

USB 2.0 Specification Engineering Change Notice (ECN) #1: Mini-B connector

Date: 10/20/2000

Reason for ECN:

The USB 2.0 specified device-side connector – the B connector – is too large for use with a new generation of handheld and mobile devices, e.g., cell phones which would benefit from connectivity to the PC. This ECN incorporates a specification of a device-side mini connector (hereafter referred to as a mini-B connector). The new connector only applies to upstream facing ports, i.e., connectors on devices.

Summary of ECN:

The bulk of the ECN specifies the mechanical requirements for the mini-B plug, receptacle and cable assembly. It also identifies the usage scope of this connector. The last part of the ECN describes the minimum test criteria and performance requirements for the new connector.

Benefits of ECN:

The ECN enables standardization of miniature device-side USB connectors and consequent economies of scales and lower cost for a new and growing class of devices which will benefit from connectivity to the PC. The standardization also allows leveraging of the compliance test and certification model which is already in place for USB connectors.

Assessment of Impact on Current Specification and Current USB Products:

The connector specified in the ECN will not have any impact on hardware or software of existing USB products. The current USB spec already allows for vendor-specific device side connectors – such cable assemblies are called captive assemblies. All that the ECN does is to identify one such connector for use in devices which need the smaller size of connector. There is a potential for some end-user confusion because of two standard cable options; but this can be mitigated by appropriate end-user education.

Structure of ECN:

The ECN is in the form of a new Chapter 6 with the mini-B connector requirements inserted into the appropriate locations. This format enables specification of the new connector in context.

Chapter 6 Mechanical

This chapter provides the mechanical and electrical specifications for the cables, connectors, and cable assemblies used to interconnect USB devices. The specification includes the dimensions, materials, electrical, and reliability requirements. This chapter documents minimum requirements for the external USB interconnect. Substitute material may be used as long as it meets these minimums.

6.1 Architectural Overview

The USB physical topology consists of connecting the downstream hub port to the upstream port of another hub or to a device. The USB can operate at three speeds. High-speed (480 Mb/s) and full-speed (12 Mb/s) require the use of a shielded cable with two power conductors and twisted pair signal conductors. Low-speed (1.5 Mb/s) recommends, but does not require the use of a cable with twisted pair signal conductors.

The connectors are designed to be hot plugged. The USB Icon on the plugs provides tactile feedback making it easy to obtain proper orientation.

6.2 Keyed Connector Protocol

To minimize end user termination problems, USB uses a “keyed connector” protocol. The physical difference in the Series “A” and “B” (or “mini-B”) connectors insures proper end user connectivity. The “A” connector is the principle means of connecting USB devices directly to a host or to the downstream port of a hub. All USB devices must have the standard Series “A” connector specified in this chapter. The “B” (or “mini-B”) “B” connector allows device vendors to provide a standard detachable cable. This facilitates end user cable replacement. Figure 6-1~~Figure 6-1~~ illustrates the keyed connector protocol.

6.5.2 USB Connector Termination Data

[Table 6-1](#) provides the standardized contact terminating assignments by number and electrical value for Series “A” and Series “B” connectors.

Table 6-1. USB Series “A” and Series “B” Connector Termination Assignment

Contact Number	Signal Name	Typical Wiring Assignment
1	VBUS	Red
2	D-	White
3	D+	Green
4	GND	Black
Shell	Shield	Drain Wire

[Table 6-2](#) provides the standardized contact terminating assignments by number and electrical value for Series “mini-B” connectors.

Table 6-2. USB Series “mini-B” Connector Termination Assignment

Contact Number	Signal Name	Typical Wiring Assignment
1	VBUS	Red
2	D-	White
3	D+	Green
4	ID	not connected
5	GND	Black
Shell	Shield	Drain Wire

6.5.3 Series “A” and Series “B” (or “Mini-B”) “B” Receptacles

Electrical and mechanical interface configuration data for Series “A” and Series “B” receptacles are shown in [Figure 6-7](#) through [Figure 6-12](#) and [Figure 6-8](#). Also, refer to [Figure 6-12](#) through [Figure 6-20](#), [Figure 6-13](#), and [Figure 6-14](#) at the end of this chapter for typical PCB receptacle layouts.