

EXPRESSCARD™ INTEROPERABILITY CHECKLIST

Release 1.1



ExpressCard™

REVISION HISTORY

Date	Specification Version	Revisions
September 24, 2004	Release 1.0	Initial Release
December 19, 2005	Release 1.1	Proposal 020: Interop Testing Clarifications <ul style="list-style-type: none"><li data-bbox="813 464 1247 489">• Added Pre-test Conditions for Host Systems<li data-bbox="813 495 1187 520">• Updated procedure details for all tests

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A. ExpressCard Interoperability Checklist Submittal Form [Error! Bookmark not defined.](#)

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INTRODUCTION

Scope

This document covers the USB-IF ExpressCard™ interoperability checklist to be used by module and system developers to establish their compliance to the *ExpressCard Standard, Release 1.1*.

The primary methodology of the compliance program is to qualify an ExpressCard-based product for the USB-IF Integrators list based on the successful completion and registration of an approved compliance checklist and the successful participation in interoperability testing by a USB-IF registered third party test house following the same procedures documented herein and done using the specified test products lists maintained and published by the USB-IF..

Related Documents

The following reference documents provide normative requirements as specified in this document.

- *ExpressCard Standard, Release 1.1* – Personal Computer Memory Card International Association (PCMCIA)/Japan Electronics and Information Technology Industries Association (JEITA)
- *PCI Express Base Specification 1.0a* – PCI Special Interest Group (PCI-SIG)
- *USB Specification, Release 2.0* – Universal Serial Bus Implementers Forum (USB-IF)
- *System Management Bus (SMBus) Specification, Version 2.0* - Smart Battery System Implementer's Forum (SBS-IF)
- *PCI Express Card Electromechanical Specification 1.0a* – PCI Special Interest Group (PCI-SIG)
- EIA-364-1000.01: Environmental Test Methodology for Assessing the Performance of Electrical Connectors and Sockets Used in Business Office Applications
- *Advanced Configuration and Power Interface (ACPI) Specification, Revision 2.0b* – Compaq Computer Corporation, Intel Corporation, Microsoft Corporation, Phoenix Technologies Ltd., Toshiba Corporation
- *PCI Bus Power Management Interface Specification, Revision 1.2* – PCI Special Interest Group (PCI-SIG)

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EXPRESSCARD INTEROPERABILITY CHECKLIST

This section describes the ExpressCard interoperability process to be completed by the product manufacturers and the results submitted as a signed affidavit for the verification of successful interoperability testing to these specified requirements. It is acceptable to have the testing completed by a third-party service provider on their behalf although the reporting affidavit must be signed by, and the accuracy of the information is the responsibility of, the original manufacturer.

It is the intent of this program that the checklist items be verified by detailed inspection or testing of actual production-representative product.

The following checklist should be followed in the order presented and is based on starting with modules and host systems that have never been used together prior to the testing. After the completion of the initial installation test, all subsequent tests assume that the module and host system have successfully completed the installation test.

An example of the testing submittal form is provided in Appendix A. When recording results on the form, be sure to include accurate references to the test procedure ID and failure characteristic (by letter reference when possible) in addition to any clarification text that will be useful in subsequent evaluation of the results.

Important Note: The procedures and pass/fail criteria presented in this document were developed based on a Microsoft Windows™ Operating System. For non-Windows platforms, appropriate adaptation of these procedures and pass/fail criteria should be accounted for in testing to this checklist.

Pre-Test Conditions for Host Systems

Interoperability testing of host systems involves the matching up a number of module products with the host system under test in order to determine that acceptable behavior will ensue for the various usage situations listed within this document. Interoperability testing at third-party testing services will involve taking the host system product under test and performing the following interoperability checklist against a series of modules covering various applications and interface configurations (PCIe, USB 2.0, and USB 1.1). It is due to this that some consideration has to be given to the initial platform settings for which each set of module tests will be run in order that the impact of issues with prior test modules are not adversely affected by incompatible behavior.

Prior to initiating the following checklist when evaluating a module that has yet to be given a compliance ID, the host system should save its current operating system configuration using a facility such as the Set Restore Point feature of the Microsoft Windows™ Operating System. Additionally, following completion of the interoperability checklist testing for a given module, the host system should be restored to that saved system configuration in order to remove the changes (i.e. drivers and/or applications installed, software settings, etc.) that may have occurred as the result of introducing the module to the host system.

Initial Module Installation

Background: The starting condition for this test is that the host system is powered and functioning in a normal operational state. The module is then introduced to the system for the first time by insertion into the slot. No pre-installation of driver or applications software is allowed prior to the module's initial insertion.

ID:	Description:	Pass / Fail Criteria:
III	<p>Power on/boot host system without any module inserted into the slot. Verify normal operation of the host system. Insert module into slot.</p> <p>Note: Some device may have to install Windows-specific component(s) during driver installation. It is acceptable to reboot specifically for these Windows component if required.</p>	<p>Pass:</p> <ul style="list-style-type: none"> ✓ Module is enumerated ✓ Driver installs with an .INF file (provide from vendor) or is enumerated automatically by the system (class driver) ✓ No reboot is required as the result of the module installation ✓ Module is correctly identified by Device Manager and no yellow exclamation point is shown for any device ✓ For USB-based modules, module is correctly installed with regard to the speed of the module and the port to which it is connected, e.g. a high-speed capable module is connected to a high-speed capable port <p>Fail:</p> <ol style="list-style-type: none"> a. Module cannot be installed because it requires driver installation or application software before module is initially inserted b. Module does not get enumerated c. Host system locks up during enumeration d. Host system requires reboot before module can be used e. Module is incorrectly identified by Device Manager or a device is flagged as not operational (yellow exclamation point)
II2	<p>Demonstrate operation of module with updated drivers and application (if applicable)</p> <p>Note: If application software necessary to demonstrate module operation was not automatically installed during the module/driver install, it is acceptable to install that software now.</p>	<p>Pass:</p> <ul style="list-style-type: none"> ✓ Module operates as expected <p>Fail:</p> <ol style="list-style-type: none"> a. Module fails to operate as expected b. Module is not operating at its designed speed c. Host system locks up due to the operation of the module or module-related application

Graceful Removal

Background: The starting condition for this test is that the host system is powered and functioning in a normal operational state with the module installed and operational as well. Prior to extracting the module, the user is to take appropriate action to request that the host system cease operation of the module and indicate to the user that it is safe to remove the module. Once the system informs that it's OK to remove the module, the module is removed.

ID:	Description:	Pass / Fail Criteria:
GR1	<p>Initiate a graceful removal per one of the following options.</p> <ol style="list-style-type: none"> 1. If the application appears in the Safely Remove Hardware applet (accessible via the task bar), then stop the module via the applet. 2. If the application doesn't appear in the Safely Remove Hardware applet but does have its own hardware control applet, then use that application as intended to stop the module. 3. If no user interface for managing the module is normally used with this module, then skip this step. 	<p>Pass:</p> <ul style="list-style-type: none"> ✓ For removal option 1 or 2, the user gets notification that the module was able to be removed safely ✓ Host system is able to continue normal operation without any adverse impact <p>Fail:</p> <ol style="list-style-type: none"> a. For removal options 1 or 2, no indication is given to the user that the Module is safe to remove or stopped b. Host system is not able to continue normal operation
GR2	Remove the module.	<p>Pass:</p> <ul style="list-style-type: none"> ✓ Module is removed from the Device Manager ✓ For removal option 1 in GR1, the module is removed from the Safely Remove Hardware applet. ✓ Host system is able to continue normal operation without any adverse impact <p>Fail:</p> <ol style="list-style-type: none"> a. Module is not removed from the Device Manager b. Host system is not able to continue normal operation

Hot Insertion

Background: The starting condition for this test is that the host system is powered and functioning in a normal operational state. The module is then introduced to the system by insertion into the slot.

ID:	Description:	Pass / Fail Criteria:
HI1	With the host on and operating normally, insert the module.	Pass: <ul style="list-style-type: none"> ✓ Module appears correctly in Device Manager ✓ As appropriate, module appears correctly in Safely Remove Hardware applet ✓ Module operates as expected ✓ Host system does not require a reboot to continue operating normally Fail: <ol style="list-style-type: none"> a. Module fails to operate as expected b. Module is not operating at its designed speed c. Host system locks up due to the operation of the module or module-related application

Surprise Removal

Background: The starting condition for this test is that the host system is powered and functioning in a normal operational state with the module installed and operational as well. Without prior action by the user to notify the host system that the module is to be removed, the module is removed from the system.

Note: This test should not be performed for systems where a system dependency was created with the insertion of the module, e.g. the module is the boot device or a system security token.

In this case, this section is NA _____

ID:	Description:	Pass / Fail Criteria:
SR1	With the host on and operating normally with the module, remove the module without using software to stop the module.	Pass: <ul style="list-style-type: none"> ✓ Module is removed from the Device Manager ✓ As appropriate, the module is removed from the Safely Remove Hardware applet. ✓ Host system is able to continue normal operation without any adverse impact Fail: <ol style="list-style-type: none"> a. Module is not removed from the Device Manager b. Module appears in the Safely Remove Hardware applet c. Host system is not able to continue normal operation

Cold Insertion

Background: The starting condition for this test is that the host system is un-powered. The module is then introduced to the system by insertion into the slot. Following module insertion, the host system is powered up for normal operation.

ID:	Description:	Pass / Fail Criteria:
CI1	With the host off, insert the module. After insertion, power on the host.	Pass: <ul style="list-style-type: none"> ✓ Host system boots correctly and operates normally ✓ Module appears correctly in Device Manager ✓ As appropriate, module appears correctly in Safely Remove Hardware applet ✓ Module operates as expected Fail: <ol style="list-style-type: none"> a. Host system fails to boot or operate correctly b. Module fails to operate as expected c. Module is not operating at its designed speed

Sleep/suspend (S1-S3) removal

Background: The starting condition for this test is that the host system is powered and functioning in a normal operational state with the module installed and operational as well. Prior to removal, the host system is put into a sleep/suspend state. Once entering the sleep/suspend state is complete, the module is removed. After removal, the host system is resumed from the sleep/suspend state and operates normally with the module no longer present in the host.

If sleep/suspend state operation is not a product feature of the host system, this section is should be skipped.

Note: This test should not be performed for systems where a system dependency was created with the insertion of the module, e.g. the module is the boot device or a system security token. In this case, skip this section.

ID:	Description:	Pass / Fail Criteria:
SS1	With the host on and operating normally with the module, put the host into the sleep/suspend state using one of the methods supported by the host. Once the host is fully suspended, remove the module.	Pass: <ul style="list-style-type: none"> ✓ Host system does not resume from the sleep/suspend (S1-S3) state as a direct result of removing the module from the slot Fail: <ol style="list-style-type: none"> a. Host system resumes as the result of removing the module from the slot

ID:	Description:	Pass / Fail Criteria:
SS2	Resume the host to normal operation (exiting the sleep/suspend state) using an appropriate method supported by the host.	<p>Pass:</p> <ul style="list-style-type: none"> ✓ Host system resumes to normal S0 operation ✓ Module is removed from the Device Manager ✓ As appropriate, the module is removed from the Safely Remove Hardware applet. ✓ Host system is able to continue normal operation without any adverse impact <p>Fail:</p> <ul style="list-style-type: none"> a. Host system fails to resume to normal S0 operation b. Module is not removed from the Device Manager c. Module appears in the Safely Remove Hardware applet

Sleep/Suspend (S1-S3) Insertion

Background: The starting condition for this test is that the host system is in normal operation with no module operating in the system and is subsequently put into a sleep/suspend state. The module is then introduced to the system by insertion into the slot. Following module insertion, the host system is resumed by direct user action from the sleep/suspend state for normal operation.

If sleep/suspend state operation is not a product feature of the host system, this section is should be skipped.

ID:	Description:	Pass / Fail Criteria:
SI1	With the host on and operating normally without a module inserted, put the host into the sleep/suspend (S1-S3) state using one of the methods supported by the host. Once the host is fully suspended, insert the module.	<p>Pass:</p> <ul style="list-style-type: none"> ✓ Host system does not resume from the sleep/suspend (S1-S3) state as a direct result of inserting the module into the slot <p>Fail:</p> <ul style="list-style-type: none"> a. Host system resumes as the result of inserting the module into the slot
SI2	Resume the host to normal operation (exiting the sleep/suspend state) using an appropriate method supported by the host.	<p>Pass:</p> <ul style="list-style-type: none"> ✓ Host system resumes to normal S0 operation ✓ Module appears correctly in Device Manager ✓ As appropriate, module appears correctly in Safely Remove Hardware applet ✓ Module operates as expected <p>Fail:</p> <ul style="list-style-type: none"> a. Host system fails to resume to normal S0 operation b. Module fails to operate as expected c. Module is not operating at its designed speed

Hibernation (S4) Removal

Background: The starting condition for this test is that the host system is powered and functioning in a normal operational state with the module installed and operational as well. Prior to removal, the host system is put into a hibernation state. Once entering the hibernation state is complete, the module is removed. After removal, the host system is resumed from the hibernation state and operates normally with the module no longer present in the host.

If hibernation state operation is not a product feature of the host system, this section is should be skipped.

Note: This test should not be performed for systems where a system dependency was created with the insertion of the module, e.g. the module is the boot device or a system security token. In this case, skip this section.

ID:	Description:	Pass / Fail Criteria:
HR1	With the host on and operating normally with the module, put the host into the hibernation state (S4) using one of the methods supported by the host. Once the host is fully hibernated, remove the module.	Pass: ✓ Host system does not resume from the hibernation state (S4) as a direct result of removing the module from the slot Fail: a. Host system resumes as the result of removing the module from the slot
HR2	Resume the host to normal operation (exiting the hibernation state) using an appropriate method supported by the host.	Pass: ✓ Host system resumes to normal S0 operation ✓ Module is removed from the Device Manager ✓ As appropriate, the module is removed from the Safely Remove Hardware applet. ✓ Host system is able to continue normal operation without any adverse impact Fail: a. Host system fails to resume to normal S0 operation b. Module is not removed from the Device Manager c. Module appears in the Safely Remove Hardware applet

Hibernation (S4) Insertion

Background: The starting condition for this test is that the host system is in normal operation with no module operating in the system and is subsequently put into a hibernation state. The module is then introduced to the system by insertion into the slot. Following module insertion, the host system is resumed by direct user action from the hibernation state for normal operation.

If hibernation state operation is not a product feature of the host system, this section is should be skipped.

ID:	Description:	Pass / Fail Criteria:
HI1	With the host on and operating normally without a module inserted, put the host into the hibernation state (S4) using one of the methods supported by the host. Once the host is fully hibernated, insert the module.	Pass: ✓ Host system does not resume from the hibernation state (S4) as a direct result of inserting the module into the slot Fail: a. Host system resumes as the result of inserting the module into the slot
HI2	Resume the host to normal operation (exiting the hibernation state) using an appropriate method supported by the host.	Pass: ✓ Host system resumes to normal S0 operation ✓ Module appears correctly in Device Manager ✓ As appropriate, module appears correctly in Safely Remove Hardware applet ✓ Module operates as expected Fail: a. Host system fails to resume to normal S0 operation b. Module fails to operate as expected c. Module is not operating at its designed speed