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***USB97C223/224***  
***USB 2.0 Flash Media Controller***  
**Software Performance and  
Compatibility Test Report**

Firmware Version: 360  
Windows 98/2000 Driver Version: 2.6.00  
Report Date: 9/17/2004

**Total Test Time Required: 316 Hours**

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## Test Environment

### Hardware:

Test Machine(s): (Include Host Controller Type, Motherboard Model, BIOS Version and Chipset)	Other Hardware:	Chipsets Used for Testing:
<p><b>Machine 1:</b> LAB-ML01 Bios: PHX Tech:ACPI Rev 1002B006 Mother board: ASUST A7N8X Rev 1002A Chipset: NVIDIA NFORCE 2 Rev A2 EHCI: NVIDIA USB 2.0 EHCI</p> <p><b>Machine 2:</b> LAB-RR02 Bios: American Megatrends Inc. Ver 1007.001 Mother board: ASUS Tek P4P800 Chipset : Intel i865P/PE/G EHCI: Intel 82801EB</p> <p><b>Machine 3:</b> LAB-DC2 Bios: PHX Tech:ACPI Rev 1002B006 Mother board:ASUST A7N8X Rev 1002A Chipset: NVIDIA NFORCE 2 Rev A2 EHCI: NVIDIA USB 2.0 EHCI</p> <p><b>Machine 4:</b> LAB-EH01 Bios: NVIDIA USB 2.0 EHCI Mother board: GIGABYTE GA-7VT600 1394 Chipset: VIA KT600 EHCI: VIA PCI to USB EHCI</p> <p><b>Machine 5:</b> LAB-NJ02 Bios: PHOENIX TECH Rev 1006 Mother board: ASUSTEK A7N8X2.0 Chipset: NVIDIA nForce2 EHCI: NEC PCI To USB EHCI</p> <p><b>Machine 6:</b></p>	<p>CF: Memorex-64MB,128MB CompUSA 16MB,48MB, 64MB Lexar- 32MB, 48MB, 64MB, 128MB, - 256MB, 512MB,1GB,2GB SanDisk- 32MB Kingmax- 8MB Delkin Devices- 640</p> <p>IMBMicroDrive: IBM-340MB,1GB</p> <p>MS: Lexar- 32MB, 64MB, 128MB SanDisk- 64MB Sony- 8MB, 16MB, 32MB, 64MB, 128MB</p> <p>High Speed MS: Sony-32MB,64MB,128MB</p> <p>MSPRO: Sony-512MB SanDisk-256MB, 1GB</p> <p>SD/MMC: I-O Data- 64MB SanDisk- 128MB,(64MB MMC) Lexar- 32MB,(16MB,32MB,64MB MMC) Panasonic- 512MB PNY-64MB</p> <p>Mini SD: Toshiba-32MB</p> <p>SM: Lexar- 16MB,32MB,64MB,128MB SanDisk- 128MB Memorex- 64MB, 128MB Kingston- 64MB Viking Components- 64MB PNY- 128MB</p> <p>XD: Olympus-32MB,128MB,256MB,512MB Fujifilm-64MB</p>	<p>Intel i845E Intel i865P/PE/G Intel i865P/PE/G/i848P Intel 865PE Intel i875P NVIDIA NFORCE 2 Rev A2 SiS648FX VIA KT600 VIA KT400 VIA P4X400(VT8754) Rev3 APPLE</p>
		<p><b>3<sup>rd</sup> Party Readers Used for Testing:</b></p> <p>ZiO SM, MS readers Dazzle reader I/O Interconnect reader Firewire readerImation FlashGO! 2.0</p>

### Software:

Drivers and Firmware	Application Software	Operating Systems
<p>Firmware USB97C223.0.360.hex USB97C224.0.360.hex</p> <p>MASS STORAGE CLASS DRIVER WINXP:MS - USBSTOR.SYS 5.1.2600.1243 WIN2K: MS -USBSTOR.SYS 5.00.2195.6655 WINME: MS -USBSTOR.SYS 4.90.3000.1 WIN98SE: SMSC - MASSWDM.SYS 2.5.0.0</p> <p>EHCI DRIVER: MS USBEHCI.SYS 5.1.2600.1243 MS USBEHCI.SYS 5.0.2195.6907 SIIG / OMI OUSBEHCI.SYS 2.1.4 OWC IUSBEHCI.SYS 1.0.3.0</p> <p>UHC DRIVER: WINXP: USBUHCI.SYS 5.1.2600.1243 WIN2K: UHCD.SYS 5.0.2195.6675 WINME UHCD.SYS 4.90.3000.1 WIN98SE: UHCD.SYS 4.10.2222</p>	<p>DFUTEST version 2.3.0.2 SFV32W.EXE version 1.0.350 Attributes Byte calculator version 14 Setlcon.exe 1.2.0.8 MAC SFV (10x) version 1.3 MacSFV (8x-9x) version 1.2 Bundled Software Production Line Descriptor Update Utility version 1.0.0.0 Production Line Test Utility version 1.0.0.5 Quick Test Production Line Utility Using Filter Driver version 1.0.0.3 Utility to Format MSPRO mediaversion 1.0.0.2 DFUTEST Applicationversion 2.3.0.2 DOSPLTU SMSC VERSION 1.4.0.0 USBDM.EXE VERSION 1.0.0.4 98SafeRemoval.exe 1.0.0.5</p>	<p>WINXP (SP1) WIN2K (SP4) WINME WIN98SE Macintosh OS 9.x, 10.x LINUX 2.4.20</p>

## **Testing Overview**

### **Standard for Certifying Firmware and Drivers**

The USB97C223/224 Test Suite consists of 19 separate functional testing areas designed to fully exercise the capabilities of the USB97C223/224 USB 2.0 Flash Media Controller chip. For a firmware and driver combination to be considered certified by the SMSC QA Test Laboratory, it must receive passing test results in each of the following functional test suites:

<b><u>Functional Test Suite</u></b>	<b><u>Operating Systems</u></b>
1. Installation	Windows 98, Me, 2000, XP
2. USBCV	Windows 2000 and XP Only
3. Compact Flash / IBM MD	Windows 98, Me, 2000, XP
4. Smart Media	Windows 98, Me, 2000, XP
5. XD	Windows 98, Me, 2000, XP
6. Secure Digital/MMC	Windows 98, Me, 2000, XP
7. Memory Stick / Memory Stick Pro	Windows 98, Me, 2000, XP
8. Multiple Device	Windows 98, Me, 2000, XP
9. Surprise Removal	Windows 2000 and XP Only
10. Load / Unload	Windows 98, Me, 2000, XP
11. Booting from USB	Windows XP Only
12. USB 1.1	Windows 98, Me, 2000, XP
13. WHQL (USB Removable Storage)	Windows XP Only
14. Chapter 9 Current Measurement	Windows XP Only
15. Bundled Software	Windows 98, Me, 2000, XP
16. DFU / Descriptor Update	Windows 98, Me, 2000, XP
17. C3 – Attach on Insert	Windows 98, Me, 2000, XP
18. Memory Stick Compatibility	Windows XP Only
19. Macintosh OS Specific	Mac OS 9.2, 10.2, 10.3

A new firmware – driver combination must pass all test suites, including WHQL for every operating system listed, to be considered certified. Note that this standard does not apply to beta software released for evaluation purposes.

## **Test Results**

Test Technician: Munabo Lwali  
Test Technician: Matt Seitzer

Test Technician: Shilpa Siva  
Test Technician: Mark McLaughlin

### **Test Suite Results Summary**

<b>Test Suite</b>	<b>Windows 98</b>	<b>Windows Me</b>	<b>Windows 2000</b>	<b>Windows XP</b>
# 1 Installation	Pass	Pass	Pass	Pass
# 2 USBCV	Not Supported	Not Supported	Pass	Pass
# 3 Compact Flash / IBM MicroDrive	Pass	Pass	Pass	Pass
# 4 Smart Media	Pass	Pass	Pass	Pass
# 5 XD	Pass	Pass	Pass	Pass
# 6 Secure Digital / Multimedia Card	Pass	Pass	Pass	Pass
# 7 Memory Stick / Memory Stick Pro	Pass	Pass	Pass	Pass
# 8 Multiple Device	Pass	Pass	Pass	Pass
# 9 Surprise Removal	N/A	N/A	Pass	Pass
# 10 Load / Unload	Pass	Pass	Pass	Pass
# 11 Booting from USB	N/A	N/A	N/A	Pass
# 12 USB 1.1	Pass	Pass	Pass	Pass
# 13 WHQL	N/A	N/A	N/A	Pass
#14 Chapter 9 Current Measurements	N/A	N/A	N/A	Pass
#15 Bundled Software	Pass	Pass	Pass	Pass
#16 DFU and Descriptor Update	Pass	Pass	Pass	Pass
#17 C3 – Attach on Insert	Pass	Pass	Pass	Pass
#18 Memory Stick Compatibility	N/A	N/A	N/A	Pass
	<b>Mac OS 9.2</b>	<b>Mac OS 10.2</b>	<b>Mac OS 10.3</b>	
#19 Macintosh OS Specific	Pass	Pass	Pass	

## **Testing Observations and Comments**

**Comments:** Explanation of any marginal or failing results from the Test Suite Results Matrix above, along with any other comments concerning the results of testing:

## **Test Completion Dates**

The test suites were completed for each operating system on the dates indicated below:

Test Suite		Win98	Testers Initials	WinMe	Testers Initials	Win2K	Testers Initials	WinXP	Testers Initials
# 1	Installation	9/14/04	ML	9/16/04	MM	9/8/04	ML	9/7/04	MM
# 2	USBCV	N/A	N/A	N/A	N/A	9/8/04	ML	9/10/04	MM
# 3	Compact Flash	9/16/04	SS	4/2/04	DC	9/14/04	SS	9/14/04	SS
# 4	Smart Media	9/16/04	SS	9/16/04	ML	9/9/04	MM	9/8/04	MM
# 5	XD	9/16/04	SS	9/16/04	ML	9/9/04	MM	9/8/04	MM
# 6	Secure Digital	9/16/04	SS	4/5/04	DC	9/14/04	SS	9/14/04	SS
# 7	Memory Stick	4/1/04	DC	4/5/04	DC	9/10/04	ML	9/7/04	MM
# 8	Multiple Device	9/15/04	ML	4/6/04	ML	9/10/04	ML	9/10/04	MM
# 9	Surprise Removal	N/A	N/A	N/A	N/A	9/8/04	ML	9/10/04	MM
# 10	Load / Unload	9/14/04	ML	9/14/04	MM	9/9/04	ML	9/8/04	MM
# 11	Bootimg from USB	N/A	N/A	N/A	N/A	N/A	N/A	9/8/04	MM
# 12	USB 1.1	4/7/04	DC	9/16/04	MM	9/13/04	ML	9/15/04	MM
# 13	WHQL (USB)	N/A	N/A	N/A	N/A	N/A	N/A	9/9/04	ML
#14	Chapter 9 Current Measurement	N/A	N/A	N/A	N/A	N/A	N/A	9/8/04	ML
#15	Bundled Software	9/16/04	ML	9/16/04	ML	9/13/04	ML	9/15/04	ML
#16	DFU and Descriptor Update	4/2/04	ML	9/16/04	ML	9/13/04	ML	9/15/04	MM
#17	C3 – Attach on Insert	9/14/04	ML	4/2/04	ML	9/9/04	ML	9/8/04	MM
#18	Memory Stick Compatibility	N/A	N/A	N/A	N/A	N/A	N/A	9/9/04	SS
		<b>MacOS 9.2</b>	Testers Initials	<b>MacOS 10.2</b>	Testers Initials	<b>MacOS 10.3</b>	Testers Initials		
#19	Macintosh OS Specific	9/17/04	CC	9/17/04	CC	9/13/04	MS		

## **Test Suite #1- Installation**

### **Overview**

This test suite evaluates the installation procedures for the USB97C223. In order to pass this suite, the following conditions must be met:

1. The operating system correctly identifies all supported flash media devices on attach.
2. Under Windows Me, 2000 (SP 3 or above) and XP, the OS automatically loads the native Windows Mass Storage Class driver. (Windows 98 and 2000 (SP2 and below) require the user to provide the SMSC MSC driver with multiple LUN support.)
3. All drivers load normally with no blue screens or system freezes before, during or after they are loaded.
4. The system does not request or require a restart after the drivers have been loaded.
5. No devices appear in the device manager with yellow exclamation marks next to them (yellow banded.)
6. The device does not blue screen the host before, during or after a system restart. After a system restart, the device is re-enumerated normally.
7. After installation, all device entries appear correctly in the device manager, showing the correct vendor, date and version information.

### **Test Suite #1 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p>Make sure there are no previous installations of the USB97C223 on the host system. For Windows 98 and 2000 (SP2 and below), run the driver installation utility and verify that it completes normally.</p> <p><b>Self-Powered Pre Plug:</b> With no media inserted in any of the media slots, attach the USB cable to the host and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p>	Pass	Pass	Pass	Pass	



2	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Again, with no media inserted in any of the media slots, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p>	Pass	Pass	Pass	Pass	
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### Test Suite #1 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Smart Media (SM) card into the SM slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SM card can be read from and written to by transferring a small file from the host to the SM card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	

4	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same SM card inserted in the SM slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SM card can be read from and written to by transferring a small file from the host to the SM card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat steps 3 and 4 using a XD card.</p>	Pass	Pass	Pass	Pass	
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## Test Suite #1 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
5	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Compact Flash (CF) card into the CF slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the CF card can be read from and written to by transferring a small file from the host to the CF card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
6	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same CF card inserted in the CF slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the CF card can be read from and written to by transferring a small file from the host to the CF card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat steps 5 and 6 with an IBM MicroDrive.</p>	Pass	Pass	Pass	Pass	

## Test Suite #1 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
7	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Secure Digital (SD) card into the SD slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SD card can be read from and written to by transferring a small file from the host to the SD card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
8	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same SD card inserted in the SD slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SD card can be read from and written to by transferring a small file from the host to the SD card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	

## Test Suite #1 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
9	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Multimedia Card (MMC) into the MMC slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MMC card can be read from and written to by transferring a small file from the host to the MMC card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
10	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same MMC card inserted in the MMC slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MMC card can be read from and written to by transferring a small file from the host to the MMC card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	

## Test Suite #1 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1 1	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Memory Stick (MS) card into the MS slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MS card can be read from and written to by transferring a small file from the host to the MS card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
1 2	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same MS card inserted in the MS slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MS card can be read from and written to by transferring a small file from the host to the MS card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat steps 11 and 12 with Memory Stick Pro media.</p>	Pass	Pass	Pass	Pass	

### Test Suite #1 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1 3	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self Powered Pre Plug:</b> Insert IBM MD, SM, SD, MMC and MS Pro cards into their respective slots, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that all of the cards can be read from and written to by transferring a small file from the host to each card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
1 4	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Leave the same flash media cards inserted in their slots, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that all of the cards can be read from and written to by transferring a small file from the host to each card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat steps 13 and 14 using CF, XD, MMC, and MS cards</p>	Pass	Pass	Pass	Pass	
1 5	<p><b>Eject and Remove-</b> With media inserted in each reader slot, test the Right-Click eject functionality for each device. Check to see that no error message is displayed, and that the host reports no media present when trying to access it after the eject.</p>	Pass	Pass	Pass	Pass	

## **Test Suite #2- USB Command Verifier (USBCV)**

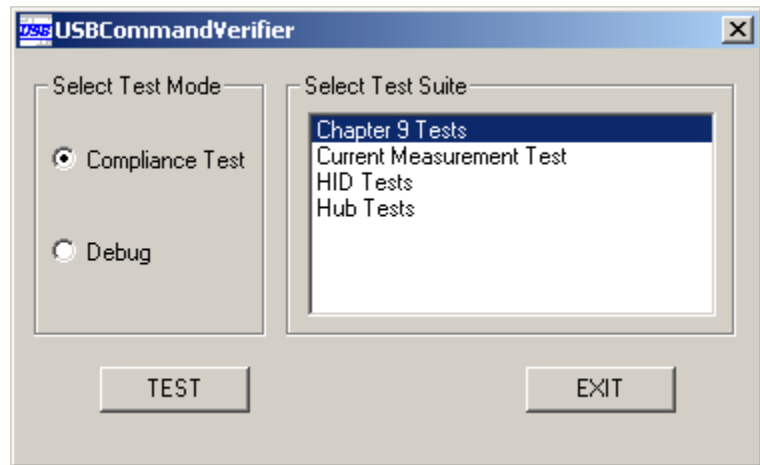
### **Overview**

This test suite utilizes the USB Command Verifier Compliance Tool provided by USB.org, to ensure that the USB97C223 complies with Chapter 9 of the USB 2.0 specification. The latest version of the tool is available at <http://www.usb.org/developers/tools.html>. The USBCV is currently only supported under Windows 2000 and XP, so testing under Windows 98 and Millennium is not performed for this test suite. In order for the device to pass this suite, it must successfully pass all Chapter 9 tests.

### **Test Suite #2 Results**

#	Test Standard	Windows 2000	Windows XP	Comments
1	The device passes all Chapter 9 tests of the Compliance Utility. Passing logs are generated showing no failures. Save the .htm test output for inclusion with this test report.	Pass	Pass	

**USB Command Verifier  
Chapter 9 Tests**





## **Test Suite #3- Compact Flash / IBM MicroDrive**

### **Overview**

This test suite evaluates the performance and function of the USB97C223 with various Type I and II Compact Flash devices, including the IBM Microdrive. All tests below are performed using a USB 2.0 host controller. Each device is checked to verify proper operation with the USB97C223 firmware and drivers under normal and abnormal operating conditions. A 690 MB CD test disk is required for these tests. The test disk contains various files ranging in size from 10 bytes to 300 megabytes, with an accompanying SFV file, which contains a calculated checksum (CRC) for each file.

### **Test Suite #3 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>CF Writes-</b> Insert a 16 MB CF card into the CF slot on the USB97C223 board. Verify that the correct capacity is shown for the CF card.</p> <p>Open the test files disk in Windows Explorer and sort the test files by size in ascending order. Starting with the smallest size file, select enough of the test files to fill the CF card. Transfer the files to the CF card.</p> <p>Once the files have been written, eject the media and place it in a 3<sup>rd</sup> party flash reader. Use WinSFV to check the CRC of each file to ensure that the data was not corrupted during the transfer.</p>	Pass	Pass	Pass	Pass	
2	<p><b>CF Insert/Remove-</b> Double click the 223 CF drive icon in Windows Explorer. Verify that the OS reports no media present. Reinsert the CF card and check to see that the OS recognizes that a card was inserted. Verify that the contents of the card can be read by transferring a file to the host.</p> <p>Repeat this procedure three times verifying that the media insert and removal is detected correctly each time.</p>	Pass	Pass	Pass	Pass	

### Test Suite #3 Results

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<b>CF Reads-</b> Using the same CF card, transfer all of the files that were previously written to the card back to the host. Once the read is complete, CRC check the files on the host to ensure there was no corruption of the data during transfer.	Pass	Pass	Pass	Pass	
4	<b>CF Write, Insert/Remove, Read-</b>  Repeat tests 1 through 3 for the following devices: 8MB CF, 32MB CF, 64MB CF, 128MB CF, 256MB CF, 512MB CF, 1GB CF, 2GB CF, 340MB IBM MicroDrive, and the 1GB IBM MicroDrive.	<b>8MB CF</b> Pass  <b>64MB CF</b> Pass  <b>256MB CF</b> Pass  <b>1GB CF</b> Pass  <b>340MB MD</b> Pass	<b>32MB CF</b> Pass  <b>128MB CF</b> Pass  <b>512MB CF</b> Pass  <b>2GB CF</b> Pass  <b>1GB MD</b> Pass	<b>8MB CF</b> Pass  <b>64MB CF</b> Pass  <b>256MB CF</b> Pass  <b>1GB CF</b> Pass  <b>340MB MD</b> Pass	<b>32MB CF</b> Pass  <b>128MB CF</b> Pass  <b>512MB CF</b> Pass  <b>2GB CF</b> Pass  <b>1GB MD</b> Pass	

## **Test Suite #4- Smart Media**

### **Overview**

This test suite evaluates the performance and function of the USB97C223 with various density Smart Media flash memory cards. All tests below are performed using a USB 2.0 host controller. A 690 MB CD test disk is required for these tests. The test disk contains various files ranging in size from 10 bytes to 300 megabytes, with an accompanying SFV file, which contains a calculated checksum (CRC) for each file.

### **Test Suite #4 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>SM Writes-</b> Insert an 8 MB SM card into the SM slot on the USB97C223 board. Verify that the correct capacity is shown for the SM card.</p> <p>Open the test files disk in Windows Explorer and sort the test files by size in ascending order. Starting with the smallest size file, select enough of the test files to fill the SM card. Transfer the files to the SM card.</p> <p>Once the files have been written, eject the media and place it in a 3<sup>rd</sup> party flash reader. Use WinSFV to check the CRC of each file to ensure that the data was not corrupted during the transfer.</p>	Pass	Pass	Pass	Pass	
2	<p><b>SM Insert/Remove-</b> Double click the 223 SM drive icon in Windows Explorer. Verify that the OS reports no media present. Reinsert the SM card and check to see that the OS recognizes that a card was inserted. Verify that the contents of the card can be read by transferring a file to the host.</p> <p>Repeat this procedure three times verifying that the media insert and removal is detected correctly each time.</p>	Pass	Pass	Pass	Pass	

## Test Suite #4 Results

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<b>SM Reads-</b> Using the same SM card, transfer all of the files that were previously written to the card back to the host. Once the read is complete, CRC check the files on the host to ensure there was no corruption of the data during transfer.	Pass	Pass	Pass	Pass	
4	<b>SM/XD Write, Insert/Remove, Read-</b>  Repeat tests 1 through 3 for the following media: 16MB SM, 32MB SM, 64MB SM, 128MB SM, 256MB SM.  <b>Note:</b> If there is not a 256MB SM available, a XD to SM adapter with a 256MB XD card inserted may be used.	<b>16MB SM</b> Pass  <b>32MB SM</b> Pass  <b>64MB SM</b> Pass  <b>128MB SM</b> Pass  <b>256MB SM</b> Pass	<b>16MB SM</b> Pass  <b>32MB SM</b> Pass  <b>64MB SM</b> Pass  <b>128MB SM</b> Pass  <b>256MB SM</b> Pass	<b>16MB SM</b> Pass  <b>32MB SM</b> Pass  <b>64MB SM</b> Pass  <b>128MB SM</b> Pass  <b>256MB SM</b> Pass	<b>16MB SM</b> Pass  <b>32MB SM</b> Pass  <b>64MB SM</b> Pass  <b>128MB SM</b> Pass  <b>256MB SM</b> Pass	
5	<b>SM MPEG Playback</b>  Insert a 64 MB SM card into the 223. From Windows Explorer, perform a Full Format of the media. Copy a MPEG video file that is larger than 15MB to the SM card. Once copy has completed, unplug device. Reattach the device and play the file that was copied to the card. Verify that the file is played back properly. The file should not skip or freeze.  <b>Note:</b> In 223 any skipping or freezing is prevented by the software. If 223 hardware is used there will be a glitch seen if the Attribute bit that determines if the Status Byte Check is bypassed for SM is set to 0. There will be no skipping or freezing if this bit is set to 1. (Attribute byte 2 bit 7). Verify that there is a glitch seen with this bit set to 0 and not seen when this bit is set to 1.	Pass	Pass	Pass	Pass	

### Test Suite #4 Results

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
6	<p><b>1-bit ECC</b> Insert a SM card with a 1-bit ECC error on it into the 223 device. Connect the 223 to the computer via a 2.0 host controller. Verify that the card contents can be read properly.</p> <p>Inset a SM card with a 2-bit ECC error on it into the 223 device. Verify that the card contents cannot be read properly.</p> <p>Repeat this step using a 1.1 host controller to connect the 223 to the computer and having attribute byte 2, bit 6 set.</p>	Pass	Pass	Pass	Pass	
7	<p><b>CIS Check</b> Set the bit for "Don't Perform Smart Media CIS checking" to 1. (Attribute byte 2, bit 0) This will <b>disable the CIS checking</b> required by the SM spec.</p> <p>Insert a SM card with a corrupt CIS block into the 223 device. Connect the 223 to the computer via a 2.0 host controller. Verify that the card <b>contents can be read</b> properly.</p> <p>Clear the bit for "Don't Perform Smart Media CIS checking"(i.e. set it to zero) This will <b>enable the CIS checking</b> required by the SM spec.</p> <p>Insert a SM card with a corrupt CIS block into the 223 device. Connect the 223 to the computer via a 2.0 host controller. Verify that the card <b>contents cannot be read</b>.</p>	Pass	Pass	Pass	Pass	
8	<p><b>SM Write Protect-</b> Enable the write protect on a 32MB SM card, and insert it into the SM slot on the 223. Check to see that the media is detected properly, and then attempt to copy a file from the host to the SM card. The OS should report that the copy could not be performed.</p> <p>Attempt to format the SM card. The OS should report that the format could not be completed.</p>	Pass	Pass	Pass	Pass	

## **Test Suite #5 - XD**

### **Overview**

This test suite evaluates the performance and function of the USB97C224 with various density XD flash memory cards. All tests below are performed using a USB 2.0 host controller. A 690 MB CD test disk is required for these tests. The test disk contains various files ranging in size from 10 bytes to 300 megabytes, with an accompanying SFV file, which contains a calculated checksum (CRC) for each file.

### **Test Suite #5 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>XD Writes-</b> Insert a 16 MB XD card into the XD slot on the USB97C224 board. Verify that the correct capacity is shown for the XD card.</p> <p>Open the test files disk in Windows Explorer and sort the test files by size in ascending order. Starting with the smallest size file, select enough of the test files to fill the XD card. Transfer the files to the XD card.</p> <p>Once the files have been written, eject the media and place it in a 3<sup>rd</sup> party flash reader. Use WinSFV to check the CRC of each file to ensure that the data was not corrupted during the transfer.</p>	Pass	Pass	Pass	Pass	
2	<p><b>XD Insert/Remove-</b> Double click the 224 XD drive icon in Windows Explorer. Verify that the OS reports no media present. Reinsert the XD card and check to see that the OS recognizes that a card was inserted. Verify that the contents of the card can be read by transferring a file to the host.</p> <p>Repeat this procedure three times verifying that the media insert and removal is detected correctly each time.</p>	Pass	Pass	Pass	Pass	

### Test Suite #5 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<b>XD Reads-</b> Using the same XD card, transfer all of the files that were previously written to the card back to the host. Once the read is complete, CRC check the files on the host to ensure there was no corruption of the data during transfer.	Pass	Pass	Pass	Pass	
4	<b>XD Write, Insert/Remove, Read-</b>  Repeat tests 1 through 3 for the following media: 32MB XD, 64MB XD, 128MB XD, 256MB XD, 512MB XD.	<b>32MB XD</b> Pass  <b>64MB XD</b> Pass  <b>128MB XD</b> Pass  <b>256MB XD</b> Pass  <b>512MB XD</b> Pass	<b>32MB XD</b> Pass  <b>64MB XD</b> Pass  <b>128MB XD</b> Pass  <b>256MB XD</b> Pass  <b>512MB XD</b> Pass	<b>32MB XD</b> Pass  <b>64MB XD</b> Pass  <b>128MB XD</b> Pass  <b>256MB XD</b> Pass  <b>512MB XD</b> Pass	<b>32MB XD</b> Pass  <b>64MB XD</b> Pass  <b>128MB XD</b> Pass  <b>256MB XD</b> Pass  <b>512MB XD</b> Pass	
5	<b>CIS Check</b>  Set the bit for "Don't Perform Smart Media CIS checking" to 1. (Attribute byte 2, bit 0) This will <b>disable the CIS checking</b> required by the SM spec.  Insert a XD card with a corrupt CIS block into the 224 device. Connect the 224 to the computer via a 2.0 host controller. Verify that the card <b>contents can be read</b> properly.  Clear the bit for "Don't Perform Smart Media CIS checking"(i.e. set it to zero) This will <b>enable the CIS checking</b> required by the SM spec.  Insert a XD card with a corrupt CIS block into the 224 device. Connect the 224 to the computer via a 2.0 host controller. Verify that the card <b>contents cannot be read</b> .	Pass	Pass	Pass	Pass	

## **Test Suite #6- Secure Digital / Multimedia Card**

### **Overview**

This test suite evaluates the performance and function of the USB97C223 with various density Secure Digital and Multimedia Card flash memory. All tests below are performed using a USB 2.0 host controller. A 690 MB CD test disk is required for these tests. The test disk contains various files ranging in size from 10 bytes to 300 megabytes, with an accompanying SFV file, which contains a calculated checksum (CRC) for each file.

### **Test Suite #6 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>SD Writes-</b> Turn off the write protection switch on a 32 MB SD card, and insert the card into the SD slot on the USB97C223 board. Verify that the correct capacity is shown for the SD card.</p> <p>Open the test files disk in Windows Explorer and sort the test files by size in ascending order. Starting with the smallest size file, select enough of the test files to fill the SD card. Transfer the files to the SD card.</p> <p>Once the files have been written, eject the media and place it in a 3<sup>rd</sup> party flash reader. Use WinSFV to check the CRC of each file to ensure that the data was not corrupted during the transfer.</p>	Pass	Pass	Pass	Pass	
2	<p><b>SD Insert/Remove-</b> Double click the 223 SD drive icon in Windows Explorer. Verify that the OS reports no media present. Reinsert the SD card and check to see that the OS recognizes that a card was inserted. Verify that the contents of the card can be read by transferring a file to the host.</p> <p>Repeat this procedure three times verifying that the media insert and removal is detected correctly each time.</p>	Pass	Pass	Pass	Pass	



## Test Suite #6 Results

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<b>SD Reads-</b> Using the same SD card, transfer all of the files that were previously written to the card back to the host. Once the read is complete, CRC check the files on the host to ensure there was no corruption of the data during transfer.	Pass	Pass	Pass	Pass	
4	<b>SD/MMC Write, Insert/Remove, Read-</b>  Repeat tests 1 through 3 for the following media: 64MB SD, 128MB SD, 256MB SD, 512MB SD, 16MB MMC, 32MB MMC, 64MB MMC, 128MB MMC, and 256MB MMC.	128MB SD Pass  512MB SD Pass  32MB MMC Pass  128MB MMC Pass  256MB MMC Pass	64MB SD Pass  256MB SD Pass  16MB MMC Pass  64MB MMC Pass  256MB MMC Pass	128MB SD Pass  512MB SD Pass  32MB MMC Pass  128MB MMC Pass  256MB MMC Pass	64MB SD Pass  256MB SD Pass  16MB MMC Pass  64MB MMC Pass  256MB MMC Pass	
7	<b>SD Write Protect-</b>  Enable the write protect switch on a 32MB SD card, and insert it into the SD slot on the 223. Check to see that the media is detected properly, and then attempt to copy a file from the host to the SD card. The OS should report that the copy could not be performed.	SD Pass	SD Pass	SD Pass	SD Pass	

## **Test Suite #7- Memory Stick / Memory Stick Pro**

### **Overview**

This test suite evaluates the performance and function of the USB97C223 with various capacity Memory Stick and Memory Stick Pro flash memory cards. All tests below are performed using a USB 2.0 host controller. A 690 MB CD test disk is required for these tests. The test disk contains various files ranging in size from 10 bytes to 300 megabytes, with an accompanying SFV file, which contains a calculated checksum (CRC) for each file.

### **Test Suite #7 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>MS Writes-</b> Turn off the write protection switch on a 16 MB MS card, and insert the card into the MS slot on the USB97C223 board. Verify that the correct capacity is shown for the MS card.</p> <p>Open the test files disk in Windows Explorer and sort the test files by size in ascending order. Starting with the smallest size file, select enough of the test files to fill the MS card. Transfer the files to the MS card.</p> <p>Once the files have been written, eject the media and place it in a 3<sup>rd</sup> party flash reader. Use WinSFV to check the CRC of each file to ensure that the data was not corrupted during the transfer.</p>	Pass	Pass	Pass	Pass	
2	<p><b>MS Insert/Remove-</b> Double click the 223 MS drive icon in Windows Explorer. Verify that the OS reports no media present. Reinsert the MS card and check to see that the OS recognizes that a card was inserted. Verify that the contents of the card can be read by transferring a file to the host.</p> <p>Repeat this procedure three times verifying that the media insert and removal is detected correctly each time.</p>	Pass	Pass	Pass	Pass	

### Test Suite #7 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<b>MS Reads-</b> Using the same MS card, transfer all of the files that were previously written to the card back to the host. Once the read is complete, CRC check the files on the host to ensure there was no corruption of the data during transfer.	Pass	Pass	Pass	Pass	
4	<b>MS Write, Insert/Remove, Read-</b>  Repeat tests 1 through 3 for the following media: 8MB MS, 64MB MS, 128MB MS, 256MB MS, 256MB MS Pro, 512MB MS Pro, 1GB MS Pro.	8MB MS Pass 32MB MS Pass 128MB MS Pass 256MB MS Pro Pass 512MB MS Pro Pass	8MB MS Pass 64MB MS Pass 256MB MS Pass 256MB MS Pro Pass 1GB MS Pro Pass	8MB MS Pass 32MB MS Pass 128MB MS Pass 256MB MS Pro Pass 512MB MS Pro Pass	8MB MS Pass 64MB MS Pass 256MB MS Pass 256MB MS Pro Pass 1GB MS Pro Pass	
5	<b>MS Write Protect-</b> Enable the write protect switch on a 32MB MS card, and insert it into the MS slot on the 223. Check to see that the media is detected properly, and then attempt to copy a file from the host to the card. The OS should report that the copy could not be performed.	Pass	Pass	Pass	Pass	
6	<b>MS Write Pro Protect-</b> Enable the write protect switch on a 512MB MS Pro card, and insert it into the MS slot on the 223. Check to see that the media is detected properly, and then attempt to copy a file from the host to the card. The OS should report that the copy could not be performed.	Pass	Pass	Pass	Pass	
7	<b>1-bit ECC</b> Insert a MS card with a 1-bit ECC error on it into the 223 device. Connect the 223 to the computer via a 2.0 host controller. Verify that the card contents can be read properly.  Insert a MS card with a 2-bit ECC error on it into the 223 device. Verify that the card contents cannot be read.  Repeat this step using a 1.1 host controller.	Pass	Pass	Pass	Pass	

## **Test Suite #8- Multiple Device**

### **Overview**

This test suite evaluates the performance and function of multiple USB97C223 devices attached to a single host. All tests below are performed using a USB 2.0 host controller. The focus of this testing is to ensure interoperability between all devices when more than one USB97C223 device is running on the same host.

### **Test Suite #8 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>Host to B1, B2-</b> Attach two USB97C223 boards to the host via the same host controller. Verify that both boards enumerate properly.</p> <p>Insert CF cards containing test data files, in the CF slots on both boards. Verify that you can read from and write to both cards individually. simultaneously transfer a couple large files from the host to the CF cards on both boards. Verify that the transfer completes normally.</p> <p>Repeat this procedure using IBM MD, SM, XD, SD, MMC, MS, and MS Pro cards. Also test writing to different cards on each board simultaneously (i.e. SM on board 1 and CF on board 2.)</p>	Pass	Pass	Pass	Pass	
2	<p><b>B1, B2 to Host-</b> Next Using the same boards and test setup as Test #1 above, simultaneously transfer a large file from each of the cards to the host. Verify that the transfer completes normally.</p> <p>Repeat this procedure using IBM MD, SM, XD, SD, MMC, MS, and MS Pro cards. Also test reading from different cards on each board simultaneously (i.e. MS on board 1 and SD on board 2.)</p>	Pass	Pass	Pass	Pass	

## Test Suite #8 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<p><b>B1 to B2-</b> Again using the same boards and test setup as Test #1, transfer a series of test files (large and small) from the CF card on board 1, to the CF card on board 2.</p> <p>Repeat this procedure using IBM MD, SM, XD, SD, MMC, MS, and MS Pro cards. Also test writing to different cards on board 2 (i.e. SM on board 1 to CF on board 2.)</p>	Pass	Pass	Pass	Pass	
4	<p><b>B1 to Host / Host to B2-</b> Using the same test setup, transfer a test file from the CF card on board 1 to the host, while at the same time transferring a separate file from the host to the CF card on board 2.</p> <p>Repeat this procedure using IBM MD, SM, XD, SD, MMC, MS, and MS Pro cards. Also test reading from and writing to different cards on each board (i.e. SM on board 1 to host, host to CF on board 2.)</p>	Pass	Pass	Pass	Pass	
5	<p><b>B1 to Host / Host to B1-</b> Leave both boards attached to the host, but for this test you will be performing all of the reads/writes on one board only.</p> <p>Insert CF and SM cards into their respective slots on the 223. Copy a large file from the CF to the host, and copy another large file from the host to the SM. Repeat this test using all possible combinations of media, for both reads and writes. Ensure that all transfers complete normally.</p>	Pass	Pass	Pass	Pass	

## **Test Suite #9- Surprise Removal**

### **Overview**

This test suite evaluates the performance and function of the USB97C223 with media and USB cable surprise removals. All tests below are performed using a USB 2.0 host controller. Each device is checked to verify proper operation with the USB97C223 firmware and drivers under normal and abnormal operating conditions. A 690 MB CD test disk is required for these tests. The test disk contains various files ranging in size from 10 bytes to 300 megabytes, with an accompanying SFV file, which contains a calculated checksum (CRC) for each file.

### **Test Suite #9 Results**

#	Test Standard	Windows 2000	Windows XP	Comments
1	<b>CF Surprise Removal (USB)-</b>			
	<b>Write-</b> Insert a 512 MB CF card and copy a large (~50 MB) test file from the host to the CF card. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the CF can be read from and written to. Complete the transfer of the test file to the CF card.	<b>Write</b> Pass	<b>Write</b> Pass	
	<b>Read-</b> Using the same CF card, copy the test file from the CF card to the host. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the CF can be read from and written to. Complete the transfer of the test file to the host.	<b>Read</b> Pass	<b>Read</b> Pass	
	Repeat this step using a 64MB CF card and 340MB IBM microdrive.			

### Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
2	<p><b>CF Surprise Removal (Media)-</b></p> <p><b>Write-</b> Using the same 512 MB CF card, copy a large (~50 MB) test file from the host to the CF card. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the CF card.</p> <p><b>Read-</b> Using the same CF card, copy the test file from the CF card to the host. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the host.</p> <p>Repeat this step using a 64MB CF card and 340MB IBM Microdrive.</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	
3	<p><b>CF Surprise Removal (Format)-</b></p> <p>Insert a 512 MB CF card into the 223. From Windows Explorer, perform a Full Format of the media. Once the format reaches approximately 20% completion, unplug the USB cable. . Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly. Attempt to format the media again. The format should complete normally.</p> <p>Repeat this procedure using a 64MB CF and 340MB IBM MicroDrives.</p>	<p><b>512MB CF</b> Pass</p> <p><b>64MB CF</b> Pass</p> <p><b>340MB MD</b> Pass</p>	<p><b>512MB CF</b> Pass</p> <p><b>64MB CF</b> Pass</p> <p><b>340MB MD</b> Pass</p>	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
4	<b>SM Surprise Removal (USB)-</b>  <b>Write-</b> Insert a 64 MB SM card and copy a large (~50 MB) test file from the host to the SM card. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the SM can be read from and written to. Complete the transfer of the test file to the SM card.	<b>Write</b> Pass	<b>Write</b> Pass	
	<b>Read-</b> Using the same SM card, copy the test file from the SM card to the host. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the SM can be read from and written to. Complete the transfer of the test file to the host.  Repeat this step using a 128MB SM card.	<b>Read</b> Pass	<b>Read</b> Pass	



## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
5	<b>SM Surprise Removal (Media)-</b>  <b>Write-</b> Using the same 64 MB SM card, copy a large (~50 MB) test file from the host to the SM card. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the SM card.	<b>Write</b> Pass	<b>Write</b> Pass	
	<b>Read-</b> Using the same SM card, copy the test file from the SM card to the host. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the host.  Repeat this step using a 128MB SM card	<b>Read</b> Pass	<b>Read</b> Pass	
6	<b>SM Surprise Removal (Format)-</b>  Insert a 64 MB SM card into the 223. From Windows Explorer, perform a Full Format of the media. Once the format reaches approximately 20% completion, unplug the USB cable. . Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly. Attempt to format the media again. The format should complete normally.  Repeat this procedure using 128MB SM	<b>64MB SM</b> Pass  <b>128MB SM</b> Pass	<b>64MB SM</b> Pass  <b>128MB SM</b> Pass	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
7	<p><b>XD Surprise Removal (USB)-</b></p> <p><b>Write-</b> Insert a 64 MB XD card and copy a large (~50 MB) test file from the host to the XD card. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the XD can be read from and written to. Complete the transfer of the test file to the XD card.</p> <p><b>Read-</b> Using the same XD card, copy the test file from the XD card to the host. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the XD can be read from and written to. Complete the transfer of the file to the host.</p> <p>Repeat this step using a 256MB XD card.</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
8	<p><b>XD Surprise Removal (Media)-</b></p> <p><b>Write-</b> Using the same 64 MB XD card, copy a large (~50 MB) test file from the host to the XD card. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the XD card.</p> <p><b>Read-</b> Using the same XD card, copy the test file from the XD card to the host. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the host.</p> <p>Repeat this step using a 256MB XD card</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	
9	<p><b>XD Surprise Removal (Format)-</b></p> <p>Insert a 64 MB XD card into the223. From Windows Explorer, perform a Full Format of the media. Once the format reaches approximately 20% completion, unplug the USB cable. . Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly. Attempt to format the media again. The format should complete normally.</p> <p>Repeat this procedure using 256MB XD.</p>	<p><b>64MB XD</b> Pass</p> <p><b>256MB XD</b> Pass</p>	<p><b>64MB XD</b> Pass</p> <p><b>256MB XD</b> Pass</p>	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
10	<p><b>SD/MMC Surprise Removal (USB)-</b></p> <p><b>Write-</b> Insert a 64 MB SD card and copy a large (~50 MB) test file from the host to the SD card. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the SD can be read from and written to. Complete the transfer of the test file to the SD card.</p> <p><b>Read-</b> Using the same SD card, copy the test file from the SD card to the host. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the SD can be read from and written to. Complete the transfer of the file to the host.</p> <p>Repeat this step using a 256MB SD card and 64MB MMC card.</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
1 1	<p><b>SD/MMC Surprise Removal (Media)-</b></p> <p><b>Write-</b> Using the same 64 MB SD card, copy a large (~50 MB) test file from the host to the SD card. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the SD card.</p> <p><b>Read-</b> Using the same SD card, copy the test file from the SD card to the host. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the host.</p> <p>Repeat this step using a 256MB SD card and 64MB MMC card.</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	
1 2	<p><b>SD/MMC Surprise Removal (Format)-</b></p> <p>Insert a 64 MB SD card into the223. From Windows Explorer, perform a Full Format of the media. Once the format reaches approximately 20% completion, unplug the USB cable. . Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly. Attempt to format the media again. The format should complete normally.</p> <p>Repeat this procedure using 256MB SD and 64MB MMC card.</p>	<p><b>64MB SD</b> Pass</p> <p><b>256MB SD</b> Pass</p> <p><b>64MB MMC</b> Pass</p>	<p><b>64MB SD</b> Pass</p> <p><b>256MB SD</b> Pass</p> <p><b>64MB MMC</b> Pass</p>	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
13	<b>MS/MS Pro Surprise Removal (USB)-</b>  <b>Write-</b> Insert a 64 MB MS card and copy a large (~50 MB) test file from the host to the MS card. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the MS can be read from and written to. Complete the transfer of the test file to the MS card.	<b>Write</b> Pass	<b>Write</b> Pass	
	<b>Read-</b> Using the same MS card, copy the test file from the MS card to the host. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the MS can be read from and written to. Complete the transfer of the file to the host.	<b>Read</b> Pass	<b>Read</b> Pass	
	Repeat this step using a 128MB MS card and 256MB MS Pro.			

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
1 4	<b>MS/MS Pro Surprise Removal (Media)-</b>			
	<b>Write-</b> Using the same 64 MB MS card, copy a large (~50 MB) test file from the host to the MS card. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the MS card.	<b>Write</b> Pass	<b>Write</b> Pass	
	<b>Read-</b> Using the same MS card, copy the test file from the MS card to the host. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the host.	<b>Read</b> Pass	<b>Read</b> Pass	
	Repeat this step using a 128MB MS card and 256MB MS Pro card.			
1 5	<b>MS/MS Pro Surprise Removal (Format)-</b>			
	Insert a 64 MB MS card into the223. From Windows Explorer, perform a Full Format of the media. Once the format reaches approximately 20% completion, unplug the USB cable. . Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly. Attempt to format the media again. The format should complete normally.	<b>64MB MS</b> Pass	<b>64MB MS</b> Pass	
		<b>128MB MS</b> Pass	<b>128MB MS</b> Pass	
	Repeat this procedure using 128MB MS and 256MB MS Pro.	<b>256MB MSPro</b> Pass	<b>256MB MSPro</b> Pass	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
16	<p><b>USB Cable Removal From Host End-</b></p> <p>Attach a 223 board to a host computer using a 15ft. USB cable. Fill all slots of the board with media.</p> <p><b>Write-</b> Copy a large (~50 MB) test file from the host one of the pieces of media in the 223 board. Once the transfer reaches approximately 50% completion, <b>unplug the USB cable from the host end.</b> Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the media can be read from and written to. Complete the transfer of the test file.</p> <p><b>Read-</b> Using the same media card, copy the test file from the 223 board to the host. Once the transfer reaches approximately 50% completion, <b>unplug the USB cable from the host end.</b> Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the media can be read from and written to. Complete the transfer of the file to the host.</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	



## **Test Suite #10- Load / Unload**

### **Overview**

This test suite evaluates the function of the USB97C223 under both normal and abnormal conditions, which cause the device to suspend, resume, enumerate or detach from the host. All tests below are performed using a self powered USB97C223 attached to a USB 2.0 host controller unless otherwise noted.

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	After disconnecting the USB cable of a properly enumerated USB97C223 device, all entries in the Device Manager associated with that device disappear. The device does not blue screen, freeze or otherwise adversely affect the host in any way.	Pass	Pass	Pass	Pass	
2	Upon reattaching the USB cable, the entries in the Device Manager reappear, and the device functions normally.	Pass	Pass	Pass	Pass	
3	After turning off power to the USB97C223, all entries in the Device Manager associated with the device disappear. The device does not blue screen, freeze or otherwise adversely affect the host in any way.	Pass	Pass	Pass	Pass	
4	After turning power to the USB97C223 back on, the entries in the Device Manager reappear, and the device functions normally.	Pass	Pass	Pass	Pass	
5	Upon rebooting the host with the USB97C223 enumerated, it does not blue screen, freeze or otherwise adversely affect the host in any way. All entries associated with the USB97C223 device appear in the Device Manager, and are not yellow banded.	Pass	Pass	Pass	Pass	

### Test Suite #10 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
6	Suspend the host and wait one minute. Resume the host and verify the device is enumerated and operates properly. Attach a 2 <sup>nd</sup> USB97C223 device to the same host and repeat the test. Verify both boards reenumerate and function properly after being resumed. Remove the 2 <sup>nd</sup> device.	Pass	Pass	Pass	Pass	
7	Insert flash media containing data into all of the reader slots on the USB97C223. Verify that all cards can be read.  Suspend the host and wait one minute. Resume the host and verify the device is enumerated and operates properly. Check to see that all of the flash media cards can be read from and written to.	Pass	Pass	Pass	Pass	
8	Insert flash media containing data into all of the reader slots on the USB97C223. Verify that all cards can be read.  Suspend the host and wait one minute. While host is suspended remove some of the media from the 223. Resume the host and verify the device is enumerated and operates properly. Check to see that the flash media cards not removed during the suspend can be read from and written to. Verify that the drives for media that was removed during the suspend cannot be accessed.	Pass	Pass	Pass	Pass	r
9	Remove all of the flash media cards from the 223 and Suspend the host. While the host is suspended, reinsert all of the flash memory cards and then resume the host.  Verify that all cards are recognized, and can be read from and written to.	Pass	Pass	Pass	Pass	

### Test Suite #10 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
10	<p>Insert flash media containing data into all of the reader slots on the USB97C223. Verify that all cards can be read.</p> <p>Shut down the host. Remove some of the media from the 223 while host is shut down. Start up the host and verify the device is enumerated and operates properly. Check to see that the flash media cards not removed while the host was shut down can be read from and written to. Verify that the drives for media that was removed while the host was shut down cannot be accessed.</p>	Pass	Pass	Pass	Pass	
11	<p>Remove all of the flash media cards from the 223. Verify that board is properly enumerated.</p> <p>Shut down the host. While host is shut down, insert media into all available slots on the 223. Start up the host.</p> <p>Verify that all cards are recognized, and can be read from and written to.</p>	Pass	Pass	Pass	Pass	
12	<p>Using the same test setup as above, with all cards inserted in the 223 and properly recognized, unplug the USB cable, wait 2-5 seconds and plug the cable back in. Verify that the device enumerates properly.</p> <p>Repeat this test for 20 iterations. Verify the device enumerates correctly each time, and that the media is properly recognized.</p>	Pass	Pass	Pass	Pass	

## Test Suite #10 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
13	<b>Self-Powered Reboot Endurance-</b>  Using the Burn-In Test Pro utility, set a host PC up to continually reboot with a self-powered 223 attached. Allow the test to run overnight. In the morning, check to see that the test is still running.  Halt the test and verify that the 223 is enumerated and operating normally.	Pass	Pass	Pass	Pass	
14	<b>Bus-Powered Reboot Endurance-</b>  Using the Burn-In Test Pro utility, set a host PC up to continually reboot with a bus-powered 223 attached. Allow the test to run overnight. In the morning, check to see that the test is still running.  Halt the test and verify that the 223 is enumerated and operating normally.	Pass	Pass	Pass	Pass	

## **Test Suite #11- Booting from USB**

### **Overview**

This test suite evaluates the function of the USB97C223 booting from media. All tests below are performed using a USB 2.0 host controller. This test needs to be performed on a machine that supports booting from a USB device.

### **Test Suite #11 Results**

#	Test Standard	Windows XP	Comments
1	<b>Boot from CF\IBM MD</b>  Configure a USB97C223 board to have a single active lun for Compact Flash.  Create a Win98 startup boot disk on a CF card.  Insert CF card with Win98 startup boot disk into test device.  Connect test device to test machine. Set up bios to choose USB device as boot option.  Restart test machine.  Verify that test machine boots off of CF card in test device.  Repeat this test using IBM Micro drive.	CF Pass       IBM - MD Pass	
2	<b>Boot from SM</b>  Configure a 223 board to have a single active lun for Smart Media.  Create a Win98 startup boot disk on a SM card.  Insert SM card with Win98 startup boot disk into test device.  Connect test device to test machine. Set up bios to choose USB device as boot option.  Restart test machine.  Verify that test machine boots off of SM card in test device.	SM Pass	

## Test Suite #11 Results

#	Test Standard	Windows XP	Comments
3	<p><b>Boot from XD</b> Configure a USB97C224 board to have a single active lun for XD.</p> <p>Create a Win98 startup boot disk on a XD card.</p> <p>Insert XD card with Win98 startup boot disk into test device.</p> <p>Connect test device to test machine. Set up bios to choose USB device as boot option.</p> <p>Restart test machine.</p> <p>Verify that test machine boots off of XD card in test device.</p>	XD Pass	
4	<p><b>Boot from SD</b> Configure a USB97C223 board to have a single active lun for Secure Digital.</p> <p>Create a Win98 startup boot disk on a SD card.</p> <p>Insert SD card with Win98 startup boot disk into test device.</p> <p>Connect test device to test machine. Set up bios to choose USB device as boot option.</p> <p>Restart test machine.</p> <p>Verify that test machine boots off of SD card in test device.</p> <p>Repeat this test with MMC.</p>	SD Pass  MMC Pass	
5	<p><b>Boot from MS</b> Configure a USB97C223 board to have a single active lun for Memory Stick.</p> <p>Create a Win98 startup boot disk on a MS card.</p> <p>Insert MS card with Win98 startup boot disk into test device.</p> <p>Connect test device to test machine. Set up bios to choose USB device as boot option.</p> <p>Restart test machine.</p> <p>Verify that test machine boots off of MS card in test device.</p> <p>Repeat this test with MS Pro.</p>	MS Pass  MS Pro Pass	

## **Test Suite #12- USB 1.1**

### **Overview**

This test suite evaluates the performance and function of USB97C223 devices while attached to a USB 1.1 host controller. All tests below are performed using a USB 1.1 host controller, unless specified otherwise.

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p>Make sure there are no previous installations of the USB97C223 on the host system. For Windows 98 and 2000, run the driver installation utility and verify that it completes normally.</p> <p><b>Self-Powered Pre Plug:</b> With no media inserted in any of the media slots, attach the USB cable to the host and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p>	Pass	Pass	Pass	Pass	
2	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Again, with no media inserted in any of the media slots, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p>	Pass	Pass	Pass	Pass	

## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Smart Media (SM) card into the SM slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SM card can be read from and written to by transferring a small file from the host to the SM card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat this step using an XD card.</p>	Pass	Pass	Pass	Pass	
4	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same SM card inserted in the SM slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SM card can be read from and written to by transferring a small file from the host to the SM card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat this step using an XD card.</p>	Pass	Pass	Pass	Pass	



## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
5	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Compact Flash (CF) card into the CF slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the CF card can be read from and written to by transferring a small file from the host to the CF card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat this test using an IBM MicroDrive.</p>	Pass	Pass	Pass	Pass	
6	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same CF card inserted in the CF slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the CF card can be read from and written to by transferring a small file from the host to the CF card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat this test using an IBM MicroDrive.</p>	Pass	Pass	Pass	Pass	

## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
7	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Secure Digital (SD) card into the SD slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SD card can be read from and written to by transferring a small file from the host to the SD card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
8	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same SD card inserted in the SD slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SD card can be read from and written to by transferring a small file from the host to the SD card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	

## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
9	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Multimedia Card (MMC) into the MMC slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MMC card can be read from and written to by transferring a small file from the host to the MMC card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
10	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same MMC card inserted in the MMC slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MMC card can be read from and written to by transferring a small file from the host to the MMC card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	

## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1 1	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Memory Stick (MS) card into the MS slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MS card can be read from and written to by transferring a small file from the host to the MS card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat this test using MS Pro media.</p>	Pass	Pass	Pass	Pass	
1 2	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same MS card inserted in the MS slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MS card can be read from and written to by transferring a small file from the host to the MS card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat this test using MS Pro media.</p>	Pass	Pass	Pass	Pass	

## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1 3	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert CF, SM, SD, and MS cards into their respective slots, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that all of the cards can be read from and written to by transferring a small file from the host to each card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
1 4	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Leave the same flash media cards inserted in their slots, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that all of the cards can be read from and written to by transferring a small file from the host to each card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat steps 13 and 14 using IBM MD, XD, MMC, and MS Pro media.</p>	Pass	Pass	Pass	Pass	

## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1 5	<p><b>Surprise Removal Write (USB):</b> Copy one large file from the host to a CF card. Once the transfer has reached 20% complete, disconnect the USB cable and wait 3 to 5 seconds. Close any warning dialog boxes and reattach the USB cable. Verify that the device reenumerates and the card and be read from and written to.</p> <p>Repeat this procedure using several small files (~1 to 10kb) instead of one large file.</p> <p>Repeat both procedures above using IBM MD, SM, XD, SD, MMC, MS, and MS Pro media.</p>	N/A	N/A	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	
1 6	<p><b>Surprise Removal Read (USB):</b> Copy one large file from a CF card to the host. Once the transfer has reached 20% complete, disconnect the USB cable and wait 3 to 5 seconds. Close any warning dialog boxes and reattach the USB cable. Verify that the device reenumerates and the card and be read from and written to.</p> <p>Repeat this procedure using several small files (~1 to 10kb) instead of one large file.</p> <p>Repeat both procedures above using IBM MD, SM, XD, SD, MMC, MS, and MS Pro media.</p>	N/A	N/A	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1 7	<p><b>Surprise Removal Write (Media):</b> Copy one large file from the host to a CF card. Once the transfer has reached 20% complete, remove the CF media and wait 3 to 5 seconds. Close any warning dialog boxes and then reinsert the CF media. Wait a few seconds for the card to be recognized and then verify it can be read from and written to.</p> <p>Repeat this procedure using several small files (~1 to 10kb) instead of one large file.</p> <p>Repeat both procedures above using IBM MD, SM, XD, SD, MMC, MS, and MS Pro media.</p>	N/A	N/A	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	
1 8	<p><b>Surprise Removal Read (Media):</b> Copy one large file from a CF card to the host. Once the transfer has reached 20% complete, remove the CF media and wait 3 to 5 seconds. Close any warning dialog boxes and then reinsert the CF media. Wait a few seconds for the card to be recognized and then verify it can be read from and written to.</p> <p>Repeat this procedure using several small files (~1 to 10kb) instead of one large file.</p> <p>Repeat both procedures above using IBM MD, SM, XD, SD, MMC, MS, and MS Pro media.</p>	N/A	N/A	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	

## **Test Suite #13- USB WHQL**

### **Overview**

This test suite checks to ensure that the USB97C223 is able to pass the Windows Hardware Quality Lab (WHQL) certification testing. All tests below are performed in a single LUN configuration under Windows XP using the latest HCT available from Microsoft.

#### **Manual Tests:**

#	WHQL Test	Windows XP	Comments
1	Enable/Disable- Device I/O (Storage)	Pass	
2	USB Selective Suspend	Pass	
3	USB Serial Number	Pass	

#### **Automated Tests:**

#	WHQL Test	Windows XP	Comments
1	ACPI S1 Stress	Pass	
2	ACPI S3 Stress	Pass	
3	Disk Stress	Pass	
4	FAT- File I/O (Removable)	Pass	
5	Storage Device Stress	Pass	
6	Surprise Removal	Pass	
7	Syscache	Pass	
8	Sysparse	Pass	



## **Test Suite #14- Chapter 9 Current Measurement Tests**

### **Overview**

This test suite checks to ensure that the USB97C223 meets all Chapter 9 power requirements for both bus and self powered devices. All tests are run in Windows XP.

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<b>Unconfigured Current (Bus Powered)-</b>  Using the USBCV test utility, check the unconfigured current for the USB97C223 bus powered.  In order to pass, the device must draw no more than 100mA in an unconfigured state.  Once the test is complete, close the USBCV application and verify that the test stack driver is unloaded and that the device is enumerated normally as a mass storage class device.	N/A	N/A	N/A	Pass	
2	<b>Operating Current-</b>  Verify that the device is bus powered and enumerated properly. Initiate large file transfers simultaneously on all four LUNs. During the transfer, measure the current being drawn by the 223.  In order to pass, the device cannot draw more than 500mA at any time during the operation.	N/A	N/A	N/A	Pass	
3	<b>Suspend Current-</b>  Suspend the host. Once the host has stabilized in a suspended state, wait 5 to 10 seconds and then measure the suspended current draw for the 223.  In order to pass the test, the device can draw no more than 500uA while suspended.	N/A	N/A	N/A	Pass	

### Test Suite #14 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
4	<p><b>Unconfigured Current (Self-Powered)-</b></p> <p>Using the USBCV test utility, check the unconfigured current for the USB97C223 self powered.</p> <p>In order to pass, the device must draw no more than 100mA in an unconfigured state.</p> <p>Once the test is complete, close the USBCV application and verify that the test stack driver is unloaded and that the device is enumerated normally as a mass storage class device.</p>	N/A	N/A	N/A	Pass	
5	<p><b>Operating Current-</b></p> <p>Verify that the device is self powered and enumerated properly. Initiate large file transfers simultaneously on all four LUNs. During the transfer, measure the current being drawn by the 223.</p> <p>In order to pass, the device cannot draw more than 100mA from the host at any time during the operation.</p>	N/A	N/A	N/A	Pass	
6	<p><b>Suspend Current-</b></p> <p>Suspend the host. Once the host has stabilized in a suspended state, wait 5 to 10 seconds and then measure the suspended current draw for the 223.</p> <p>In order to pass the test, the device can draw no more than 500uA from the host while suspended.</p>	N/A	N/A	N/A	Pass	

## **Test Suite #15- Bundled Software Application Tests**

### **Overview**

This test suite checks to ensure that all of the applications bundled with the USB97C223 operate properly in accordance with the user instructions provided in the USB97C223 Software Release Notes.

#	Application	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	USBDM 1.004	Not Tested	Not Tested	Not Tested	Pass	
2	DOS Pitu	Pass	Pass	Pass	Pass	
3	PLDU	Pass	Pass	Pass	Pass	
4	DFUTest	Pass	Pass	Pass	Pass	

## **Test Suite #16- Device Firmware Upgrade / Descriptor Update**

### **Overview**

This test suite checks to ensure that both the device firmware upgrade (DFU) and descriptor update functionality of the USB97C223 work properly. Please note that DFU functionality is only available for devices that utilize an external flash ROM.

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>DFU-</b></p> <p>Load a 223 eval board with a DFU enabled "both.bin" binary created from the last release version of the 223 firmware.</p> <p>Perform a DFU update to the version of firmware under test. Verify that the operation completes normally.</p> <p>Unplug the device and reattach it to the host. Verify that it enumerates properly. Check the version of the firmware using USBView (looking at the bcdDevice string). Make sure that the version displayed is the version that was uploaded to the device.</p>	Pass	Pass	Pass	Pass	
2	<p><b>Descriptor Update-</b></p> <p>Modify an eeprom.dat file and upload it to the device. Once the operation completes, hot plug the device and verify that the eeprom contains the new data. Repeat this test using the "NO.EEPROM" version of the firmware.</p> <p>Continue to use descriptor updates to completely verify the LUN configuration and icon sharing functionality of the device.</p> <p>(Refer to the USB97C223 Software Release Notes for information on LUN Configuration and Icon Sharing.)</p>	Pass	Pass	Pass	Pass	

## **Test Suite #17 - C3 – Attach on Insert**

### **Overview**

This test suite checks to ensure that the C3 Attach on Insert functionality of the USB97C223 works properly. For test steps that require verification that the device suspends properly, measure the suspend current of the test device. The following is required for this feature to function properly when using a USB97C223 EVB

- 1) Ensure that the EVB is REV B
- 2) Ensure that R135 is removed from the EVB
- 3) Set GPIO to be used as SD indicator (Attribute byte 1, bit 2)
- 4) Enable C3 functionality (Attach on card insertion, Attribute byte 3, bit 0)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<b>Initial Plug-in – with media</b>  Insert media into each available slot of a USB97C223 board.  Connect this test device to the host controller.  Verify that the device does attach as normal. Icons should be present. Each piece of media should be active and should be able to be written to and read from.	Pass	Pass	Pass	Pass	
2	<b>Initial Plug-in – no media</b>  Disconnect the USB97C223 board from the host controller.  Remove all media.  Reattach the USB97C223 board. Verify that the device does not attach. No icons should be present.	Pass	Pass	Pass	Pass	
3	<b>Insert of single media – removal of single media</b>  Insert a CF card into the USB97C223 board. Verify that after this insertion of media, the test device is attached and all luns are present. Only CF should be active and be able to be read from and written to.  Remove the CF card. Verify that this removal results in the test device detaching and going into suspend mode.  Repeat these steps using MS, MS Pro, IBM-MD, SM, XD, SD, and MMC	Pass	Pass	Pass	Pass	

## Test Suite #17 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
4	<p><b>Insert of several media – removal of several media</b></p> <p>Verify that with no media inserted into test device that it is not attached. Insert media into all available slots. Verify that the first media inserted causes the device to attach. Each media inserted after this should result in that particular drive becoming active and being able to read from/write to the card.</p> <p>Remove each piece of media one at a time until only one piece remains in the test device. Verify for these removals that the device remains attached and the slot that the media was removed from can no longer be accessed.</p> <p>Remove the last piece of media. Verify that the device detaches and suspends.</p>	Pass	Pass	Pass	Pass	
5	<p><b>Suspend –</b></p> <p>Insert media into the test device. Verify that the device is attached.</p> <p>Suspend the device by putting the host in standby. Verify that while the host is in standby that the device does not detach and suspends normally.</p> <p>Wake the host. Verify that the device is still attached and all media that is inserted into the device can be read from and written to.</p>	Pass	Pass	Pass	Pass	
6	<p><b>Awakened Device – no media</b></p> <p>Remove all media from test device. Verify device is detached. Suspend the host.</p> <p>Wake host and verify that device is still detached.</p>	Pass	Pass	Pass	Pass	

### Test Suite #17 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
7	<p><b>Awakened Device – surprise insertion of media</b></p> <p>Device should contain no media, be connected to host, and be detached.</p> <p>Suspend the host.</p> <p>While host is suspended, insert media into test device. Verify that device is still suspended.</p> <p>Wake host. Verify that the device attaches and that each media can be read from and written to.</p>	Pass	Pass	Pass	Pass	
8	<p><b>Awakened Device – surprise removal of media</b></p> <p>Device should contain media from prior step, be connected to host, and be attached.</p> <p>Suspend the host.</p> <p>While host is suspended, remove all media from test device. Verify that the device is still suspended.</p> <p>Wake host. Verify that the device is not detached and that no icons are present.</p>	Pass	Pass	Pass	Pass	

## **Test Suite #18- Memory Stick Compatibility Testing**

### **Overview**

This test ensures that all tests listed in Sony Corporation's *Memory Stick Implementation Check Procedures* pass with USB97C223. Refer to the *Memory Stick Implementation Check Procedures* document for specific instructions on how to perform each individual test listed below. All tests are run using Windows XP.

### **Chapter 7 of Memory Stick Compatibility test results:**

Test #	Test Description	Windows XP	Comments
7001	1.6 Logical / Physical Translation Table Block	Pass	
7002	1.7 Data Write/Read (when W/P SW is turned ON)	Pass	
7003	1.8 Data Read/Write (when W/P SW is turned OFF)	Pass	
7004	1.9 Duplicated Logical Addresses	Pass	
7005	1.10 Alternative Blocks	Pass	
7006	1.11 Disabled Blocks	Pass	
7007	1.12 Digital Read Protected Bit	Pass	
7008	1.13 Block Status/Page Status	Pass	



7009	1.14 Abnormal Boot Block	Pass	
7010	1.15 Boot Area Protection Processing	Pass	
7011	1.16 128MB Support	Pass	
7012	1.17 Alternative Blocks	Pass	

### Chapter 8 of Memory Stick Compatibility test results:

Test #	Test Description	Windows XP	Comments
8001	2.6 Mount Processing	Pass	
8002	2.7 Write Processing	Pass	
8003	2.8 Delete and Format Processing	Pass	
8004	2.9 Relating to Archive Bits	Pass	
8005	2.10 Memory Stick formatted by Windows	N/A	

## **Test Suite #19- Macintosh OS Specific Testing**

### **Overview**

This test suite summarizes the testing performed in the Macintosh operating systems.

#	Test Suite	Mac OS 9.2	Mac OS 10.2	Mac OS 10.3		Comments
1	Installation	Pass	Pass	Pass		
2	Compact Flash / IBM MicroDrive	Pass	Pass	Pass		
3	Smart Media	Pass	Pass	Pass		
4	XD	Pass	Pass	Pass		
5	Secure Digital / Multimedia Card	Pass	Pass	Pass		
6	Memory Stick / Memory Stick Pro	Pass	Pass	Pass		
7	Multiple Device	Pass	Pass	Pass		
8	C3 – Attach on Insert	Pass	Pass	Pass		
9	USB 1.1	Not Required- OS is USB 1.1 Only.	Pass	Pass		



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***USB97C223/224***  
***USB 2.0 Flash Media Controller***  
**Software Performance and  
Compatibility Test Report**

Firmware Version: 360  
Windows 98/2000 Driver Version: 2.6.00  
Report Date: 9/17/2004

**Total Test Time Required: 316 Hours**

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## Test Environment

### Hardware:

Test Machine(s): (Include Host Controller Type, Motherboard Model, BIOS Version and Chipset)	Other Hardware:	Chipsets Used for Testing:
<p><b>Machine 1:</b> LAB-ML01 Bios: PHX Tech:ACPI Rev 1002B006 Mother board: ASUST A7N8X Rev 1002A Chipset: NVIDIA NFORCE 2 Rev A2 EHCI: NVIDIA USB 2.0 EHCI</p> <p><b>Machine 2:</b> LAB-RR02 Bios: American Megatrends Inc. Ver 1007.001 Mother board: ASUS Tek P4P800 Chipset : Intel i865P/PE/G EHCI: Intel 82801EB</p> <p><b>Machine 3:</b> LAB-DC2 Bios: PHX Tech:ACPI Rev 1002B006 Mother board:ASUST A7N8X Rev 1002A Chipset: NVIDIA NFORCE 2 Rev A2 EHCI: NVIDIA USB 2.0 EHCI</p> <p><b>Machine 4:</b> LAB-EH01 Bios: NVIDIA USB 2.0 EHCI Mother board: GIGABYTE GA-7VT600 1394 Chipset: VIA KT600 EHCI: VIA PCI to USB EHCI</p> <p><b>Machine 5:</b> LAB-NJ02 Bios: PHOENIX TECH Rev 1006 Mother board: ASUSTEK A7N8X2.0 Chipset: NVIDIA nForce2 EHCI: NEC PCI To USB EHCI</p> <p><b>Machine 6:</b></p>	<p>CF: Memorex-64MB,128MB CompUSA 16MB,48MB, 64MB Lexar- 32MB, 48MB, 64MB, 128MB, - 256MB, 512MB,1GB,2GB SanDisk- 32MB Kingmax- 8MB Delkin Devices- 640</p> <p>IMBMicroDrive: IBM-340MB,1GB</p> <p>MS: Lexar- 32MB, 64MB, 128MB SanDisk- 64MB Sony- 8MB, 16MB, 32MB, 64MB, 128MB</p> <p>High Speed MS: Sony-32MB,64MB,128MB</p> <p>MSPRO: Sony-512MB SanDisk-256MB, 1GB</p> <p>SD/MMC: I-O Data- 64MB SanDisk- 128MB,(64MB MMC) Lexar- 32MB,(16MB,32MB,64MB MMC) Panasonic- 512MB PNY-64MB</p> <p>Mini SD: Toshiba-32MB</p> <p>SM: Lexar- 16MB,32MB,64MB,128MB SanDisk- 128MB Memorex- 64MB, 128MB Kingston- 64MB Viking Components- 64MB PNY- 128MB</p> <p>XD: Olympus-32MB,128MB,256MB,512MB Fujifilm-64MB</p>	<p>Intel i845E Intel i865P/PE/G Intel i865P/PE/G/i848P Intel 865PE Intel i875P NVIDIA NFORCE 2 Rev A2 SiS648FX VIA KT600 VIA KT400 VIA P4X400(VT8754) Rev3 APPLE</p>
		<p><b>3<sup>rd</sup> Party Readers Used for Testing:</b></p> <p>ZiO SM, MS readers Dazzle reader I/O Interconnect reader Firewire readerImation FlashGO! 2.0</p>

### Software:

Drivers and Firmware	Application Software	Operating Systems
<p>Firmware USB97C223.0.360.hex USB97C224.0.360.hex</p> <p>MASS STORAGE CLASS DRIVER WINXP:MS - USBSTOR.SYS 5.1.2600.1243 WIN2K: MS -USBSTOR.SYS 5.00.2195.6655 WINME: MS -USBSTOR.SYS 4.90.3000.1 WIN98SE: SMSC - MASSWDM.SYS 2.5.0.0</p> <p>EHCI DRIVER: MS USBEHCI.SYS 5.1.2600.1243 MS USBEHCI.SYS 5.0.2195.6907 SIIG / OMI OUSBEHCI.SYS 2.1.4 OWC IUSBEHCI.SYS 1.0.3.0</p> <p>UHC DRIVER: WINXP: USBUHCI.SYS 5.1.2600.1243 WIN2K: UHCD.SYS 5.0.2195.6675 WINME UHCD.SYS 4.90.3000.1 WIN98SE: UHCD.SYS 4.10.2222</p>	<p>DFUTEST version 2.3.0.2 SFV32W.EXE version 1.0.350 Attributes Byte calculator version 14 Setlcon.exe 1.2.0.8 MAC SFV (10x) version 1.3 MacSFV (8x-9x) version 1.2 Bundled Software Production Line Descriptor Update Utility version 1.0.0.0 Production Line Test Utility version 1.0.0.5 Quick Test Production Line Utility Using Filter Driver version 1.0.0.3 Utility to Format MSPRO media version 1.0.0.2 DFUTEST Application version 2.3.0.2 DOSPLTU SMSC VERSION 1.4.0.0 USBDM.EXE VERSION 1.0.0.4 98SafeRemoval.exe 1.0.0.5</p>	<p>WINXP (SP1) WIN2K (SP4) WINME WIN98SE Macintosh OS 9.x, 10.x LINUX 2.4.20</p>

## **Testing Overview**

### **Standard for Certifying Firmware and Drivers**

The USB97C223/224 Test Suite consists of 19 separate functional testing areas designed to fully exercise the capabilities of the USB97C223/224 USB 2.0 Flash Media Controller chip. For a firmware and driver combination to be considered certified by the SMSC QA Test Laboratory, it must receive passing test results in each of the following functional test suites:

<b><u>Functional Test Suite</u></b>	<b><u>Operating Systems</u></b>
1. Installation	Windows 98, Me, 2000, XP
2. USBCV	Windows 2000 and XP Only
3. Compact Flash / IBM MD	Windows 98, Me, 2000, XP
4. Smart Media	Windows 98, Me, 2000, XP
5. XD	Windows 98, Me, 2000, XP
6. Secure Digital/MMC	Windows 98, Me, 2000, XP
7. Memory Stick / Memory Stick Pro	Windows 98, Me, 2000, XP
8. Multiple Device	Windows 98, Me, 2000, XP
9. Surprise Removal	Windows 2000 and XP Only
10. Load / Unload	Windows 98, Me, 2000, XP
11. Booting from USB	Windows XP Only
12. USB 1.1	Windows 98, Me, 2000, XP
13. WHQL (USB Removable Storage)	Windows XP Only
14. Chapter 9 Current Measurement	Windows XP Only
15. Bundled Software	Windows 98, Me, 2000, XP
16. DFU / Descriptor Update	Windows 98, Me, 2000, XP
17. C3 – Attach on Insert	Windows 98, Me, 2000, XP
18. Memory Stick Compatibility	Windows XP Only
19. Macintosh OS Specific	Mac OS 9.2, 10.2, 10.3

A new firmware – driver combination must pass all test suites, including WHQL for every operating system listed, to be considered certified. Note that this standard does not apply to beta software released for evaluation purposes.

## **Test Results**

Test Technician: Munabo Lwali  
Test Technician: Matt Seitzer

Test Technician: Shilpa Siva  
Test Technician: Mark McLaughlin

### **Test Suite Results Summary**

<b>Test Suite</b>	<b>Windows 98</b>	<b>Windows Me</b>	<b>Windows 2000</b>	<b>Windows XP</b>
# 1 Installation	Pass	Pass	Pass	Pass
# 2 USBCV	Not Supported	Not Supported	Pass	Pass
# 3 Compact Flash / IBM MicroDrive	Pass	Pass	Pass	Pass
# 4 Smart Media	Pass	Pass	Pass	Pass
# 5 XD	Pass	Pass	Pass	Pass
# 6 Secure Digital / Multimedia Card	Pass	Pass	Pass	Pass
# 7 Memory Stick / Memory Stick Pro	Pass	Pass	Pass	Pass
# 8 Multiple Device	Pass	Pass	Pass	Pass
# 9 Surprise Removal	N/A	N/A	Pass	Pass
# 10 Load / Unload	Pass	Pass	Pass	Pass
# 11 Booting from USB	N/A	N/A	N/A	Pass
# 12 USB 1.1	Pass	Pass	Pass	Pass
# 13 WHQL	N/A	N/A	N/A	Pass
#14 Chapter 9 Current Measurements	N/A	N/A	N/A	Pass
#15 Bundled Software	Pass	Pass	Pass	Pass
#16 DFU and Descriptor Update	Pass	Pass	Pass	Pass
#17 C3 – Attach on Insert	Pass	Pass	Pass	Pass
#18 Memory Stick Compatibility	N/A	N/A	N/A	Pass
	<b>Mac OS 9.2</b>	<b>Mac OS 10.2</b>	<b>Mac OS 10.3</b>	
#19 Macintosh OS Specific	Pass	Pass	Pass	

## **Testing Observations and Comments**

**Comments:** Explanation of any marginal or failing results from the Test Suite Results Matrix above, along with any other comments concerning the results of testing:



## **Test Completion Dates**

The test suites were completed for each operating system on the dates indicated below:

<b>Test Suite</b>		<b>Win98</b>	<b>Testers Initials</b>	<b>WinMe</b>	<b>Testers Initials</b>	<b>Win2K</b>	<b>Testers Initials</b>	<b>WinXP</b>	<b>Testers Initials</b>
# 1	Installation	9/14/04	ML	9/16/04	MM	9/8/04	ML	9/7/04	MM
# 2	USBCV	N/A	N/A	N/A	N/A	9/8/04	ML	9/10/04	MM
# 3	Compact Flash	9/16/04	SS	4/2/04	DC	9/14/04	SS	9/14/04	SS
# 4	Smart Media	9/16/04	SS	9/16/04	ML	9/9/04	MM	9/8/04	MM
# 5	XD	9/16/04	SS	9/16/04	ML	9/9/04	MM	9/8/04	MM
# 6	Secure Digital	9/16/04	SS	4/5/04	DC	9/14/04	SS	9/14/04	SS
# 7	Memory Stick	4/1/04	DC	4/5/04	DC	9/10/04	ML	9/7/04	MM
# 8	Multiple Device	9/15/04	ML	4/6/04	ML	9/10/04	ML	9/10/04	MM
# 9	Surprise Removal	N/A	N/A	N/A	N/A	9/8/04	ML	9/10/04	MM
# 10	Load / Unload	9/14/04	ML	9/14/04	MM	9/9/04	ML	9/8/04	MM
# 11	Bootling from USB	N/A	N/A	N/A	N/A	N/A	N/A	9/8/04	MM
# 12	USB 1.1	4/7/04	DC	9/16/04	MM	9/13/04	ML	9/15/04	MM
# 13	WHQL (USB)	N/A	N/A	N/A	N/A	N/A	N/A	9/9/04	ML
#14	Chapter 9 Current Measurement	N/A	N/A	N/A	N/A	N/A	N/A	9/8/04	ML
#15	Bundled Software	9/16/04	ML	9/16/04	ML	9/13/04	ML	9/15/04	ML
#16	DFU and Descriptor Update	4/2/04	ML	9/16/04	ML	9/13/04	ML	9/15/04	MM
#17	C3 – Attach on Insert	9/14/04	ML	4/2/04	ML	9/9/04	ML	9/8/04	MM
#18	Memory Stick Compatibility	N/A	N/A	N/A	N/A	N/A	N/A	9/9/04	SS
		<b>MacOS 9.2</b>	<b>Testers Initials</b>	<b>MacOS 10.2</b>	<b>Testers Initials</b>	<b>MacOS 10.3</b>	<b>Testers Initials</b>		
#19	Macintosh OS Specific	9/17/04	CC	9/17/04	CC	9/13/04	MS		

## **Test Suite #1- Installation**

### **Overview**

This test suite evaluates the installation procedures for the USB97C223. In order to pass this suite, the following conditions must be met:

1. The operating system correctly identifies all supported flash media devices on attach.
2. Under Windows Me, 2000 (SP 3 or above) and XP, the OS automatically loads the native Windows Mass Storage Class driver. (Windows 98 and 2000 (SP2 and below) require the user to provide the SMSC MSC driver with multiple LUN support.)
3. All drivers load normally with no blue screens or system freezes before, during or after they are loaded.
4. The system does not request or require a restart after the drivers have been loaded.
5. No devices appear in the device manager with yellow exclamation marks next to them (yellow banded.)
6. The device does not blue screen the host before, during or after a system restart. After a system restart, the device is re-enumerated normally.
7. After installation, all device entries appear correctly in the device manager, showing the correct vendor, date and version information.

### **Test Suite #1 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p>Make sure there are no previous installations of the USB97C223 on the host system. For Windows 98 and 2000 (SP2 and below), run the driver installation utility and verify that it completes normally.</p> <p><b>Self-Powered Pre Plug:</b> With no media inserted in any of the media slots, attach the USB cable to the host and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p>	Pass	Pass	Pass	Pass	

2	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Again, with no media inserted in any of the media slots, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p>	Pass	Pass	Pass	Pass	
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### Test Suite #1 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Smart Media (SM) card into the SM slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SM card can be read from and written to by transferring a small file from the host to the SM card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	

4	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same SM card inserted in the SM slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SM card can be read from and written to by transferring a small file from the host to the SM card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat steps 3 and 4 using a XD card.</p>	Pass	Pass	Pass	Pass	
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## Test Suite #1 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
5	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Compact Flash (CF) card into the CF slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the CF card can be read from and written to by transferring a small file from the host to the CF card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
6	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same CF card inserted in the CF slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the CF card can be read from and written to by transferring a small file from the host to the CF card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat steps 5 and 6 with an IBM MicroDrive.</p>	Pass	Pass	Pass	Pass	

## Test Suite #1 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
7	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Secure Digital (SD) card into the SD slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SD card can be read from and written to by transferring a small file from the host to the SD card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
8	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same SD card inserted in the SD slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SD card can be read from and written to by transferring a small file from the host to the SD card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	

## Test Suite #1 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
9	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Multimedia Card (MMC) into the MMC slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MMC card can be read from and written to by transferring a small file from the host to the MMC card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
10	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same MMC card inserted in the MMC slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MMC card can be read from and written to by transferring a small file from the host to the MMC card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	

## Test Suite #1 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1 1	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Memory Stick (MS) card into the MS slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MS card can be read from and written to by transferring a small file from the host to the MS card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
1 2	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same MS card inserted in the MS slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MS card can be read from and written to by transferring a small file from the host to the MS card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat steps 11 and 12 with Memory Stick Pro media.</p>	Pass	Pass	Pass	Pass	



### Test Suite #1 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1 3	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self Powered Pre Plug:</b> Insert IBM MD, SM, SD, MMC and MS Pro cards into their respective slots, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that all of the cards can be read from and written to by transferring a small file from the host to each card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
1 4	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Leave the same flash media cards inserted in their slots, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that all of the cards can be read from and written to by transferring a small file from the host to each card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat steps 13 and 14 using CF, XD, MMC, and MS cards</p>	Pass	Pass	Pass	Pass	
1 5	<p><b>Eject and Remove-</b> With media inserted in each reader slot, test the Right-Click eject functionality for each device. Check to see that no error message is displayed, and that the host reports no media present when trying to access it after the eject.</p>	Pass	Pass	Pass	Pass	

## **Test Suite #2- USB Command Verifier (USBCV)**

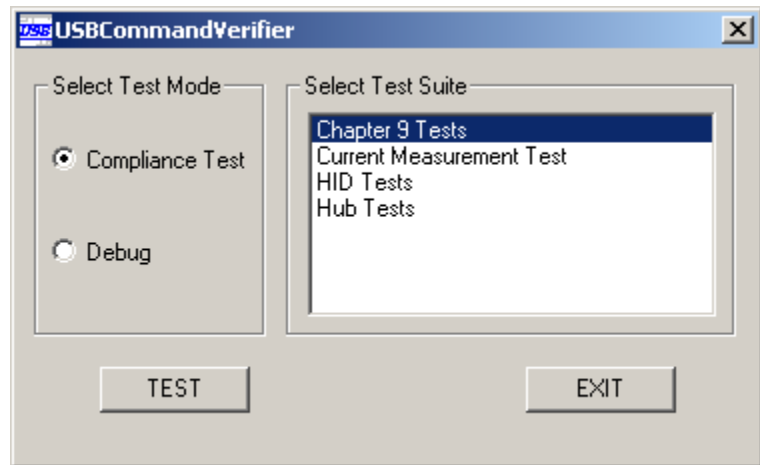
### **Overview**

This test suite utilizes the USB Command Verifier Compliance Tool provided by USB.org, to ensure that the USB97C223 complies with Chapter 9 of the USB 2.0 specification. The latest version of the tool is available at <http://www.usb.org/developers/tools.html>. The USBCV is currently only supported under Windows 2000 and XP, so testing under Windows 98 and Millennium is not performed for this test suite. In order for the device to pass this suite, it must successfully pass all Chapter 9 tests.

### **Test Suite #2 Results**

#	Test Standard	Windows 2000	Windows XP	Comments
1	The device passes all Chapter 9 tests of the Compliance Utility. Passing logs are generated showing no failures. Save the .htm test output for inclusion with this test report.	Pass	Pass	

**USB Command Verifier  
Chapter 9 Tests**



## **Test Suite #3- Compact Flash / IBM MicroDrive**

### **Overview**

This test suite evaluates the performance and function of the USB97C223 with various Type I and II Compact Flash devices, including the IBM Microdrive. All tests below are performed using a USB 2.0 host controller. Each device is checked to verify proper operation with the USB97C223 firmware and drivers under normal and abnormal operating conditions. A 690 MB CD test disk is required for these tests. The test disk contains various files ranging in size from 10 bytes to 300 megabytes, with an accompanying SFV file, which contains a calculated checksum (CRC) for each file.

### **Test Suite #3 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>CF Writes-</b> Insert a 16 MB CF card into the CF slot on the USB97C223 board. Verify that the correct capacity is shown for the CF card.</p> <p>Open the test files disk in Windows Explorer and sort the test files by size in ascending order. Starting with the smallest size file, select enough of the test files to fill the CF card. Transfer the files to the CF card.</p> <p>Once the files have been written, eject the media and place it in a 3<sup>rd</sup> party flash reader. Use WinSFV to check the CRC of each file to ensure that the data was not corrupted during the transfer.</p>	Pass	Pass	Pass	Pass	
2	<p><b>CF Insert/Remove-</b> Double click the 223 CF drive icon in Windows Explorer. Verify that the OS reports no media present. Reinsert the CF card and check to see that the OS recognizes that a card was inserted. Verify that the contents of the card can be read by transferring a file to the host.</p> <p>Repeat this procedure three times verifying that the media insert and removal is detected correctly each time.</p>	Pass	Pass	Pass	Pass	

### Test Suite #3 Results

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<b>CF Reads-</b> Using the same CF card, transfer all of the files that were previously written to the card back to the host. Once the read is complete, CRC check the files on the host to ensure there was no corruption of the data during transfer.	Pass	Pass	Pass	Pass	
4	<b>CF Write, Insert/Remove, Read-</b>  Repeat tests 1 through 3 for the following devices: 8MB CF, 32MB CF, 64MB CF, 128MB CF, 256MB CF, 512MB CF, 1GB CF, 2GB CF, 340MB IBM MicroDrive, and the 1GB IBM MicroDrive.	<b>8MB CF</b> Pass  <b>64MB CF</b> Pass  <b>256MB CF</b> Pass  <b>1GB CF</b> Pass  <b>340MB MD</b> Pass	<b>32MB CF</b> Pass  <b>128MB CF</b> Pass  <b>512MB CF</b> Pass  <b>2GB CF</b> Pass  <b>1GB MD</b> Pass	<b>8MB CF</b> Pass  <b>64MB CF</b> Pass  <b>256MB CF</b> Pass  <b>1GB CF</b> Pass  <b>340MB MD</b> Pass	<b>32MB CF</b> Pass  <b>128MB CF</b> Pass  <b>512MB CF</b> Pass  <b>2GB CF</b> Pass  <b>1GB MD</b> Pass	

## **Test Suite #4- Smart Media**

### **Overview**

This test suite evaluates the performance and function of the USB97C223 with various density Smart Media flash memory cards. All tests below are performed using a USB 2.0 host controller. A 690 MB CD test disk is required for these tests. The test disk contains various files ranging in size from 10 bytes to 300 megabytes, with an accompanying SFV file, which contains a calculated checksum (CRC) for each file.

### **Test Suite #4 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>SM Writes-</b> Insert an 8 MB SM card into the SM slot on the USB97C223 board. Verify that the correct capacity is shown for the SM card.</p> <p>Open the test files disk in Windows Explorer and sort the test files by size in ascending order. Starting with the smallest size file, select enough of the test files to fill the SM card. Transfer the files to the SM card.</p> <p>Once the files have been written, eject the media and place it in a 3<sup>rd</sup> party flash reader. Use WinSFV to check the CRC of each file to ensure that the data was not corrupted during the transfer.</p>	Pass	Pass	Pass	Pass	
2	<p><b>SM Insert/Remove-</b> Double click the 223 SM drive icon in Windows Explorer. Verify that the OS reports no media present. Reinsert the SM card and check to see that the OS recognizes that a card was inserted. Verify that the contents of the card can be read by transferring a file to the host.</p> <p>Repeat this procedure three times verifying that the media insert and removal is detected correctly each time.</p>	Pass	Pass	Pass	Pass	

## Test Suite #4 Results

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<b>SM Reads-</b> Using the same SM card, transfer all of the files that were previously written to the card back to the host. Once the read is complete, CRC check the files on the host to ensure there was no corruption of the data during transfer.	Pass	Pass	Pass	Pass	
4	<b>SM/XD Write, Insert/Remove, Read-</b>  Repeat tests 1 through 3 for the following media: 16MB SM, 32MB SM, 64MB SM, 128MB SM, 256MB SM.  <b>Note:</b> If there is not a 256MB SM available, a XD to SM adapter with a 256MB XD card inserted may be used.	16MB SM Pass  32MB SM Pass  64MB SM Pass  128MB SM Pass  256MB SM Pass	16MB SM Pass  32MB SM Pass  64MB SM Pass  128MB SM Pass  256MB SM Pass	16MB SM Pass  32MB SM Pass  64MB SM Pass  128MB SM Pass  256MB SM Pass	16MB SM Pass  32MB SM Pass  64MB SM Pass  128MB SM Pass  256MB SM Pass	
5	<b>SM MPEG Playback</b>  Insert a 64 MB SM card into the 223. From Windows Explorer, perform a Full Format of the media. Copy a MPEG video file that is larger than 15MB to the SM card. Once copy has completed, unplug device. Reattach the device and play the file that was copied to the card. Verify that the file is played back properly. The file should not skip or freeze.  <b>Note:</b> In 223 any skipping or freezing is prevented by the software. If 223 hardware is used there will be a glitch seen if the Attribute bit that determines if the Status Byte Check is bypassed for SM is set to 0. There will be no skipping or freezing if this bit is set to 1. (Attribute byte 2 bit 7). Verify that there is a glitch seen with this bit set to 0 and not seen when this bit is set to 1.	Pass	Pass	Pass	Pass	

### Test Suite #4 Results

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
6	<p><b>1-bit ECC</b> Insert a SM card with a 1-bit ECC error on it into the 223 device. Connect the 223 to the computer via a 2.0 host controller. Verify that the card contents can be read properly.</p> <p>Inset a SM card with a 2-bit ECC error on it into the 223 device. Verify that the card contents cannot be read properly.</p> <p>Repeat this step using a 1.1 host controller to connect the 223 to the computer and having attribute byte 2, bit 6 set.</p>	Pass	Pass	Pass	Pass	
7	<p><b>CIS Check</b> Set the bit for "Don't Perform Smart Media CIS checking" to 1. (Attribute byte 2, bit 0) This will <b>disable the CIS checking</b> required by the SM spec.</p> <p>Insert a SM card with a corrupt CIS block into the 223 device. Connect the 223 to the computer via a 2.0 host controller. Verify that the card <b>contents can be read</b> properly.</p> <p>Clear the bit for "Don't Perform Smart Media CIS checking"(i.e. set it to zero) This will <b>enable the CIS checking</b> required by the SM spec.</p> <p>Insert a SM card with a corrupt CIS block into the 223 device. Connect the 223 to the computer via a 2.0 host controller. Verify that the card <b>contents cannot be read</b>.</p>	Pass	Pass	Pass	Pass	
8	<p><b>SM Write Protect-</b> Enable the write protect on a 32MB SM card, and insert it into the SM slot on the 223. Check to see that the media is detected properly, and then attempt to copy a file from the host to the SM card. The OS should report that the copy could not be performed.</p> <p>Attempt to format the SM card. The OS should report that the format could not be completed.</p>	Pass	Pass	Pass	Pass	

## **Test Suite #5 - XD**

### **Overview**

This test suite evaluates the performance and function of the USB97C224 with various density XD flash memory cards. All tests below are performed using a USB 2.0 host controller. A 690 MB CD test disk is required for these tests. The test disk contains various files ranging in size from 10 bytes to 300 megabytes, with an accompanying SFV file, which contains a calculated checksum (CRC) for each file.

### **Test Suite #5 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>XD Writes-</b> Insert a 16 MB XD card into the XD slot on the USB97C224 board. Verify that the correct capacity is shown for the XD card.</p> <p>Open the test files disk in Windows Explorer and sort the test files by size in ascending order. Starting with the smallest size file, select enough of the test files to fill the XD card. Transfer the files to the XD card.</p> <p>Once the files have been written, eject the media and place it in a 3<sup>rd</sup> party flash reader. Use WinSFV to check the CRC of each file to ensure that the data was not corrupted during the transfer.</p>	Pass	Pass	Pass	Pass	
2	<p><b>XD Insert/Remove-</b> Double click the 224 XD drive icon in Windows Explorer. Verify that the OS reports no media present. Reinsert the XD card and check to see that the OS recognizes that a card was inserted. Verify that the contents of the card can be read by transferring a file to the host.</p> <p>Repeat this procedure three times verifying that the media insert and removal is detected correctly each time.</p>	Pass	Pass	Pass	Pass	



### Test Suite #5 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<b>XD Reads-</b> Using the same XD card, transfer all of the files that were previously written to the card back to the host. Once the read is complete, CRC check the files on the host to ensure there was no corruption of the data during transfer.	Pass	Pass	Pass	Pass	
4	<b>XD Write, Insert/Remove, Read-</b>  Repeat tests 1 through 3 for the following media: 32MB XD, 64MB XD, 128MB XD, 256MB XD, 512MB XD.	32MB XD Pass  64MB XD Pass  128MB XD Pass  256MB XD Pass  512MB XD Pass	32MB XD Pass  64MB XD Pass  128MB XD Pass  256MB XD Pass  512MB XD Pass	32MB XD Pass  64MB XD Pass  128MB XD Pass  256MB XD Pass  512MB XD Pass	32MB XD Pass  64MB XD Pass  128MB XD Pass  256MB XD Pass  512MB XD Pass	
5	<b>CIS Check</b>  Set the bit for "Don't Perform Smart Media CIS checking" to 1. (Attribute byte 2, bit 0) This will <b>disable the CIS checking</b> required by the SM spec.  Insert a XD card with a corrupt CIS block into the 224 device. Connect the 224 to the computer via a 2.0 host controller. Verify that the card <b>contents can be read</b> properly.  Clear the bit for "Don't Perform Smart Media CIS checking"(i.e. set it to zero) This will <b>enable the CIS checking</b> required by the SM spec.  Insert a XD card with a corrupt CIS block into the 224 device. Connect the 224 to the computer via a 2.0 host controller. Verify that the card <b>contents cannot be read</b> .	Pass	Pass	Pass	Pass	

## **Test Suite #6- Secure Digital / Multimedia Card**

### **Overview**

This test suite evaluates the performance and function of the USB97C223 with various density Secure Digital and Multimedia Card flash memory. All tests below are performed using a USB 2.0 host controller. A 690 MB CD test disk is required for these tests. The test disk contains various files ranging in size from 10 bytes to 300 megabytes, with an accompanying SFV file, which contains a calculated checksum (CRC) for each file.

### **Test Suite #6 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>SD Writes-</b> Turn off the write protection switch on a 32 MB SD card, and insert the card into the SD slot on the USB97C223 board. Verify that the correct capacity is shown for the SD card.</p> <p>Open the test files disk in Windows Explorer and sort the test files by size in ascending order. Starting with the smallest size file, select enough of the test files to fill the SD card. Transfer the files to the SD card.</p> <p>Once the files have been written, eject the media and place it in a 3<sup>rd</sup> party flash reader. Use WinSFV to check the CRC of each file to ensure that the data was not corrupted during the transfer.</p>	Pass	Pass	Pass	Pass	
2	<p><b>SD Insert/Remove-</b> Double click the 223 SD drive icon in Windows Explorer. Verify that the OS reports no media present. Reinsert the SD card and check to see that the OS recognizes that a card was inserted. Verify that the contents of the card can be read by transferring a file to the host.</p> <p>Repeat this procedure three times verifying that the media insert and removal is detected correctly each time.</p>	Pass	Pass	Pass	Pass	

## Test Suite #6 Results

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<b>SD Reads-</b> Using the same SD card, transfer all of the files that were previously written to the card back to the host. Once the read is complete, CRC check the files on the host to ensure there was no corruption of the data during transfer.	Pass	Pass	Pass	Pass	
4	<b>SD/MMC Write, Insert/Remove, Read-</b>  Repeat tests 1 through 3 for the following media: 64MB SD, 128MB SD, 256MB SD, 512MB SD, 16MB MMC, 32MB MMC, 64MB MMC, 128MB MMC, and 256MB MMC.	128MB SD Pass  512MB SD Pass  32MB MMC Pass  128MB MMC Pass  256MB MMC Pass	64MB SD Pass  256MB SD Pass  16MB MMC Pass  64MB MMC Pass  256MB MMC Pass	128MB SD Pass  512MB SD Pass  32MB MMC Pass  128MB MMC Pass  256MB MMC Pass	64MB SD Pass  256MB SD Pass  16MB MMC Pass  64MB MMC Pass  256MB MMC Pass	
7	<b>SD Write Protect-</b>  Enable the write protect switch on a 32MB SD card, and insert it into the SD slot on the 223. Check to see that the media is detected properly, and then attempt to copy a file from the host to the SD card. The OS should report that the copy could not be performed.	SD Pass	SD Pass	SD Pass	SD Pass	

## **Test Suite #7- Memory Stick / Memory Stick Pro**

### **Overview**

This test suite evaluates the performance and function of the USB97C223 with various capacity Memory Stick and Memory Stick Pro flash memory cards. All tests below are performed using a USB 2.0 host controller. A 690 MB CD test disk is required for these tests. The test disk contains various files ranging in size from 10 bytes to 300 megabytes, with an accompanying SFV file, which contains a calculated checksum (CRC) for each file.

### **Test Suite #7 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>MS Writes-</b> Turn off the write protection switch on a 16 MB MS card, and insert the card into the MS slot on the USB97C223 board. Verify that the correct capacity is shown for the MS card.</p> <p>Open the test files disk in Windows Explorer and sort the test files by size in ascending order. Starting with the smallest size file, select enough of the test files to fill the MS card. Transfer the files to the MS card.</p> <p>Once the files have been written, eject the media and place it in a 3<sup>rd</sup> party flash reader. Use WinSFV to check the CRC of each file to ensure that the data was not corrupted during the transfer.</p>	Pass	Pass	Pass	Pass	
2	<p><b>MS Insert/Remove-</b> Double click the 223 MS drive icon in Windows Explorer. Verify that the OS reports no media present. Reinsert the MS card and check to see that the OS recognizes that a card was inserted. Verify that the contents of the card can be read by transferring a file to the host.</p> <p>Repeat this procedure three times verifying that the media insert and removal is detected correctly each time.</p>	Pass	Pass	Pass	Pass	

### Test Suite #7 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<b>MS Reads-</b> Using the same MS card, transfer all of the files that were previously written to the card back to the host. Once the read is complete, CRC check the files on the host to ensure there was no corruption of the data during transfer.	Pass	Pass	Pass	Pass	
4	<b>MS Write, Insert/Remove, Read-</b>  Repeat tests 1 through 3 for the following media: 8MB MS, 64MB MS, 128MB MS, 256MB MS, 256MB MS Pro, 512MB MS Pro, 1GB MS Pro.	8MB MS Pass 32MB MS Pass 128MB MS Pass 256MB MS Pro Pass 512MB MS Pro Pass	8MB MS Pass 64MB MS Pass 256MB MS Pass 256MB MS Pro Pass 1GB MS Pro Pass	8MB MS Pass 32MB MS Pass 128MB MS Pass 256MB MS Pro Pass 512MB MS Pro Pass	8MB MS Pass 64MB MS Pass 256MB MS Pass 256MB MS Pro Pass 1GB MS Pro Pass	
5	<b>MS Write Protect-</b> Enable the write protect switch on a 32MB MS card, and insert it into the MS slot on the 223. Check to see that the media is detected properly, and then attempt to copy a file from the host to the card. The OS should report that the copy could not be performed.	Pass	Pass	Pass	Pass	
6	<b>MS Write Pro Protect-</b> Enable the write protect switch on a 512MB MS Pro card, and insert it into the MS slot on the 223. Check to see that the media is detected properly, and then attempt to copy a file from the host to the card. The OS should report that the copy could not be performed.	Pass	Pass	Pass	Pass	
7	<b>1-bit ECC</b> Insert a MS card with a 1-bit ECC error on it into the 223 device. Connect the 223 to the computer via a 2.0 host controller. Verify that the card contents can be read properly.  Insert a MS card with a 2-bit ECC error on it into the 223 device. Verify that the card contents cannot be read.  Repeat this step using a 1.1 host controller.	Pass	Pass	Pass	Pass	

## **Test Suite #8- Multiple Device**

### **Overview**

This test suite evaluates the performance and function of multiple USB97C223 devices attached to a single host. All tests below are performed using a USB 2.0 host controller. The focus of this testing is to ensure interoperability between all devices when more than one USB97C223 device is running on the same host.

### **Test Suite #8 Results**

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>Host to B1, B2-</b> Attach two USB97C223 boards to the host via the same host controller. Verify that both boards enumerate properly.</p> <p>Insert CF cards containing test data files, in the CF slots on both boards. Verify that you can read from and write to both cards individually. simultaneously transfer a couple large files from the host to the CF cards on both boards. Verify that the transfer completes normally.</p> <p>Repeat this procedure using IBM MD, SM, XD, SD, MMC, MS, and MS Pro cards. Also test writing to different cards on each board simultaneously (i.e. SM on board 1 and CF on board 2.)</p>	Pass	Pass	Pass	Pass	
2	<p><b>B1, B2 to Host-</b> Next Using the same boards and test setup as Test #1 above, simultaneously transfer a large file from each of the cards to the host. Verify that the transfer completes normally.</p> <p>Repeat this procedure using IBM MD, SM, XD, SD, MMC, MS, and MS Pro cards. Also test reading from different cards on each board simultaneously (i.e. MS on board 1 and SD on board 2.)</p>	Pass	Pass	Pass	Pass	

## Test Suite #8 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<p><b>B1 to B2-</b> Again using the same boards and test setup as Test #1, transfer a series of test files (large and small) from the CF card on board 1, to the CF card on board 2.</p> <p>Repeat this procedure using IBM MD, SM, XD, SD, MMC, MS, and MS Pro cards. Also test writing to different cards on board 2 (i.e. SM on board 1 to CF on board 2.)</p>	Pass	Pass	Pass	Pass	
4	<p><b>B1 to Host / Host to B2-</b> Using the same test setup, transfer a test file from the CF card on board 1 to the host, while at the same time transferring a separate file from the host to the CF card on board 2.</p> <p>Repeat this procedure using IBM MD, SM, XD, SD, MMC, MS, and MS Pro cards. Also test reading from and writing to different cards on each board (i.e. SM on board 1 to host, host to CF on board 2.)</p>	Pass	Pass	Pass	Pass	
5	<p><b>B1 to Host / Host to B1-</b> Leave both boards attached to the host, but for this test you will be performing all of the reads/writes on one board only.</p> <p>Insert CF and SM cards into their respective slots on the 223. Copy a large file from the CF to the host, and copy another large file from the host to the SM. Repeat this test using all possible combinations of media, for both reads and writes. Ensure that all transfers complete normally.</p>	Pass	Pass	Pass	Pass	

## **Test Suite #9- Surprise Removal**

### **Overview**

This test suite evaluates the performance and function of the USB97C223 with media and USB cable surprise removals. All tests below are performed using a USB 2.0 host controller. Each device is checked to verify proper operation with the USB97C223 firmware and drivers under normal and abnormal operating conditions. A 690 MB CD test disk is required for these tests. The test disk contains various files ranging in size from 10 bytes to 300 megabytes, with an accompanying SFV file, which contains a calculated checksum (CRC) for each file.

### **Test Suite #9 Results**

#	Test Standard	Windows 2000	Windows XP	Comments
1	<b>CF Surprise Removal (USB)-</b>			
	<b>Write-</b> Insert a 512 MB CF card and copy a large (~50 MB) test file from the host to the CF card. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the CF can be read from and written to. Complete the transfer of the test file to the CF card.	<b>Write</b> Pass	<b>Write</b> Pass	
	<b>Read-</b> Using the same CF card, copy the test file from the CF card to the host. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the CF can be read from and written to. Complete the transfer of the test file to the host.	<b>Read</b> Pass	<b>Read</b> Pass	
	Repeat this step using a 64MB CF card and 340MB IBM microdrive.			



### Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
2	<p><b>CF Surprise Removal (Media)-</b></p> <p><b>Write-</b> Using the same 512 MB CF card, copy a large (~50 MB) test file from the host to the CF card. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the CF card.</p> <p><b>Read-</b> Using the same CF card, copy the test file from the CF card to the host. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the host.</p> <p>Repeat this step using a 64MB CF card and 340MB IBM Microdrive.</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	
3	<p><b>CF Surprise Removal (Format)-</b></p> <p>Insert a 512 MB CF card into the 223. From Windows Explorer, perform a Full Format of the media. Once the format reaches approximately 20% completion, unplug the USB cable. . Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly. Attempt to format the media again. The format should complete normally.</p> <p>Repeat this procedure using a 64MB CF and 340MB IBM MicroDrives.</p>	<p><b>512MB CF</b> Pass</p> <p><b>64MB CF</b> Pass</p> <p><b>340MB MD</b> Pass</p>	<p><b>512MB CF</b> Pass</p> <p><b>64MB CF</b> Pass</p> <p><b>340MB MD</b> Pass</p>	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
4	<b>SM Surprise Removal (USB)-</b>  <b>Write-</b> Insert a 64 MB SM card and copy a large (~50 MB) test file from the host to the SM card. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the SM can be read from and written to. Complete the transfer of the test file to the SM card.	<b>Write</b> Pass	<b>Write</b> Pass	
	<b>Read-</b> Using the same SM card, copy the test file from the SM card to the host. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the SM can be read from and written to. Complete the transfer of the test file to the host.  Repeat this step using a 128MB SM card.	<b>Read</b> Pass	<b>Read</b> Pass	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
5	<b>SM Surprise Removal (Media)-</b>  <b>Write-</b> Using the same 64 MB SM card, copy a large (~50 MB) test file from the host to the SM card. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the SM card.	<b>Write</b> Pass	<b>Write</b> Pass	
	<b>Read-</b> Using the same SM card, copy the test file from the SM card to the host. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the host.  Repeat this step using a 128MB SM card	<b>Read</b> Pass	<b>Read</b> Pass	
6	<b>SM Surprise Removal (Format)-</b>  Insert a 64 MB SM card into the 223. From Windows Explorer, perform a Full Format of the media. Once the format reaches approximately 20% completion, unplug the USB cable. . Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly. Attempt to format the media again. The format should complete normally.  Repeat this procedure using 128MB SM	<b>64MB SM</b> Pass  <b>128MB SM</b> Pass	<b>64MB SM</b> Pass  <b>128MB SM</b> Pass	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
7	<p><b>XD Surprise Removal (USB)-</b></p> <p><b>Write-</b> Insert a 64 MB XD card and copy a large (~50 MB) test file from the host to the XD card. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the XD can be read from and written to. Complete the transfer of the test file to the XD card.</p> <p><b>Read-</b> Using the same XD card, copy the test file from the XD card to the host. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the XD can be read from and written to. Complete the transfer of the file to the host.</p> <p>Repeat this step using a 256MB XD card.</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
8	<p><b>XD Surprise Removal (Media)-</b></p> <p><b>Write-</b> Using the same 64 MB XD card, copy a large (~50 MB) test file from the host to the XD card. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the XD card.</p> <p><b>Read-</b> Using the same XD card, copy the test file from the XD card to the host. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the host.</p> <p>Repeat this step using a 256MB XD card</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	
9	<p><b>XD Surprise Removal (Format)-</b></p> <p>Insert a 64 MB XD card into the223. From Windows Explorer, perform a Full Format of the media. Once the format reaches approximately 20% completion, unplug the USB cable. . Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly. Attempt to format the media again. The format should complete normally.</p> <p>Repeat this procedure using 256MB XD.</p>	<p><b>64MB XD</b> Pass</p> <p><b>256MB XD</b> Pass</p>	<p><b>64MB XD</b> Pass</p> <p><b>256MB XD</b> Pass</p>	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
10	<p><b>SD/MMC Surprise Removal (USB)-</b></p> <p><b>Write-</b> Insert a 64 MB SD card and copy a large (~50 MB) test file from the host to the SD card. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the SD can be read from and written to. Complete the transfer of the test file to the SD card.</p> <p><b>Read-</b> Using the same SD card, copy the test file from the SD card to the host. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the SD can be read from and written to. Complete the transfer of the file to the host.</p> <p>Repeat this step using a 256MB SD card and 64MB MMC card.</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
1 1	<p><b>SD/MMC Surprise Removal (Media)-</b></p> <p><b>Write-</b> Using the same 64 MB SD card, copy a large (~50 MB) test file from the host to the SD card. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the SD card.</p> <p><b>Read-</b> Using the same SD card, copy the test file from the SD card to the host. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the host.</p> <p>Repeat this step using a 256MB SD card and 64MB MMC card.</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	
1 2	<p><b>SD/MMC Surprise Removal (Format)-</b></p> <p>Insert a 64 MB SD card into the223. From Windows Explorer, perform a Full Format of the media. Once the format reaches approximately 20% completion, unplug the USB cable. . Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly. Attempt to format the media again. The format should complete normally.</p> <p>Repeat this procedure using 256MB SD and 64MB MMC card.</p>	<p><b>64MB SD</b> Pass</p> <p><b>256MB SD</b> Pass</p> <p><b>64MB MMC</b> Pass</p>	<p><b>64MB SD</b> Pass</p> <p><b>256MB SD</b> Pass</p> <p><b>64MB MMC</b> Pass</p>	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
13	<p><b>MS/MS Pro Surprise Removal (USB)-</b></p> <p><b>Write-</b> Insert a 64 MB MS card and copy a large (~50 MB) test file from the host to the MS card. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the MS can be read from and written to. Complete the transfer of the test file to the MS card.</p> <p><b>Read-</b> Using the same MS card, copy the test file from the MS card to the host. Once the transfer reaches approximately 50% completion, unplug the USB cable. Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the MS can be read from and written to. Complete the transfer of the file to the host.</p> <p>Repeat this step using a 128MB MS card and 256MB MS Pro.</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	



## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
1 4	<p><b>MS/MS Pro Surprise Removal (Media)-</b></p> <p><b>Write-</b> Using the same 64 MB MS card, copy a large (~50 MB) test file from the host to the MS card. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the MS card.</p> <p><b>Read-</b> Using the same MS card, copy the test file from the MS card to the host. Once the transfer reaches approximately 50% completion, remove the media. Wait 3-5 seconds and close any open warning dialogs. Reinsert the media and check to see that the OS properly recognizes the card, and can read from and write to it. Complete the transfer of the test file to the host.</p> <p>Repeat this step using a 128MB MS card and 256MB MS Pro card.</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	
1 5	<p><b>MS/MS Pro Surprise Removal (Format)-</b></p> <p>Insert a 64 MB MS card into the223. From Windows Explorer, perform a Full Format of the media. Once the format reaches approximately 20% completion, unplug the USB cable. . Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly. Attempt to format the media again. The format should complete normally.</p> <p>Repeat this procedure using 128MB MS and 256MB MS Pro.</p>	<p><b>64MB MS</b> Pass</p> <p><b>128MB MS</b> Pass</p> <p><b>256MB MSPro</b> Pass</p>	<p><b>64MB MS</b> Pass</p> <p><b>128MB MS</b> Pass</p> <p><b>256MB MSPro</b> Pass</p>	

## Test Suite #9 Results (cont.)

#	Test Standard	Windows 2000	Windows XP	Comments
16	<p><b>USB Cable Removal From Host End-</b></p> <p>Attach a 223 board to a host computer using a 15ft. USB cable. Fill all slots of the board with media.</p> <p><b>Write-</b> Copy a large (~50 MB) test file from the host one of the pieces of media in the 223 board. Once the transfer reaches approximately 50% completion, <b>unplug the USB cable from the host end.</b> Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the media can be read from and written to. Complete the transfer of the test file.</p> <p><b>Read-</b> Using the same media card, copy the test file from the 223 board to the host. Once the transfer reaches approximately 50% completion, <b>unplug the USB cable from the host end.</b> Wait 3-5 seconds and close any open warning dialogs. Reattach the USB cable and check to see that the device reenumerates properly, and the media can be read from and written to. Complete the transfer of the file to the host.</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	<p><b>Write</b> Pass</p> <p><b>Read</b> Pass</p>	

## **Test Suite #10- Load / Unload**

### **Overview**

This test suite evaluates the function of the USB97C223 under both normal and abnormal conditions, which cause the device to suspend, resume, enumerate or detach from the host. All tests below are performed using a self powered USB97C223 attached to a USB 2.0 host controller unless otherwise noted.

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	After disconnecting the USB cable of a properly enumerated USB97C223 device, all entries in the Device Manager associated with that device disappear. The device does not blue screen, freeze or otherwise adversely affect the host in any way.	Pass	Pass	Pass	Pass	
2	Upon reattaching the USB cable, the entries in the Device Manager reappear, and the device functions normally.	Pass	Pass	Pass	Pass	
3	After turning off power to the USB97C223, all entries in the Device Manager associated with the device disappear. The device does not blue screen, freeze or otherwise adversely affect the host in any way.	Pass	Pass	Pass	Pass	
4	After turning power to the USB97C223 back on, the entries in the Device Manager reappear, and the device functions normally.	Pass	Pass	Pass	Pass	
5	Upon rebooting the host with the USB97C223 enumerated, it does not blue screen, freeze or otherwise adversely affect the host in any way. All entries associated with the USB97C223 device appear in the Device Manager, and are not yellow banded.	Pass	Pass	Pass	Pass	

### Test Suite #10 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
6	Suspend the host and wait one minute. Resume the host and verify the device is enumerated and operates properly. Attach a 2 <sup>nd</sup> USB97C223 device to the same host and repeat the test. Verify both boards reenumerate and function properly after being resumed. Remove the 2 <sup>nd</sup> device.	Pass	Pass	Pass	Pass	
7	Insert flash media containing data into all of the reader slots on the USB97C223. Verify that all cards can be read.  Suspend the host and wait one minute. Resume the host and verify the device is enumerated and operates properly. Check to see that all of the flash media cards can be read from and written to.	Pass	Pass	Pass	Pass	
8	Insert flash media containing data into all of the reader slots on the USB97C223. Verify that all cards can be read.  Suspend the host and wait one minute. While host is suspended remove some of the media from the 223. Resume the host and verify the device is enumerated and operates properly. Check to see that the flash media cards not removed during the suspend can be read from and written to. Verify that the drives for media that was removed during the suspend cannot be accessed.	Pass	Pass	Pass	Pass	r
9	Remove all of the flash media cards from the 223 and Suspend the host. While the host is suspended, reinsert all of the flash memory cards and then resume the host.  Verify that all cards are recognized, and can be read from and written to.	Pass	Pass	Pass	Pass	

### Test Suite #10 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
10	<p>Insert flash media containing data into all of the reader slots on the USB97C223. Verify that all cards can be read.</p> <p>Shut down the host. Remove some of the media from the 223 while host is shut down. Start up the host and verify the device is enumerated and operates properly. Check to see that the flash media cards not removed while the host was shut down can be read from and written to. Verify that the drives for media that was removed while the host was shut down cannot be accessed.</p>	Pass	Pass	Pass	Pass	
11	<p>Remove all of the flash media cards from the 223. Verify that board is properly enumerated.</p> <p>Shut down the host. While host is shut down, insert media into all available slots on the 223. Start up the host.</p> <p>Verify that all cards are recognized, and can be read from and written to.</p>	Pass	Pass	Pass	Pass	
12	<p>Using the same test setup as above, with all cards inserted in the 223 and properly recognized, unplug the USB cable, wait 2-5 seconds and plug the cable back in. Verify that the device enumerates properly.</p> <p>Repeat this test for 20 iterations. Verify the device enumerates correctly each time, and that the media is properly recognized.</p>	Pass	Pass	Pass	Pass	

### Test Suite #10 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
13	<b>Self-Powered Reboot Endurance-</b>  Using the Burn-In Test Pro utility, set a host PC up to continually reboot with a self-powered 223 attached. Allow the test to run overnight. In the morning, check to see that the test is still running.  Halt the test and verify that the 223 is enumerated and operating normally.	Pass	Pass	Pass	Pass	
14	<b>Bus-Powered Reboot Endurance-</b>  Using the Burn-In Test Pro utility, set a host PC up to continually reboot with a bus-powered 223 attached. Allow the test to run overnight. In the morning, check to see that the test is still running.  Halt the test and verify that the 223 is enumerated and operating normally.	Pass	Pass	Pass	Pass	

## **Test Suite #11- Booting from USB**

### **Overview**

This test suite evaluates the function of the USB97C223 booting from media. All tests below are performed using a USB 2.0 host controller. This test needs to be performed on a machine that supports booting from a USB device.

### **Test Suite #11 Results**

#	Test Standard	Windows XP	Comments
1	<b>Boot from CF\IBM MD</b>  Configure a USB97C223 board to have a single active lun for Compact Flash.  Create a Win98 startup boot disk on a CF card.  Insert CF card with Win98 startup boot disk into test device.  Connect test device to test machine. Set up bios to choose USB device as boot option.  Restart test machine.  Verify that test machine boots off of CF card in test device.  Repeat this test using IBM Micro drive.	CF Pass       IBM - MD Pass	
2	<b>Boot from SM</b>  Configure a 223 board to have a single active lun for Smart Media.  Create a Win98 startup boot disk on a SM card.  Insert SM card with Win98 startup boot disk into test device.  Connect test device to test machine. Set up bios to choose USB device as boot option.  Restart test machine.  Verify that test machine boots off of SM card in test device.	SM Pass	

## Test Suite #11 Results

#	Test Standard	Windows XP	Comments
3	<p><b>Boot from XD</b> Configure a USB97C224 board to have a single active lun for XD.</p> <p>Create a Win98 startup boot disk on a XD card.</p> <p>Insert XD card with Win98 startup boot disk into test device.</p> <p>Connect test device to test machine. Set up bios to choose USB device as boot option.</p> <p>Restart test machine.</p> <p>Verify that test machine boots off of XD card in test device.</p>	<p>XD Pass</p>	
4	<p><b>Boot from SD</b> Configure a USB97C223 board to have a single active lun for Secure Digital.</p> <p>Create a Win98 startup boot disk on a SD card.</p> <p>Insert SD card with Win98 startup boot disk into test device.</p> <p>Connect test device to test machine. Set up bios to choose USB device as boot option.</p> <p>Restart test machine.</p> <p>Verify that test machine boots off of SD card in test device.</p> <p>Repeat this test with MMC.</p>	<p>SD Pass</p> <p>MMC Pass</p>	
5	<p><b>Boot from MS</b> Configure a USB97C223 board to have a single active lun for Memory Stick.</p> <p>Create a Win98 startup boot disk on a MS card.</p> <p>Insert MS card with Win98 startup boot disk into test device.</p> <p>Connect test device to test machine. Set up bios to choose USB device as boot option.</p> <p>Restart test machine.</p> <p>Verify that test machine boots off of MS card in test device.</p> <p>Repeat this test with MS Pro.</p>	<p>MS Pass</p> <p>MS Pro Pass</p>	



## **Test Suite #12- USB 1.1**

### **Overview**

This test suite evaluates the performance and function of USB97C223 devices while attached to a USB 1.1 host controller. All tests below are performed using a USB 1.1 host controller, unless specified otherwise.

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p>Make sure there are no previous installations of the USB97C223 on the host system. For Windows 98 and 2000, run the driver installation utility and verify that it completes normally.</p> <p><b>Self-Powered Pre Plug:</b> With no media inserted in any of the media slots, attach the USB cable to the host and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p>	Pass	Pass	Pass	Pass	
2	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Again, with no media inserted in any of the media slots, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p>	Pass	Pass	Pass	Pass	

## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
3	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Smart Media (SM) card into the SM slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SM card can be read from and written to by transferring a small file from the host to the SM card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat this step using an XD card.</p>	Pass	Pass	Pass	Pass	
4	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same SM card inserted in the SM slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SM card can be read from and written to by transferring a small file from the host to the SM card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat this step using an XD card.</p>	Pass	Pass	Pass	Pass	

## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
5	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Compact Flash (CF) card into the CF slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the CF card can be read from and written to by transferring a small file from the host to the CF card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat this test using an IBM MicroDrive.</p>	Pass	Pass	Pass	Pass	
6	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same CF card inserted in the CF slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the CF card can be read from and written to by transferring a small file from the host to the CF card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat this test using an IBM MicroDrive.</p>	Pass	Pass	Pass	Pass	

## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
7	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Secure Digital (SD) card into the SD slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SD card can be read from and written to by transferring a small file from the host to the SD card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
8	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same SD card inserted in the SD slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the SD card can be read from and written to by transferring a small file from the host to the SD card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	

## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
9	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Multimedia Card (MMC) into the MMC slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MMC card can be read from and written to by transferring a small file from the host to the MMC card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
10	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same MMC card inserted in the MMC slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MMC card can be read from and written to by transferring a small file from the host to the MMC card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	

## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1 1	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert a Memory Stick (MS) card into the MS slot, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MS card can be read from and written to by transferring a small file from the host to the MS card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat this test using MS Pro media.</p>	Pass	Pass	Pass	Pass	
1 2	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Using the same MS card inserted in the MS slot, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that the MS card can be read from and written to by transferring a small file from the host to the MS card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat this test using MS Pro media.</p>	Pass	Pass	Pass	Pass	

## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1 3	<p>Uninstall the USB97C223 hardware entries from the Device Manager and power off the device.</p> <p><b>Self-Powered Pre Plug:</b> Insert CF, SM, SD, and MS cards into their respective slots, and power up the eval board. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that all of the cards can be read from and written to by transferring a small file from the host to each card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p>	Pass	Pass	Pass	Pass	
1 4	<p>Uninstall the USB97C223 hardware entries from the Device Manager. Detach the USB cable from the host and power off the device.</p> <p><b>Self Powered Post Plug:</b> Leave the same flash media cards inserted in their slots, power up the eval board, wait a few seconds and then plug the USB cable into the host. Check to see that the device enumerates properly, the correct drivers are loaded, and a drive icon appears for each LUN supported in the firmware.</p> <p>Check to see that all of the cards can be read from and written to by transferring a small file from the host to each card and back. (To avoid caching of the data, hot plug the device between the read and write.)</p> <p>Repeat steps 13 and 14 using IBM MD, XD, MMC, and MS Pro media.</p>	Pass	Pass	Pass	Pass	

## Test Suite #12 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1 5	<p><b>Surprise Removal Write (USB):</b> Copy one large file from the host to a CF card. Once the transfer has reached 20% complete, disconnect the USB cable and wait 3 to 5 seconds. Close any warning dialog boxes and reattach the USB cable. Verify that the device reenumerates and the card and be read from and written to.</p> <p>Repeat this procedure using several small files (~1 to 10kb) instead of one large file.</p> <p>Repeat both procedures above using IBM MD, SM, XD, SD, MMC, MS, and MS Pro media.</p>	N/A	N/A	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	
1 6	<p><b>Surprise Removal Read (USB):</b> Copy one large file from a CF card to the host. Once the transfer has reached 20% complete, disconnect the USB cable and wait 3 to 5 seconds. Close any warning dialog boxes and reattach the USB cable. Verify that the device reenumerates and the card and be read from and written to.</p> <p>Repeat this procedure using several small files (~1 to 10kb) instead of one large file.</p> <p>Repeat both procedures above using IBM MD, SM, XD, SD, MMC, MS, and MS Pro media.</p>	N/A	N/A	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	



## Test Suite #9 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
17	<p><b>Surprise Removal Write (Media):</b> Copy one large file from the host to a CF card. Once the transfer has reached 20% complete, remove the CF media and wait 3 to 5 seconds. Close any warning dialog boxes and then reinsert the CF media. Wait a few seconds for the card to be recognized and then verify it can be read from and written to.</p> <p>Repeat this procedure using several small files (~1 to 10kb) instead of one large file.</p> <p>Repeat both procedures above using IBM MD, SM, XD, SD, MMC, MS, and MS Pro media.</p>	N/A	N/A	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	
18	<p><b>Surprise Removal Read (Media):</b> Copy one large file from a CF card to the host. Once the transfer has reached 20% complete, remove the CF media and wait 3 to 5 seconds. Close any warning dialog boxes and then reinsert the CF media. Wait a few seconds for the card to be recognized and then verify it can be read from and written to.</p> <p>Repeat this procedure using several small files (~1 to 10kb) instead of one large file.</p> <p>Repeat both procedures above using IBM MD, SM, XD, SD, MMC, MS, and MS Pro media.</p>	N/A	N/A	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	<p><b>CF</b> Pass</p> <p><b>IBM MD</b> Pass</p> <p><b>SM</b> Pass</p> <p><b>XD</b> Pass</p> <p><b>SD</b> Pass</p> <p><b>MMC</b> Pass</p> <p><b>MS</b> Pass</p> <p><b>MS Pro</b> Pass</p>	

## **Test Suite #13- USB WHQL**

### **Overview**

This test suite checks to ensure that the USB97C223 is able to pass the Windows Hardware Quality Lab (WHQL) certification testing. All tests below are performed in a single LUN configuration under Windows XP using the latest HCT available from Microsoft.

#### **Manual Tests:**

#	WHQL Test	Windows XP	Comments
1	Enable/Disable- Device I/O (Storage)	Pass	
2	USB Selective Suspend	Pass	
3	USB Serial Number	Pass	

#### **Automated Tests:**

#	WHQL Test	Windows XP	Comments
1	ACPI S1 Stress	Pass	
2	ACPI S3 Stress	Pass	
3	Disk Stress	Pass	
4	FAT- File I/O (Removable)	Pass	
5	Storage Device Stress	Pass	
6	Surprise Removal	Pass	
7	Syscache	Pass	
8	Sysparse	Pass	

## **Test Suite #14- Chapter 9 Current Measurement Tests**

### **Overview**

This test suite checks to ensure that the USB97C223 meets all Chapter 9 power requirements for both bus and self powered devices. All tests are run in Windows XP.

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<b>Unconfigured Current (Bus Powered)-</b>  Using the USBCV test utility, check the unconfigured current for the USB97C223 bus powered.  In order to pass, the device must draw no more than 100mA in an unconfigured state.  Once the test is complete, close the USBCV application and verify that the test stack driver is unloaded and that the device is enumerated normally as a mass storage class device.	N/A	N/A	N/A	Pass	
2	<b>Operating Current-</b>  Verify that the device is bus powered and enumerated properly. Initiate large file transfers simultaneously on all four LUNs. During the transfer, measure the current being drawn by the 223.  In order to pass, the device cannot draw more than 500mA at any time during the operation.	N/A	N/A	N/A	Pass	
3	<b>Suspend Current-</b>  Suspend the host. Once the host has stabilized in a suspended state, wait 5 to 10 seconds and then measure the suspended current draw for the 223.  In order to pass the test, the device can draw no more than 500uA while suspended.	N/A	N/A	N/A	Pass	

### Test Suite #14 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
4	<p><b>Unconfigured Current (Self-Powered)-</b></p> <p>Using the USBCV test utility, check the unconfigured current for the USB97C223 self powered.</p> <p>In order to pass, the device must draw no more than 100mA in an unconfigured state.</p> <p>Once the test is complete, close the USBCV application and verify that the test stack driver is unloaded and that the device is enumerated normally as a mass storage class device.</p>	N/A	N/A	N/A	Pass	
5	<p><b>Operating Current-</b></p> <p>Verify that the device is self powered and enumerated properly. Initiate large file transfers simultaneously on all four LUNs. During the transfer, measure the current being drawn by the 223.</p> <p>In order to pass, the device cannot draw more than 100mA from the host at any time during the operation.</p>	N/A	N/A	N/A	Pass	
6	<p><b>Suspend Current-</b></p> <p>Suspend the host. Once the host has stabilized in a suspended state, wait 5 to 10 seconds and then measure the suspended current draw for the 223.</p> <p>In order to pass the test, the device can draw no more than 500uA from the host while suspended.</p>	N/A	N/A	N/A	Pass	

## **Test Suite #15- Bundled Software Application Tests**

### **Overview**

This test suite checks to ensure that all of the applications bundled with the USB97C223 operate properly in accordance with the user instructions provided in the USB97C223 Software Release Notes.

#	Application	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	USBDM 1.004	Not Tested	Not Tested	Not Tested	Pass	
2	DOS Pitu	Pass	Pass	Pass	Pass	
3	PLDU	Pass	Pass	Pass	Pass	
4	DFUTest	Pass	Pass	Pass	Pass	

## **Test Suite #16- Device Firmware Upgrade / Descriptor Update**

### **Overview**

This test suite checks to ensure that both the device firmware upgrade (DFU) and descriptor update functionality of the USB97C223 work properly. Please note that DFU functionality is only available for devices that utilize an external flash ROM.

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<p><b>DFU-</b></p> <p>Load a 223 eval board with a DFU enabled "both.bin" binary created from the last release version of the 223 firmware.</p> <p>Perform a DFU update to the version of firmware under test. Verify that the operation completes normally.</p> <p>Unplug the device and reattach it to the host. Verify that it enumerates properly. Check the version of the firmware using USBView (looking at the bcdDevice string). Make sure that the version displayed is the version that was uploaded to the device.</p>	Pass	Pass	Pass	Pass	
2	<p><b>Descriptor Update-</b></p> <p>Modify an eeprom.dat file and upload it to the device. Once the operation completes, hot plug the device and verify that the eeprom contains the new data. Repeat this test using the "NO.EEPROM" version of the firmware.</p> <p>Continue to use descriptor updates to completely verify the LUN configuration and icon sharing functionality of the device.</p> <p>(Refer to the USB97C223 Software Release Notes for information on LUN Configuration and Icon Sharing.)</p>	Pass	Pass	Pass	Pass	

## **Test Suite #17 - C3 – Attach on Insert**

### **Overview**

This test suite checks to ensure that the C3 Attach on Insert functionality of the USB97C223 works properly. For test steps that require verification that the device suspends properly, measure the suspend current of the test device. The following is required for this feature to function properly when using a USB97C223 EVB

- 1) Ensure that the EVB is REV B
- 2) Ensure that R135 is removed from the EVB
- 3) Set GPIO to be used as SD indicator (Attribute byte 1, bit 2)
- 4) Enable C3 functionality (Attach on card insertion, Attribute byte 3, bit 0)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
1	<b>Initial Plug-in – with media</b>  Insert media into each available slot of a USB97C223 board.  Connect this test device to the host controller.  Verify that the device does attach as normal. Icons should be present. Each piece of media should be active and should be able to be written to and read from.	Pass	Pass	Pass	Pass	
2	<b>Initial Plug-in – no media</b>  Disconnect the USB97C223 board from the host controller.  Remove all media.  Reattach the USB97C223 board. Verify that the device does not attach. No icons should be present.	Pass	Pass	Pass	Pass	
3	<b>Insert of single media – removal of single media</b>  Insert a CF card into the USB97C223 board. Verify that after this insertion of media, the test device is attached and all luns are present. Only CF should be active and be able to be read from and written to.  Remove the CF card. Verify that this removal results in the test device detaching and going into suspend mode.  Repeat these steps using MS, MS Pro, IBM-MD, SM, XD, SD, and MMC	Pass	Pass	Pass	Pass	

## Test Suite #17 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
4	<p><b>Insert of several media – removal of several media</b></p> <p>Verify that with no media inserted into test device that it is not attached. Insert media into all available slots. Verify that the first media inserted causes the device to attach. Each media inserted after this should result in that particular drive becoming active and being able to read from/write to the card.</p> <p>Remove each piece of media one at a time until only one piece remains in the test device. Verify for these removals that the device remains attached and the slot that the media was removed from can no longer be accessed.</p> <p>Remove the last piece of media. Verify that the device detaches and suspends.</p>	Pass	Pass	Pass	Pass	
5	<p><b>Suspend –</b></p> <p>Insert media into the test device. Verify that the device is attached.</p> <p>Suspend the device by putting the host in standby. Verify that while the host is in standby that the device does not detach and suspends normally.</p> <p>Wake the host. Verify that the device is still attached and all media that is inserted into the device can be read from and written to.</p>	Pass	Pass	Pass	Pass	
6	<p><b>Awakened Device – no media</b></p> <p>Remove all media from test device. Verify device is detached. Suspend the host.</p> <p>Wake host and verify that device is still detached.</p>	Pass	Pass	Pass	Pass	



### Test Suite #17 Results (cont.)

#	Test Standard	Windows 98	Windows Me	Windows 2000	Windows XP	Comments
7	<p><b>Awakened Device – surprise insertion of media</b></p> <p>Device should contain no media, be connected to host, and be detached.</p> <p>Suspend the host.</p> <p>While host is suspended, insert media into test device. Verify that device is still suspended.</p> <p>Wake host. Verify that the device attaches and that each media can be read from and written to.</p>	Pass	Pass	Pass	Pass	
8	<p><b>Awakened Device – surprise removal of media</b></p> <p>Device should contain media from prior step, be connected to host, and be attached.</p> <p>Suspend the host.</p> <p>While host is suspended, remove all media from test device. Verify that the device is still suspended.</p> <p>Wake host. Verify that the device is not detached and that no icons are present.</p>	Pass	Pass	Pass	Pass	

## **Test Suite #18- Memory Stick Compatibility Testing**

### **Overview**

This test ensures that all tests listed in Sony Corporation's *Memory Stick Implementation Check Procedures* pass with USB97C223. Refer to the *Memory Stick Implementation Check Procedures* document for specific instructions on how to perform each individual test listed below. All tests are run using Windows XP.

### **Chapter 7 of Memory Stick Compatibility test results:**

Test #	Test Description	Windows XP	Comments
7001	1.6 Logical / Physical Translation Table Block	Pass	
7002	1.7 Data Write/Read (when W/P SW is turned ON)	Pass	
7003	1.8 Data Read/Write (when W/P SW is turned OFF)	Pass	
7004	1.9 Duplicated Logical Addresses	Pass	
7005	1.10 Alternative Blocks	Pass	
7006	1.11 Disabled Blocks	Pass	
7007	1.12 Digital Read Protected Bit	Pass	
7008	1.13 Block Status/Page Status	Pass	

7009	1.14 Abnormal Boot Block	Pass	
7010	1.15 Boot Area Protection Processing	Pass	
7011	1.16 128MB Support	Pass	
7012	1.17 Alternative Blocks	Pass	

### Chapter 8 of Memory Stick Compatibility test results:

Test #	Test Description	Windows XP	Comments
8001	2.6 Mount Processing	Pass	
8002	2.7 Write Processing	Pass	
8003	2.8 Delete and Format Processing	Pass	
8004	2.9 Relating to Archive Bits	Pass	
8005	2.10 Memory Stick formatted by Windows	N/A	

## **Test Suite #19- Macintosh OS Specific Testing**

### **Overview**

This test suite summarizes the testing performed in the Macintosh operating systems.

#	Test Suite	Mac OS 9.2	Mac OS 10.2	Mac OS 10.3		Comments
1	Installation	Pass	Pass	Pass		
2	Compact Flash / IBM MicroDrive	Pass	Pass	Pass		
3	Smart Media	Pass	Pass	Pass		
4	XD	Pass	Pass	Pass		
5	Secure Digital / Multimedia Card	Pass	Pass	Pass		
6	Memory Stick / Memory Stick Pro	Pass	Pass	Pass		
7	Multiple Device	Pass	Pass	Pass		
8	C3 – Attach on Insert	Pass	Pass	Pass		
9	USB 1.1	Not Required- OS is USB 1.1 Only.	Pass	Pass		