Identix Techical Note: 001

Choosing the right USB data cable for miniPad and rPad

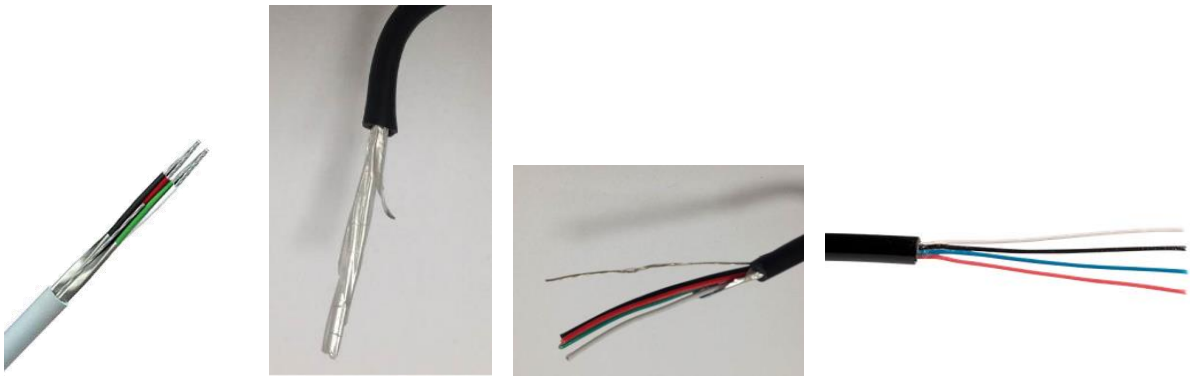
Sometimes customers complain about intermittent disconnections of miniPad or rPad devices from the host computer, communications problems and driver recognition issues on Windows computers.

miniPad a rPad are UHF readers which connect to the hot computer using standard USB 2.0 data connection. Although the data rate used by these devices is moderate, (115Kbps) communication errors may occur if you use inadequate USB cables to connect these devices to the host computer.

miniPad and rPad ship with a 60cm standard USB data cable. This cable is certified for use with both devices and may be substituted by longer cables if the following criteria are observed.

1) Always use high quality “USB-A (standard USB) to USB-B (mini-USB) USB 2.0 data communications cable”.
2) The total cable length must not exceed 2m (7”).
3) Make sure the cable is a “shielded twisted pair cable”.
4) Below are some examples of the right cable for use with miniPad and rPad.

Internal Conductors

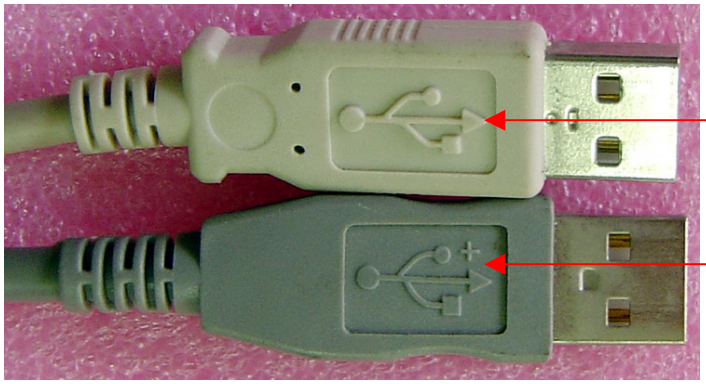


(a) (b) (c) (d)

a) Correct Cable (ideal) - shielded and twisted
b) Acceptable – straight wires but shielded
c) Acceptable – straight wires but shielded
d) Unacceptable – straight wires and not shielded

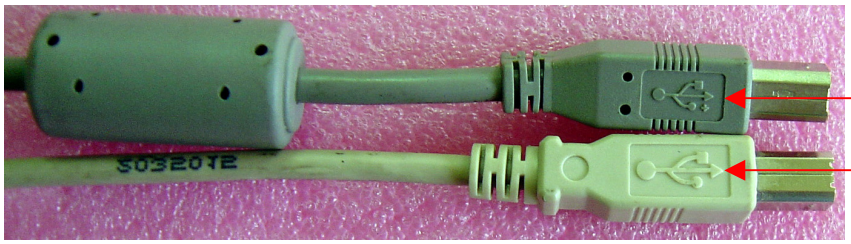
The comparison between USB 1.1 cable and USB 2.0 cable

1. How to tell the difference of USB cable ?



The USB 1.1 cable or USB 1.0 cable did not has " + " sign on USB Logo in both ends of USB connector.

The USB 2.0 cable will has " + " sign on USB Logo in both ends of USB connector.



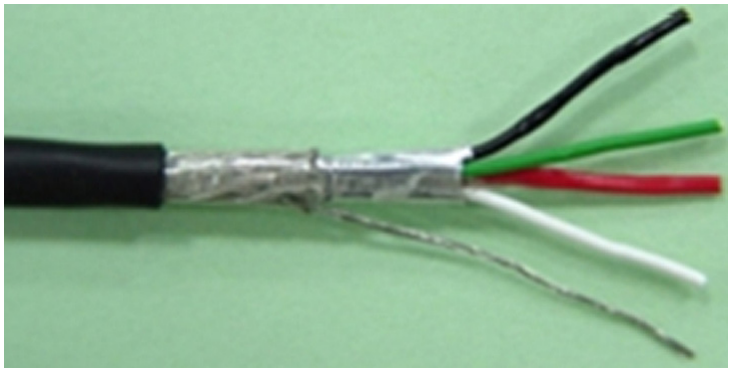
Here is a bundled USB 2.0 cable in Microtek scanner with USB 2.0 interface.

Here is an USB 1.1 cable.

2. The shielding between USB 2.0 cable and USB 1.1 cable.

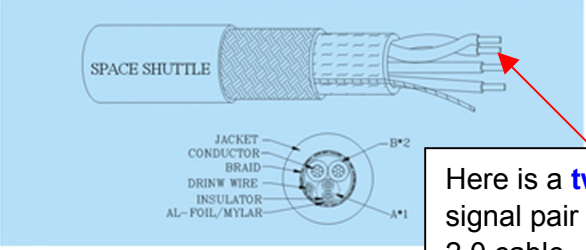
The data transmission speed for USB 2.0 port is 480M Bit / second.
The data transmission speed for USB 1.1 port is 12M Bit / second.
The data transmission speed for USB 1.0 port is 1.5M Bit / second.
USB 2.0 specification encompasses all USB data transmission speed for low speed (1.5M Bit / second), full speed (12M Bit / second) and high speed (480M Bit / second).
USB 2.0 cable meet the compliance with USB 2.0 specification, hence, it can support to work with low speed (USB 1.0) or full speed (USB1.1) USB products and high speed USB 2.0 products.
The maximum cable length for USB 2.0 cable is 5 meters.
The maximum cable length for USB 1.1 cable is 3 meters.
It is because the data transmission speed from USB 2.0 port is higher than USB 1.1 port, hence, the requirement of shielding in USB 2.0 cable is more important than USB 1.1 cable.
You can find out there is a core in Microtek USB 2.0 cable, it is to reduce cross talk and ensure high speed, error-free data transfer. But USB 1.1 cable did not has such shielding in design.

Below illustration is the picture of shielding in USB 2.0 cable. (Black Line is a Ground wire, Red Line is a Vcc (+ 5Vdc) wire, Green Line is a Data (+) wire, White Line is a Data (-) wire. Green wire and White wire is a **twisted** signal pair in USB 2.0 cable.)



Here is an USB Logo : Hi-Speed version for USB 2.0 Cable.

UNIVERSAL SERIAL BUS CABLE



Here is a **twisted** signal pair in USB 2.0 cable.

Structure:
Tinned Stranded Copper Conductor.
Power wire Insulation:Semi-rigid polyvinyl chloride
Twisted Signal Pair Insulation:HD-PE
Aluminum Metallized Polyester Inner Shield.

Drain Wire:
28AWG stranded Tinned Copper
Braid:Tinned Copper Wire Outer Shield
Coverage Rate:Minimum 65%
Polyvinyl Chloride(PVC) Jacket

Spec NO:	Conductor		No.of Pair(core)	Insulation Diameter	Insulation	Jacket Diameter
	AWG	No./mm		mm		mm
KDHB	28	7/0.127	1PR	0.8	HD-PE	4.2
	28	7/0.127	2C	0.82	SR-PVC	
KDHC	28	7/0.127	1PR	0.8	HD-PE	4.5
	26	7/0.16	2C	1.0	SR-PVC	
KDHD	28	7/0.127	1PR	0.8	HD-PE	4.7
	24	7/0.2	2C	1.07	SR-PVC	
KDHE	28	7/0.127	1PR	0.8	HD-PE	5.0
	22	7/0.254	2C	1.3	SR-PVC	
KDHF	28	7/0.127	1PR	0.8	HD-PE	5.3
	20	7/0.32	2C	1.5	SR-PVC	
KD34	24	7/0.2	1PR	1.35	HD-PE	5.2
	24	7/0.2	2C	1.07	SR-PVC	

Physical Characters:
Voltage rating:30V
Temperature rating:80℃
Flame test of cable:VW-1

Transmission Characters:
1.Attenuation:

Frequency (MHz)	Attenuation (MAX) dB/Cable (USB 1.1)	Attenuation (MAX) dB/Cable (USB 2.0)
0.064	0.08	0.08
0.256	0.11	0.11
0.512	0.13	0.13
0.772	0.15	0.15
1.0	0.2	0.2
4.0	0.39	0.39
8.0	0.57	0.57
12.0	0.67	0.67
24.0	0.95	0.95
48.0	1.35	1.35
96.0	1.9	1.9
200	--	3.2
400	--	5.8

2.Impedance : 90Ω ± 15% @ TDR (differential) (USB 1.1)
3.Propagation Delay: 26ns/5M (USB 1.1)
4.Propagation Delay Skew: 400PS(USB 1.1)
5.Impedance : 30Ω ± 30% @ TDR (Common mode) (USB 2.0)
90Ω ± 15% @ TDR (differential) (USB 2.0)
6.Propagation Delay: 5.2ns/M MAX(USB 2.0)
7.Propagation Delay Skew: 100PS(USB 2.0)

Applications:
Monitor ,Audio ,Input/Output System ,Keyboard ,Mouse ,Modem ,CD-ROM , Scanner ,Printer…

Remarks :color code:
1.GREEN*WHITE
2.BLACK
3.RED

3. How come you need USB 2.0 cable for USB 2.0 port ?

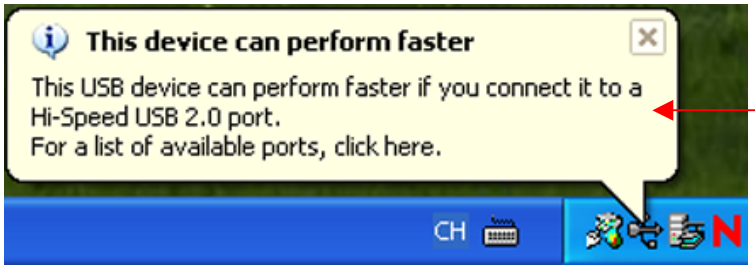
Below illustration is a table to show the attenuation between USB 1.1 cable and USB 2.0 cable @ different running speed. (You can find out the data transmission speed of USB 1.1 cable can not run over 96MHz.)

Frequency (MHz)	Attenuation (MAX) dB/Cable (USB 1.1)	Attenuation (MAX) dB/Cable (USB 2.0)
0.064	0.08	0.08
0.256	0.11	0.11
0.512	0.13	0.13
0.772	0.15	0.15
1.0	0.2	0.2
4.0	0.39	0.39
8.0	0.57	0.57
12.0	0.67	0.67
24.0	0.95	0.95
48.0	1.35	1.35
96.0	1.9	1.9
200	--	3.2
400	--	5.8

above information tell you if USB 1.1 cable is connected to USB 2.0 port from PC to scanner, it will slow down the data transmission speed of USB 2.0 port and make the data transmission speed of USB Bus can not keep up with USB 2.0 port has.

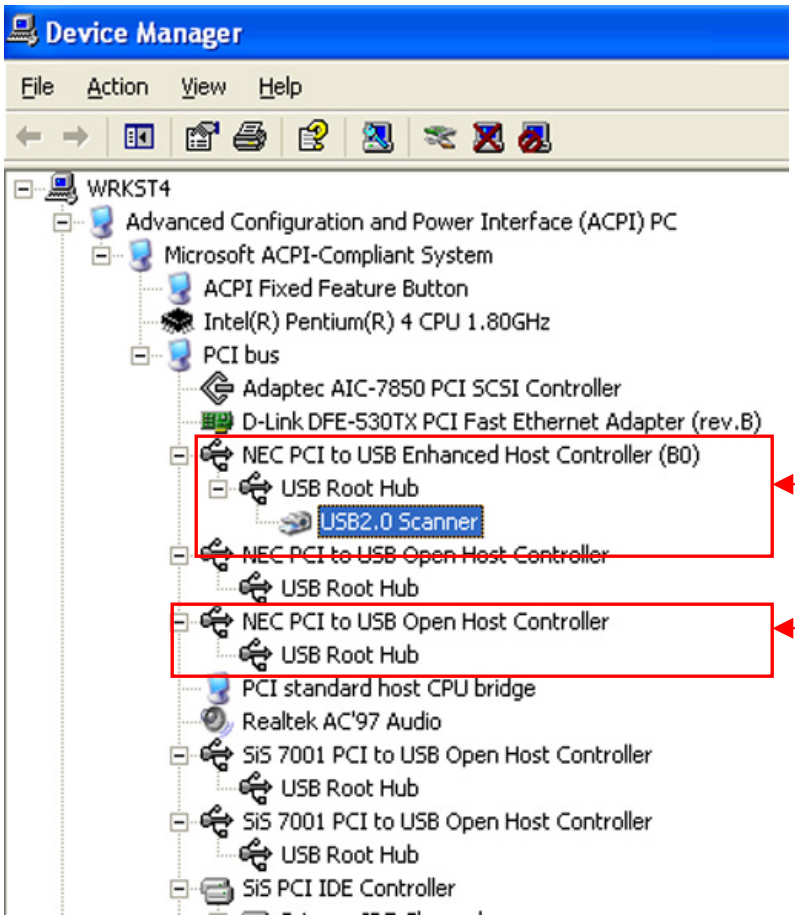
4. **Windows XP system will treat USB 1.1 port or USB 1.1 Hub as a low speed USB device.**

If you interfaced USB 2.0 scanner into USB 1.1 port in PC, or if you interfaced a USB 1.1 Hub into USB 2.0 port in PC, by this way, there is a message box will pop out in screen as below illustration.



Sometimes, if USB 2.0 port in PC connected to an USB 2.0 Scanner through USB 1.1 cable, it will pops up the same message also.

Normally, if USB 2.0 cable connects to USB 2.0 port between PC and scanner, by this way, Windows XP system will treat it as a high speed USB device and list you the information as below.



In Device Manager, **USB Enhanced** Host Controller is an **USB 2.0** port.

In Device Manager, **USB Open** Host Controller is an **USB 1.1** port.