
USB Compliance Checklist Peripherals (Excluding Hubs)

For the 2.0 USB Specification
Checklist Version 1.08
November 28, 2001

USB Device Product Information

field	—all fields must be filled in—
Date	
Vendor Name	
Vendor Street Address	
Vendor City, State, Postal Code	
Vendor Country	
Vendor Phone Number	
Vendor Contact, Title	
Vendor Contact Email Address	
Product Name	
Product Model Number	
Product Revision Level	
Test ID Number	
Captive Cable Used (Yes/No)	
Manufacture, Model, & TID of Receptacles used	
Manufacture, Model, & TID of Connectors and/or Cable Assemblies used	
Manufacture & Model Identifier of the USB Silicon used in this peripheral	
Signature of Preparer	

Table of Contents

1	INTRODUCTION	2
1.1	General Notes.....	2
2	MECHANICAL DESIGN AND LAYOUT	2
2.1	Low-Speed Devices (not applicable to full-speed devices)	3
2.2	Full-Speed Devices (not applicable to low-speed devices).....	3
2.3	Tethered Devices (not applicable to untethered devices)	3
2.4	Untethered Devices (not applicable to tethered devices)	3
3	DEVICE STATES AND SIGNALS.....	4
3.1	Low-Speed Devices (not applicable to full-speed devices)	5
3.2	Full-Speed Devices (not applicable to low-speed devices).....	5
3.3	Remote Wakeup (not applicable to devices which do not support remote wakeup).....	5
4	OPERATING VOLTAGES AND POWER CONSUMPTION.....	6
4.1	Bus Power Consumption (applicable to all devices, including self powered devices)	6
4.1.1	Low-Power and Self Powered Devices (not applicable to high power devices).....	6
4.1.2	High Power Devices (not applicable to low-power and self powered devices).....	6
5	RECOMMENDED QUESTIONS.....	7
6	EXPLANATIONS.....	8

Revision History

version	changes	Date
1.07	Minor modifications for 2.0 spec	2001.11.28
1.07	Changes for 2.0	2001.10.5
1.06	added test ID field	1999.8.16
1.05	added D3, revised D2, D4	1999.7.15
1.04	typo fixes	1999.5.18
1.03	added D25, test description pointers	1999.4.9
1.02	revised introduction and clarified bus current draw ownership revised D11, D12, LP9, HP12, fixed □, □, typos	1999.2.5
1.01	added preparer's signature and changed checklist contact info	1999.1.4
1.00	initial release: added contact info and some minor clarifications	1998.11.20
.95	first public review draft, released for Taipei USB Plugfest	1998.10.26

1 Introduction

This checklist helps designers of USB peripherals to assess their products' compliance with the Universal Serial Bus Specification, Revision 2.0. Unless explicitly stated otherwise, all references to the USB Specification refer to Revision 2.0.

This checklist is also used, in part, to qualify a USB peripheral for the USB-IF Integrators List. This document and other USB compliance tools, including USB Check, are available in the developers section of the USB-IF's website, <http://www.usb.org/developers/>. The compliance checklists are updated periodically, so developers should check for updates when starting new projects.

Section 5, Recommended Questions, contains questions covering areas not required by the USB Specification. Answering these questions is not a requirement for compliance with the Specification or acceptance to the Integrators List. However, vendors are strongly encouraged to take these questions into consideration when designing their products.

Questions or comments regarding the Integrators List, Compliance Workshop testing results, or checklist submissions should be sent to admin@usb.org. If you have questions regarding the checklist itself, feel it fails to adequately cover an aspect of the USB specification, have found an error, or would like to propose a question, please contact the USB-IF at checklists@usb.org.

1.1 General Notes

- All voltages are referenced to the device's USB ground.

2 Mechanical Design and Layout

ID	question
M1	<p>What is the manufacture and model identifier of the connectors or cables used with this peripheral?</p> <p>Manufacturer: _____</p> <p>Model: _____</p> <p>If the connectors or cables used in this peripheral are NOT listed on the USB Integrators List attach Connector and Cable Assembly checklists covering this peripheral's connectors and cable assemblies.</p>
M2	<p>What is the manufacture and model identifier of the USB silicon used in this peripheral?</p> <p>Manufacturer: _____</p> <p>Model: _____</p> <p>If the silicon used in this peripheral is NOT listed on the USB Integrators List attach a Peripheral Silicon checklist covering this peripheral's USB silicon.</p>

Device vendors are strongly encouraged to review the Connector and Cable Assembly and Peripheral Silicon checklists regardless of whether or not their device's cabling, connectors, and silicon appear on the Integrators List.

ID	question	response	sections in spec
M3	Can the device's data lines withstand voltages between -1.0 and 4.6V	yes no	7.1.1

	applied with a source impedance of $39\Omega \pm 2\%$ for up to 100ns?			
M4	When tri-stated, can either data line be continuously shorted to V_{BUS} , GND, the other data line, or the connector's shield without damage occurring?	yes	no	7.1.1
M5	When driving 50% of the time, can either data line be shorted to V_{BUS} , GND, the other data line, or the connector's shield without damage occurring?	yes	no	7.1.1
M6	Do the D+ and D- traces present a characteristic impedance of $45\Omega \pm 15\%$ to GND and a differential impedance of $90\Omega \pm 15\%$, between the device's cable connection and termination resistors?	yes	no	7.1.6
M7	If edge rate control capacitors are used: Are they located between the transceiver pins and the device's termination resistors? Is their capacitance less than 75pF and balanced within 10%?	yes	no	7.1.6
M8	Are the device's receivers and transmitters within 1ns of its cable connection?	yes	no	7.1.16
M9	Does the device present sufficient capacitance between V_{BUS} and GND to prevent adverse effects from flyback voltages when its cable is disconnected? (A minimum of 1.0nF is recommended.)	yes	no	7.2.4.2

2.1 Low-Speed Devices

(not applicable to full-speed devices)

MLS1	Does the device have a captive cable?	yes	no	7.1.1.2
MLS2	Does the device pull up D-?	yes	no	7.1.5
MLS3	Does the device, with its captive cable, present a single-ended capacitance between 200 and 450pF on the D+ and D- lines?	yes	no	7.1.1.2
MLS4	Is the device's signaling rate 1.50Mb/s $\pm 1.5\%$, even if the device uses spread spectrum clocking?	yes	no	7.1.11

2.2 Full-Speed Devices

(not applicable to low-speed devices)

MFS1	Does the device's source impedance remain in the shaded areas of Figure 7-4?	yes	no	7.1.1.1
MFS2	Does the device pull up D+?	yes	no	7.1.5
MFS3	Is the device's signaling rate 12.000Mb/s $\pm 2.5\%$, even if the device uses spread spectrum clocking?	yes	no	7.1.11

2.3 Tethered Devices

(not applicable to untethered devices)

Tethered devices are devices with a captive cable.

MT1	Does the captive cable have a series A plug?	yes	no	6.2
MT2	Does the device pull up the appropriate data line with a $1.5k\Omega \pm 5\%$ resistor attached to a voltage source between 3.0 and 3.6V or with a Thévenin source of at least 900 Ω ?	yes	no	7.1.5

2.4 Untethered Devices

(not applicable to tethered devices)

Untethered devices are devices with a detachable cable.

MUT1	Does the device have a series B receptacle?	yes	no	6.2
MUT2	Does the device pull up D+ with a 1.5k Ω \pm 5% resistor attached to a voltage source between 3.0 and 3.6V?	yes	no	7.1.5
MUT3	Does the device's upstream port present 100pF or less on D+ and D-?	yes	no	7.1.6

3 Device States and Signals

D1	Can the device pull up the appropriate data line to at least 2.0V within 2.5 μ s?	yes	no	7.1.5
D2	Is the device's pullup active only when V _{BUS} is high?	yes	no	7.1.5
D3	Is the V _{BUS} switching threshold for the device's pullup control between 1.0V and 4.0V?	yes	no	7.1.5
D4	If the device is bus powered, or uses bus power to run any of its components, does it pull up the appropriate data line within 100ms of V _{BUS} exceeding 4.01V?	yes	no	7.1.5
D5	Does the device meet all power-on and connection timing requirements, as illustrated in Figure 7-29?	yes	no	7.1.7.3 7.3.2
D6	Does the device respond to a reset no sooner than 2.5 μ s and no later than 10ms after the SE0 begins?	yes	no	7.1.7.5
D7	Is the device's reset recovery time less than 10ms?	yes	no	7.1.7.5
D8	At the end of reset is the device in the default state?	yes	no	7.1.7.3 9.1.1
D9	Can the device correctly handle more than one USB RESET with no intervening packets?	yes	no	7.1.7.3
D10	Does the device begin the transition to its suspend state after its bus segment has been idle for 3ms, regardless of the device's state?	yes	no	7.1.7.4
D11	Has the device's power consumption dropped to its suspended value after the hub's upstream bus segment has been idle for 10ms?	yes	no	7.1.7.4
D12	When suspended, does the device recognize any non-idle state on the bus, excluding a reset, as a resume signal?	yes	no	7.1.7.5
D13	When suspended, does the device recognize a reset and act on the signal so that it enters the default state?	yes	no	7.1.7.5 7.1.7.3 9.1
D14	Does the device recognize a K \rightarrow low-speed EOP \rightarrow J transition on its upstream port as the end of resume signaling?	yes	no	7.1.7.7
D15	Is the device able to accept a SetAddress() request 10ms after resume is signaled?	yes	no	7.1.7.5
D16	Does the device complete its wakeup within 20ms?	yes	no	7.1.7.5
D17	Can the device function correctly with frame lengths between 995 and 1005 μ s?	yes	no	7.1.12
D18	Does the device function correctly on tier 6, when subjected to worst-case hub bit skews and delay times?	yes	no	7.1.14 7.1.19
D19	Does the device drive no signals upstream on power up?	yes	no	7.2.1
D20	Does the combination of the device's pullup and the 15k Ω \pm 5% pulldown resistor at the upstream port yield a voltage between 2.7 and 3.6V when the bus is idle?	yes	no	7.3.2
D21	Does the device complete SetAddress() or a standard request with no data in less than 50ms?	yes	no	7.3.2 9.2.6.3

D22	Does the device deliver the first and all subsequent data packets, except for the last data packet, for a standard request within 500ms?	yes	no	7.3.2 9.2.6.4
D23	Does the device deliver the last data packet for a standard request within 50ms?	yes	no	7.3.2 9.2.6.4
D24	Does the device pass a full Chapter 9 test, as performed by USB Check?	yes	no	Chapters 8 and 9
D25	Does the device implement a default control endpoint 0 for all addresses?	yes	no	9.1.1.4
D26	Are the device's differential <i>and</i> single-ended USB signals within spec? Note: This test is especially important if ferrite beads or a common mode choke is used on the USB data lines, as these components often pose a significant signal integrity hazard.	yes	no	7.1.6

Device vendors are strongly encouraged to complete all bus transactions as quickly as is practical. See section 9.2.6.1 for details.

For details on testing USB signals, consult the USB-IF's signal quality test description, which can be downloaded from the USB-IF Compliance Program webpage.

3.1 Low-Speed Devices

(not applicable to full-speed devices)

LS1	Does a low-speed device implement the default control pipe and, at most, two interrupt endpoints?	yes	no	5.3.1.1
LS2	Does the device allow an interpacket delay of at least two low-speed bit times?	yes	no	7.1.18
LS3	Is the device's transaction timeout 16–18 low-speed bit times?	yes	no	7.1.19
LS4	Does the device recognize keep alive strobes and remain awake?	yes	no	11.8.4.1

3.2 Full-Speed Devices

(not applicable to low-speed devices)

FS1	Does the device allow an interpacket delay of at least two full-speed bit times?	yes	no	7.1.18
FS2	Is the device's transaction timeout 16–18 full-speed bit times?	yes	no	7.1.19
FS3	Does the device ignore low-speed packets?	yes	no	8.6.5

3.3 Remote Wakeup

(not applicable to devices which do not support remote wakeup)

W1	Does the device wait at least 5.0ms after its bus segment enters the idle state before sending a remote wakeup?	yes	no	7.1.7.5
W2	Does the device signal remote wakeup by driving K upstream for at least 1ms, but not more than 15m?	yes	no	7.1.7.5
W3	After driving K, does the device immediately tri-state its buffers without driving the bus to any non-K state?	yes	no	7.1.7.5
W4	Does the device send remote wakeups only when configured to do so?	yes	no	9.6.2

4 Operating Voltages and Power Consumption

P1	Does the device source no current to V_{BUS} under any circumstance?	yes	no	7.2.1
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4.1 Bus Power Consumption (applicable to all devices, including self powered devices)

Note: the current allotted for a device consuming bus power encompasses all current drawn from V_{BUS} , including the power required to drive the device's upstream USB port. For details on testing USB device current consumption, please consult the USB-IF current test description, which can be downloaded from the USB-IF Compliance Program webpage.

4.1.1 Low-Power and Self Powered Devices (not applicable to high power devices)

LP1	Is the MaxPower field in the device's configuration descriptor 100mA or less?	yes	no	7.2.1.3 9.6.2
LP2	Can the device operate in all states with a steady-state V_{BUS} of 4.35–5.25V?	yes	no	7.2.2
LP3	Can the device operate in all states with a transient V_{BUS} as low as 4.02V?	yes	no	7.2.2
LP4	Does the device draw the amount of current specified in its MaxPower field or less at all times, provided its V_{BUS} is between 4.02 and 5.25V?	yes	no	7.2.1.3
LP5	When the device is suspended, is its average current draw less than 500 μ A?	yes	no	7.2.3
LP6	If the device's current draw spikes during suspend, is the maximum spike height less than 100mA and is the spike's edge rate less than 100mA/ μ s for V_{BUS} between 4.02 and 5.25V?	yes	no	7.2.3
LP7	When the device wakes up from suspend, does it limit any inrush currents to 100mA or less?	yes	no	7.2.3
LP8	Does the device limit its inrush current, either by using capacitors smaller than 10 μ F or by using soft-start circuits, such that no more than 10 μ F of capacitance is charged by currents higher than 100mA when the device is hot plugged?	yes	no	7.2.4.1 7.2.3
LP9	Does the device draw no inrush current at configuration or when it transitions to its operating mode?	yes	no	7.2.4.1

4.1.2 High Power Devices (not applicable to low-power and self powered devices)

HP1	Is the MaxPower field in the device's configuration descriptor 500mA or less?	yes	no	7.2.2
HP2	Can the device operate in its unconfigured state with a steady-state V_{BUS} of 4.35–5.25V?	yes	no	7.2.2
HP3	Can the device operate in its unconfigured state with a transient V_{BUS} as low as 4.02V?	yes	no	7.2.2
HP4	While unconfigured, does the device draw 100mA or less at all times, provided its V_{BUS} is between 4.02 and 5.25V?	yes	no	7.2.1.3
HP5	Can the device operate in its configured state with a steady-state V_{BUS} of 4.50–5.25V?	yes	no	7.2.2
HP6	Can the device operate in its configured state with a transient V_{BUS} as low as 4.17V?	yes	no	7.2.2
HP7	While configured, does the device draw the amount of current specified in its MaxPower field or less at all times, provided its V_{BUS} is between 4.02 and 5.25V?	yes	no	7.2.1.3
HP8	If the device does not support remote wakeup, the device is not configured,	yes	no	7.2.3

	or remote wakeup is disabled, is the device's average suspend current draw less than 500 μ A?		
HP9	If the device supports remote wakeup, remote wakeup is enabled, and the device is configured, is the device's average suspend current draw less than 2.5mA?	yes	no
HP10	If the device's current draw spikes during suspend, is the maximum spike height less than 500mA and the spike's leading edge rate less than 100mA/ μ s for V_{BUS} between 4.02 and 5.25V?	yes	no
HP11	When the device wakes up from suspend, does it limit any inrush currents to 500mA or less?	yes	no
HP12	Does the device limit its inrush current, either by using capacitors smaller than 10 μ F or by using soft-start circuits, such that no more than 10 μ F of capacitance is charged: By currents higher than 100mA when the device is hot plugged? By currents higher than the device's MaxPower at configuration or when the device transitions to its operating mode?	yes	no
		yes	no

5 Recommended Questions

R1	Are the device's signal swings matched as closely as possible?	yes	no
R2	If ferrite beads are used in the device's USB connection, are they present on only the V_{BUS} and GND lines?	yes	no
R3	Does the device complete all commands as quickly as is practical?	yes	no
R4	If the device is self-powered and does not operate any of its components from bus power, does it only signal an attach when both bus power and external power are available?	yes	no

