	X	X	X	X	X	
ZIP1	15	X	X	X	X	X	X	X	
ZIP1	16	X	X	X	X	X	X	X	
ZIP1	17	X	X	X	X	X	X	X	
ZIP1	1	X	X	X	X	X	X	X	
ZIP1	2	X	X	X	X	X	X	X	
ZIP1	3	X	X	X	X	X	X	X	
ZIP1	8	X	X	X	X	X	X	X	
ZIP1	9	X	X	X	X	X	X	X	
ZIP1	10	X	X	X	X	X	X	X	

DVD/CD Tests: Default Firmware

Device	Description
DVD/CD1	Ricoh MP9120A CD-RW/DVD-ROM
DVD/CD2	Pioneer DVR-105 DVD-R/RW
DVD/CD3	HP DVD+/-R/RW 420i
DVD/CD4	Sony DRU-500A DVD-/+R/RW
DVD/CD5	Toshiba SDR5002 DVD-R/RW

Code	Description
X	Test Completed successfully
ns	Test not supported by system.
\	Test not run.
n/a	Test not available, see notes.
F	Test fail, see notes.

Test #	Description
TST1	Plug & Play w/o disk
TST2	Plug & Play w/ disk
TST3	Read blank CD
TST4	Read audio CD
TST5	Read data CD
TST6	Read DVD-ROM
TST7	Read DVD Movie
TST8	Test Movie Functions
TST9	Read supported writeable media types
TST10	Erase CD-RW/DVD-RW
TST11	Write CD-R, CD-RW
TST12	Create and write Direct CD
TST13	Test File Manager CD Write
TST14	Write DVD-/+R, DVD-/+RW
TST15	Reboot platform w/ device attached

Test: Device	System	TST1	TST2	TST3	TST4	TST5	TST6	TST7	TST8	TST9	TST10	TST11	TST12	TST13	TST14	TST15	NOTES
DVD/CD1	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
DVD/CD1	8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
DVD/CD2	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
DVD/CD2	3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
DVD/CD3	7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
DVD/CD3	21	X	X	X	X	X	X	X	X	X	X	n/a	ns	ns	n/a	X	Need CD/DVD software for Apple
DVD/CD3	23	X	X	X	X	X	X	X	X	X	X	n/a	ns	ns	n/a	X	Need CD/DVD software for Apple
DVD/CD3	10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
DVD/CD3	9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
DVD/CD3	8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
DVD/CD4	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
DVD/CD4	3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
DVD/CD4	9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
DVD/CD4	10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
DVD/CD4	8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
DVD/CD5	2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Compact Flash Tests: Compact Flash Firmware

Device	Description
CF1	Magicstor 2.2GB
CF2	Hitachi Microdrive 2GB
CF3	SanDisk 128MB
CF4	Pretec 8 MB
CF5	Kingston 64MB
CF6	Lexar 64MB

Code	Description
X	Test Completed successfully
ns	Test not supported by device or system
\	Test not run.
n/a	Test not available, see notes.
F	Test fail, see notes.

Test #	Description
TST1	Plug & Play w/o disk
TST2	Plug & Play w/ disk
TST3	Reboot platform w/disk
TST4	Reboot platform w/o disk
TST5	Eject disk and insert new disk
TST6	Read files
TST7	Write files

Test: Device	System	TST1	TST2	TST3	TST4	TST5	TST6	TST7	NOTES
CF1	9	X	X	X	X	X	X	X	
CF1	23	X	X	X	X	X	X	X	
CF1	21	X	X	X	X	X	X	X	
CF1	5	X	X	X	X	X	X	X	
CF1	7	X	X	X	X	X	X	X	
CF1	8	X	X	X	X	X	X	X	
CF2	9	X	X	X	X	X	X	X	
CF2	23	X	X	X	X	X	X	X	
CF2	21	X	X	X	X	X	X	X	
CF2	5	X	X	X	X	X	X	X	
CF2	7	X	X	X	X	X	X	X	
CF2	8	X	X	X	X	X	X	X	
CF3	1	X	X	X	X	X	X	X	
CF3	3	X	X	X	X	X	X	X	
CF3	9	X	X	X	X	X	X	X	
CF3	10	X	X	X	X	X	X	X	
CF3	23	X	X	X	X	X	X	X	
CF3	21	X	X	X	X	X	X	X	
CF3	5	X	X	X	X	X	X	X	
CF3	7	X	X	X	X	X	X	X	
CF3	8	X	X	X	X	X	X	X	
CF4	1	X	X	X	X	X	X	X	
CF4	3	X	X	X	X	X	X	X	
CF4	9	X	X	X	X	X	X	X	
CF4	10	X	X	X	X	X	X	X	
CF5	1	X	X	X	X	X	X	X	
CF5	3	X	X	X	X	X	X	X	
CF5	9	X	X	X	X	X	X	X	
CF5	10	X	X	X	X	X	X	X	
CF6	1	X	X	X	X	X	X	X	
CF6	3	X	X	X	X	X	X	X	
CF6	9	X	X	X	X	X	X	X	
CF6	10	X	X	X	X	X	X	X	

Dual HDD Tests: Dual Device Firmware

Device	Description
HDD+HDD1	WD 6G, Quantum 20G
HDD+HDD2	Maxtor 40G, IBM 40G
HDD+CF1	Seagate 160G, Sandisk 128MB

Test #	Description
TST1	Format Drives
TST2	Read files
TST3	Write files
TST4	Copy files from one drive to another
TST5	Run stress test application
TST6	Reboot platform w/ device attached

Code	Description
X	Test Completed successfully
ns	Test not supported by device or system
\	Test not run.
n/a	Test not available, see notes.
F	Test fail, see notes.

Test:		TST1	TST2	TST3	TST4	TST5	TST6	NOTES
Device	**System**							
HDD+CF1	21	X	X	X	X	X	X	
HDD+CF1	9	X	X	X	X	X	X	
HDD+CF1	2	X	X	X	X	X	X	
HDD+CF1	8	X	X	X	X	X	X	
HDD+HDD1	21	X	X	X	X	X	X	
HDD+HDD1	9	X	X	X	X	X	X	
HDD+HDD1	2	X	X	X	X	X	X	
HDD+HDD1	7	X	X	X	X	X	X	
HDD+HDD2	21	X	X	X	X	X	X	
HDD+HDD2	9	X	X	X	X	X	X	
HDD+HDD2	2	X	X	X	X	X	X	
HDD+HDD2	8	X	X	X	X	X	X	

*Tests require a composite driver

Appendix B: Quickstart Guide to using TI TUSB6250 with Linux

Introduction

This Quickstart guide was written using Redhat 9.0. However, other distributions should be very similar in nature. Redhat 9.0 uses a 2.4.20 kernel.

The general rule is that the more recent the kernel version the better. We recommend our customers use production kernels only (e.g. 2.4.x & 2.6.x series are production kernels).

We also recommend that the user uses a distribution where USB support has been compiled into the kernel. This should not be a great inconvenience to the user since most distributions have supported USB for a number of years now. While a list of all distributions is beyond the scope of this document, a few of the major distributions have been listed below:

- Redhat 9.0
- SuSe 9.0
- Mandrake 10.0

Users can check the kernel version of a wide range of distributions at the following web site:
http://www.distrowatch.com/

This guide is broken up into a number of sections to deal with different types of media. The user is urged to read all sections, so they have a greater understanding of what is going on.

Using the 6250 with a HDD

1.1.1 Getting Drive Information

Plug in the 6250 device, and then take a look at the system log.

```
# dmesg -c

hub.c: new USB device 00:1d.7-3, assigned address 4
scsi3 : SCSI emulation for USB Mass Storage devices
  Vendor: USB 2.0   Model: USB HDD FW 01.10  Rev:
  Type:   Direct-Access                    ANSI SCSI revision: 02
Attached scsi disk sdc at scsi3, channel 0, id 0, lun 0
SCSI device sdc: 78242976 512-byte hdwr sectors (40060 MB)
 sdc: sdc1 sdc2 < sdc5 >
WARNING: USB Mass Storage data integrity not assured
USB Mass Storage device found at 4
```

You should see that the USB sub-system detected the device and loaded the USB Mass Storage device driver (usb-storage).
These system messages are important because they tell us that the device we just plugged has been given the device node /dev/sdc. We will use this information latter.

1.1.2 Inspection the USB /proc entries

You can do a few checks to see if the device has appeared in the proc file system. First look at the SCSI entries. e.g.

```
# cat /proc/scsi/scsi

Attached devices:
Host: scsi0 Channel: 00 Id: 00 Lun: 00
  Vendor: SAMSUNG  Model: CDRW/DVD SM-352B Rev: T802
  Type:   CD-ROM                   ANSI SCSI revision: 02
Host: scsi1 Channel: 00 Id: 00 Lun: 00
  Vendor: USB 2.0  Model: USB HDD FW 01.10 Rev:
  Type:   Direct-Access            ANSI SCSI revision: 02
Host: scsi2 Channel: 00 Id: 00 Lun: 00
  Vendor: IBM-DTLA Model: -305040         Rev: TW4O
  Type:   Direct-Access            ANSI SCSI revision: 02
Host: scsi3 Channel: 00 Id: 00 Lun: 00
  Vendor: USB 2.0  Model: USB HDD FW 01.10 Rev:
  Type:   Direct-Access            ANSI SCSI revision: 02
```

You can see that our USB 2.0 device appears as the entry scsi3.

Then check the usb-storage entry by using the following command:

```
# ls -la /proc/scsi/usb-storage-*
```

Depending on the number of USB storage devices you have previously used on the system, you will see something like this:

```
/proc/scsi/usb-storage-0:
total 0
dr-xr-xr-x    2 root     root            0 Mar 12 14:39 .
```

```
dr-xr-xr-x    7 root     root            0 Mar 12 14:39 ..
-rw-r--r--    1 root     root            0 Mar 12 14:39 1

/proc/scsi/usb-storage-1:
total 0
dr-xr-xr-x    2 root     root            0 Mar 12 14:39 .
dr-xr-xr-x    7 root     root            0 Mar 12 14:39 ..
-rw-r--r--    1 root     root            0 Mar 12 14:39 2

/proc/scsi/usb-storage-2:
total 0
dr-xr-xr-x    2 root     root            0 Mar 12 14:39 .
dr-xr-xr-x    7 root     root            0 Mar 12 14:39 ..
-rw-r--r--    1 root     root            0 Mar 12 14:39 3
```

You can get more information about each device by using the cat command and walking through the proc entries in each directory. Doing this you should be able to find more information on the device you just plugged in:

```
# cat /proc/scsi/usb-storage-2/3

  Host scsi3: usb-storage
    Vendor: Texas Instruments Incorporated
   Product: 6250 FW: 00.00.01.10.162AD403
Serial Number: None
  Protocol: Transparent SCSI
 Transport: Bulk
      GUID: 0451625f0000000000000000
  Attached: Yes
```

1.1.3 Finding Partition Information

You can also get information about the HDD partitions. Note that we are using the devices node name (/dev/sdc) which we previously discovered when using the dmesg command.

```
# fdisk -l /dev/sdc

Disk /dev/sdc: 40.0 GB, 40060403712 bytes
255 heads, 63 sectors/track, 4870 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes

   Device Boot    Start       End    Blocks   Id  System
/dev/sdc1             1      2611  20972826    c  Win95 FAT32 (LBA)
/dev/sdc2          2612      4870  18145417+   f  Win95 Ext'd (LBA)
/dev/sdc5          2612      4870  18145386    b  Win95 FAT32
```

The first few lines tell us about the drives geometry.
After that comes the partition table. This tells us that there are two partitions:

/dev/sdc1 [which is the primary partition]
/dev/sdc5 [which is on the secondary partition]

Both partitions have been formatted as FAT32.

1.1.4 Mounting the Drive

Now create a mount point. It is generally good practice to create mount points under the /mnt directory. In this case we will create a mount point called ums.

```
# mkdir /mnt/ums
```

Or you may wish to create a number of mount points to mount different partitions:

```
# mkdir /mnt/ums0
# mkdir /mnt/ums1
# mkdir /mnt/ums2
```

Now mount a partition. For this you should know the file system type the partition has been formatted as. For example in the above example the 1st partition is formatted as FAT32. The mount command to use is:

```
# mount -t vfat /dev/sdc1 /mnt/ums0
```

You can then examine the contents of the partition using the usual file system commands:

```
# cd /mnt/ums0
# ls -la
total 36
drwxr-xr-x    2 root     root        16384 Dec 31  1969 .
drwxr-xr-x    7 root     root         4096 Mar 12 14:47 ..
-rwxr-xr-x    1 root     root           12 Mar 12 10:49 hello1.txt
#
```

To mount the 1st extended FAT32 partition (if one exists), use:

```
# mount -t vfat /dev/sdc5 /mnt/ums5
# cd /mnt/ums5
# ls -la
total 36
drwxr-xr-x    2 root     root        16384 Dec 31  1969 .
drwxr-xr-x    9 root     root         4096 Mar 12 14:50 ..
-rwxr-xr-x    1 root     root           12 Mar 12 10:50 hello2.txt
```

1.1.5 Unmounting the Drive

You should always unmount all of the device's partitions before you unplug the device.
To do this use:

```
# umount /mnt/ums0
# umount /mnt/ums5
```

This will stop you loosing data.

Using the 6250 with a Compact Flash Reader

1.1.6 Getting Drive Information

Connect the 6250/CF board to the Linux machine via USB.
Check that the 6250 shows up as a USB device by using the cat command to look at the proc entries for USB devices:

```
# cat /proc/bus/usb/devices

T:  Bus=05 Lev=00 Prnt=00 Port=00 Cnt=00 Dev#=  1 Spd=12  MxCh= 2
B:  Alloc=  0/900 us ( 0%), #Int=  0, #Iso=  0
D:  Ver= 1.00 Cls=09(hub  ) Sub=00 Prot=00 MxPS= 8 #Cfgs=  1
P:  Vendor=0000 ProdID=0000 Rev= 0.00
S:  Product=USB UHCI Root Hub
S:  SerialNumber=d800
C:* #Ifs= 1 Cfg#= 1 Atr=40 MxPwr=  0mA
I:  If#= 0 Alt= 0 #EPs= 1 Cls=09(hub  ) Sub=00 Prot=00 Driver=hub
E:  Ad=81(I) Atr=03(Int.) MxPS=   8 Ivl=255ms
.
.
.
T:  Bus=01 Lev=01 Prnt=01 Port=02 Cnt=01 Dev#=  4 Spd=480 MxCh= 0
D:  Ver= 2.00 Cls=00(>ifc ) Sub=00 Prot=00 MxPS=64 #Cfgs=  1
P:  Vendor=0451 ProdID=625f Rev= 1.00
S:  Manufacturer=Texas Instruments Incorporated
S:  Product=6250 FW: 00.00.01.10.1ACAD402
S:  SerialNumber=FFFFFFFFFFFF
C:* #Ifs= 1 Cfg#= 1 Atr=c0 MxPwr=  4mA
I:  If#= 0 Alt= 0 #EPs= 2 Cls=08(stor.) Sub=06 Prot=50 Driver=usb-storage
E:  Ad=01(O) Atr=02(Bulk) MxPS= 512 Ivl=0ms
E:  Ad=82(I) Atr=02(Bulk) MxPS= 512 Ivl=0ms
```

You should be looking for lines that are similar to the following:

S: Manufacturer=Texas Instruments Incorporated
S: Product=6250 FW: 00.00.01.10.1ACAD402

1.1.7 Installing the sg3 Utilities

On an x86 platform you can download sg3_utils (if you do not already have them) from:

http://www.torque.net/sg/index.html

(See the 'Utilities: sg_utils and sg3_utils' section).

The author recommends downloading the binary RPM if possible.

Once you have download the RPM package then install the sg3_utils as follows:

```
# rpm -i sg3_utils-1.05-1.i386.rpm
```

If you are not using a x86 platform you will have to download the tarball and compile the sg3_util source for your platform.

1.1.8 Using the sg3 Utils

Now run the command sg_scan. You should see something like this:

```
# sg_scan –i

/dev/sg0: scsi0 channel=0 id=0 lun=0 [em]  type=5
   SAMSUNG   CDRW/DVD SM-352B  T802 [wide=0 sync=0 cmdq=0 sftre=0 pq=0x0]
/dev/sg1: scsi1 channel=0 id=0 lun=0 [em]  type=0
   USB 2.0   USB2 CF FW 01.10   [wide=0 sync=0 cmdq=0 sftre=0 pq=0x0]
```

This indicates that the "raw" SCSI device associated with your reader is /dev/sg1.

You can also confirm that the driver is working by looking at the file /proc/scsi/scsi .

```
# cat /proc/scsi/scsi

Attached devices:
Host: scsi0 Channel: 00 Id: 00 Lun: 00
  Vendor: SAMSUNG  Model: CDRW/DVD SM-352B Rev: T802
  Type:   CD-ROM                   ANSI SCSI revision: 02
Host: scsi1 Channel: 00 Id: 00 Lun: 00
  Vendor: USB 2.0  Model: USB HDD FW 01.10 Rev:
  Type:   Direct-Access            ANSI SCSI revision: 02
```

Now, run the command sg_map to determine the real SCSI device associated with your reader.
You should see output like this:

```
# sg_map

/dev/sg0  /dev/scd0
/dev/sg1  /dev/sda
```

This means that your Flash reader is /dev/sda. Note that in the above example the other node /dev/scd0 is assigned to the internal CD-ROM drive.

Now that we know the name of the SCSI disk device node that the 6250 is associated with (/dev/sda in the case of our example) then we can use some other tools to get more information about it.

1.1.9 Finding Partition Information

To get more information on the device and its partitions run the fdisk command:

```
# fdisk -l /dev/sda

Disk /dev/sda: 32 MB, 32047104 bytes
1 heads, 62 sectors/track, 1009 cylinders
Units = cylinders of 62 * 512 = 31744 bytes

   Device Boot    Start       End    Blocks   Id  System
/dev/sda1             2      1009     31248    4  FAT16 <32M
```

This means that the device has one partition (/dev/sda1) which is formatted as FAT16.

1.1.10 Formatting a Partition

If you need to format a partition then, depending on the type of file system you wish to use, you can use one of the following commands:

To format the partition as FAT32:

```
# mkfs -t vfat /dev/sda1
```

To format the partition as EXT2:

```
# mke2fs /dev/sda1
```

1.1.11 Mounting the Drive

To mount the device first make a mount point. For example:

```
# mkdir /mnt/cf
```

And then mount the device partition /dev/sda1 under the mount point /mnt/cf:

```
# mount -t vfat /dev/sda1 /mnt/cf
```

1.1.12 Unmounting the Drive

You should always unmount all of the device's partitions before you unplug the device.
To do this use:

```
# umount /mnt/cf
```

This will stop you loosing data.

Useful Links

Using a USB Compact Flash Reader in Linux
http://www.cs.sfu.ca/~ggbaker/personal/cf-linux

The Linux SCSI Generic (sg) Driver
http://www.torque.net/sg/index.html

USB Mass Storage Driver for Linux
http://www2.one-eyed-alien.net/~mdharm/linux-usb/

Linux USB Project
http://www.linux-usb.org/

SuSe Search portal
http://portal.suse.com/PM/page/search.pm

Linux-USB device overview
http://www.qbik.ch/usb/devices/

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