

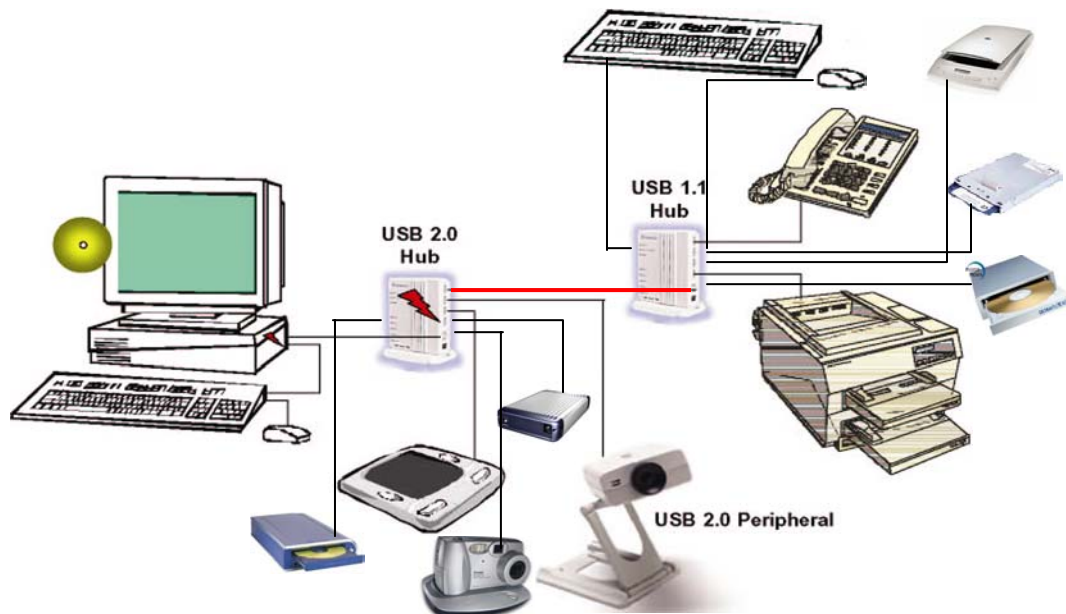
Tekram TR-621 2.5 White Paper

--- USB 2.0 External Box

USB 2.0 Introduction

A core team from Compaq, Hewlett Packard, Intel, Lucent, Microsoft, NEC and Philips is leading the development of the USB Specification, version 2.0, which will increase data throughput by a factor of 40. This backwards-compatible extension of the USB 1.1 specification uses the same cables, connectors and software interface so the user will see no change in the usage model. They will, however, benefit from an additional range of higher performance peripherals, such as video-conferencing cameras, next-generation features as today's USB peripherals.

At forty times faster than the USB 1.1 specification, the new USB 2.0 standard is ideal for high-speed peripherals because it provides the higher bandwidth necessary for external hard disks, high-speed scanners, CD-RW and DVD storage drives. USB 2.0 can also still be used to connect lower speed USB 1.1 devices like digital cameras, modems, keyboards, mouse, digital joysticks, tape and floppy drives, digital scanners and printers to computers.



Why USB 2.0 External Box

USB ports are now available on all new computers and PCs. With such a universal interface, USB portable hard disks are ideal as a data-shuttle. With hot-plug capability and automatic configuration, the transfer of large amount of data between computers couldn't be easier. Regard of USB 1.1 and USB 2.0, the transfer rate of USB 1.1(12Mbps) is dropped far behind the transfer rate of HDD (100MBps). The transfer rate of USB 2.0(480Mbps) is more fit for

increasing the performance of HDD. USB 2.0 is an ideal interface to connect high-speed external device like HDD.

Here we do a testing:

On a PC that is stalled with a USB 2.0 PCI card, we test the transfer rate of USB 1.1 external box and USB 2.0 external box under Win 2000 and Win XP. The transfer rate of USB 2.0 box is much faster than the USB 1.1 box. So using USB 2.0 box can make HDD got better performance.

PC with USB 2.0 PCI Card	USB 1.1 Box	USB 2.0 Box
Windows 2000	1.0 ~ 1.05 MB/ps	16.0 ~ 18.0 MB/ps
Windows XP	0.95 ~ 1.0 MB/ps	16.0 ~ 18.0 MB/ps

Tekram TR-621 2.5 for USB 2.0

With the veritable wealth of possibilities and the low cost of the USB interface, chips and cables, Tekram external box will quickly become a vital tool in your day-to-day business and personal computing activities.

Tekram TR-621 2.5 are ideal for professionals and home users, and for various applications such as databases, desktop publishing, digital content creation and digital audio/video. Tekram TR-621 2.5 offer a simple and easy way for you to expand capacity and increase transfer rates, as well as achieve greater mobility for transferring and exchanging data. Tekram TR-621 2.5 will enable you to archive, backup, store and exchange data anytime, anywhere. Its hot-plug USB technology allows you to get it up and running in a snap.

Tekram TR-621 2.5 --- bundled with e-space software for file compression and decompression to get better performance and capacity availability.

➤ **Appearance:**



➤ **Benefits:**

Mobility: Lightweight and portable

Connectivity: The most convenient way to connect and share files between desktop and notebook; ideal for transporting and backing up data

Simplicity: Plug and play

Easy Installation: Win ME/2000/XP is default built in; Need driver under Win 98

➤ **Features:**

Metal Box without fan

* Good cooling function

* Without fan/ low noise/ decreased failure rate

* Solid rack to ensure reliable function

* Block radiation (FCC & CE radiation)

Increased Performance

With e-space software for data compression and decompression to get better performance, capacity availability and increase disk space

Accommodate 2.5 inch IDE hard disk

Full compatible with two models of 2.5 inch HDD in market – 12.5*70*100mm / 9.5*70*100mm

Support Windows 98SE/ME/2000/XP

External Power Adapter (Optional)

TR-621 2.5 can work without external power adapter. But if users want to get more Stable and reliable performance, we suggest using an external power adapter

➤ **Package Contents:**

1. 2.5”HDD External Box – TR-621 2.5
2. USB Cable (AM-BM, silver, 1.2m)
3. Quick Reference for Hardware Installation in 8 languages
4. CD (Driver, Manuals & E-space software)
5. Power Cable (through PS/2 port)
6. USB 2.0 PCI Card (Optional)

Product Trend

TR-621 2.5 – USB 2.0 External Box – is the best portable storage device for 2.5 inch HDD.

➤ **Compatibility:**

TR-621 2.5 – USB 2.0 External Box – is 100% compatible with the current mainboard



that is default support USB 1.1. Moreover, the transfer rate of USB 2.0 external box is faster than USB 1.1 external box.

(You can refer to the “**Performance comparison of USB 2.0 Box & USB 1.1 Box on USB 1.1 mainboard**” below).

➤ **Performance:**

Working in the USB 2.0 interface on host PC, USB 2.0 external box can get better performance. Seeing from testing data, the transfer rate of USB 2.0 external box is 16-18 times faster than USB 1.1 external box.

(You can refer to the “**Performance comparison of USB 2.0 Box & USB 1.1 Box using with USB 2.0 PCI Card**” below).

➤ **Market Trend:**

Mainboard will be default support USB 2.0 Interface. The market share of USB 2.0 mainboard will reach 15% at the end of 2002, and 50% in 2003. In the future, with the feature of compatible with USB 1.0, 1.1, 2.0, USB 2.0 external box will become the market trend for external HDD.

➤ **Performance/Cost:**

The transfer rate of USB 2.0 external box is 16-18 times faster than USB 1.1 external box. Moreover, with reasonable price, USB 2.0 is the best choice for you.

Product Roadmap

Model Name	TR-621 2.5	TR-621 3.5	TR-621 5.25
Interface	USB 2.0	USB 2.0	USB 2.0
Internal HDD	2.5 inch, Single Bay	3.5 inch, Single Bay	5.25 inch, Single Bay
Market Target	Dedicate for portable market, for HDD	For PC second storage device, for HDD	For PC second storage devices, for CD-R/W, DVD-ROM, CD-ROM, HDD
Features	Portable storage device, plug and play, easy installation.		

Product Testing Data

➤ **Performance comparison of USB 2.0 Box & USB 1.1 Box on USB 1.1 mainboard.**

Basing on USB 1.1 mainboard, using USB 2.0 Box can achieve better performance than using USB 1.1 Box.

Item	Bench Mark	Result	
		On USB 1.1 MainBoard	
		USB 1.1 Device	USB 2.0 Device
1	<i>Business Disk WinMark 99</i>	726	1490
2	Disk Access Time	24.9	18.9
3	Disk CPU Utilization	5.6	4.6
4	Disk Playback/Bus:Overall	726	1490
5	Disk Playback/HE:AVS/Express 3.4	1790	1580
6	Disk Playback/HE:FrontPage 98	3080	31900
7	Disk Playback/HE:MicroStation SE	2560	3670
8	Disk Playback/HE:Overall	1280	1760
9	Disk Playback/HE:Photoshop 4.0	726	736
10	Disk Playback/HE:Premiere 4.2	1020	1310
11	Disk Playback/HE:Sound Forge 4.0	1440	1710
12	Disk Playback/HE:Visual C++ 5.0	857	2960
13	Disk Playback/Removable Media	207	611
14	<i>Disk Transfer Rate:Beginning</i>	993	993
15	Disk Transfer Rate:End	993	993
16	High-End Disk WinMark 99	1280	1760

➤ **Performance comparison of USB 2.0 Box & USB 1.1 Box using with USB 2.0 PCI Card**

Using USB 2.0 Box with USB 2.0 PCI Card can fully exert the efficiency of USB 2.0.

Item	Bench Mark	Result	
		USB 2.0 CARD	
		USB 1.1 Device	USB 2.0 Device
1	<i>Business Disk WinMark 99</i>	842	3530
2	Disk Access Time	23.2	15
3	Disk CPU Utilization	3.16	4.36
4	Disk Playback/Bus:Overall	842	3530
5	Disk Playback/HE:AVS/Express 3.4	1710	10800
6	Disk Playback/HE:FrontPage 98	2980	69200
7	Disk Playback/HE:MicroStation SE	2570	15200
8	Disk Playback/HE:Overall	1210	7070

9	Disk Playback/HE:Photoshop 4.0	657	2740
10	Disk Playback/HE:Premiere 4.2	926	4800
11	Disk Playback/HE:Sound Forge 4.0	1350	7170
12	Disk Playback/HE:Visual C++ 5.0	867	9450
13	Disk Playback/Removable Media	197	1590
14	Disk Transfer Rate:Beginning	936	12300
15	Disk Transfer Rate:End	936	12300
16	High-End Disk WinMark 99	1210	7070

➤ **Performance comparison of Tekram TR-621 2.5 and other products**

We compare other two products as follows with our TR-621 2.5:

Manufacture		Model	Chipset
2.5 BOX	TR-621-2.5	USB 2.0	ALI
	Wise	USB 2.0	In-System
3.5 BOX	DATAFAB	USB 2.0	In-System
2.5 Inch HDD	TOSHIBA MK2018GAP 30GB		
3.5 Inch HDD	MAXTOR D540X-4K 20.0GB		

We use three kinds of testing measures to compare their performance. The testing result is as below:

1). Run WinBench99 V2.0

Item	Bench Mark	Result					
		USB 2.0 MainBoard			USB 1.1 MainBoard		
		TR-621 2.5 Box	Wise 2.5 Box	DATA FAB 3.5 Box	TR-621 2.5 Box	Wise 2.5 Box	DATA FAB 3.5 Box
1	<i>Business Disk WinMark 99</i>	5860	2780	9000	1990	1970	2100
2	Disk Access Time	15.3	18.2	10	15.4	15.3	17.5
3	Disk CPU Utilization	1.76	2.14	1.96	2.95	2.89	2.73
4	Disk Playback/Bus:Overall	5860	2780	9000	1990	1970	2100
5	Disk Playback/HE:AVS/Express 3.4	13800	5010	18100	2010	2010	2110
6	Disk Playback/HE:FrontPage 98	94400	82700	10800	52700	52700	59300
7	Disk Playback/HE:MicroStation SE	20500	8760	29200	4510	4700	4810
8	Disk Playback/HE:Overall	14000	8960	19300	1930	1940	1990

9	Disk Playback/HE:Photoshop 4.0	6030	5120	8680	791	788	804
10	Disk Playback/HE:Premiere 4.2	13100	9800	17100	1350	1360	1380
11	Disk Playback/HE:Sound Forge 4.0	16900	11800	19500	1760	1740	1810
12	Disk Playback/HE:Visual C++ 5.0	15200	13600	25200	3240	3290	3400
13	Disk Playback/Removable Media	6200	6310	6580	769	775	771
14	Disk Transfer Rate:Beginning	18600	8890	19500	1020	1030	1060
15	Disk Transfer Rate:End	18300	11400	19500	1020	1020	1050
16	High-End Disk WinMark 99	14000	8960	19300	1930	1940	1990

2). Run Iometer

Access Specification Name	Work	IOps			MBps			Average Response Time		
		TR-62 1-2.5	Wise	DATA FAB	TR-62 1-2.5	Wise	DATA FAB	TR-62 1-2.5	Wise	DATA FAB
64K Sequential Write	10	253.0	209.5	294.4	15.8	13.1	18.4	39.5	47.4	33.9
64K Sequential Read	10	284.9	210.2	305.4	17.8	13.1	19.1	35.1	47.2	32.7
64K Random Write	10	57.5	68.9	101.8	3.6	4.3	6.4	118.5	95.9	62.5
64K Random Read	10	60.7	63.5	84.2	3.8	4.0	5.3	112.5	93.2	79.5
128K Sequential Write	10	111.7	104.2	147.1	14.0	13.0	18.4	85.6	94.8	68.0
128K Sequential Read	10	130.3	105.4	153.1	16.3	13.2	19.1	72.5	94.1	65.2
128K Random Write	10	49.0	51.8	81.4	6.1	6.5	10.2	126.5	110.3	88.1
128K Random Read	10	40.3	43.4	61.9	5.0	5.4	7.7	144.3	99.5	109.8
USB 2.0 Port										

Access Specification Name	Work	IOps			MBps			Average Response Time		
		TR-621 -2.5	Wise	DATA FAB	TR-621 -2.5	Wise	DATA FAB	TR-621 -2.5	Wise	DATA FAB
64K Sequential Write	10	16.1	16.2	16.1	1.0	1.0	1.0	607.9	604.1	609.8
64K Sequential Read	10	16.1	16.4	16.1	1.0	1.0	1.0	610.6	598.3	610.6
64K Random Write	10	16.0	16.9	17.4	1.0	1.1	1.1	397.2	328.0	337.2
64K Random Read	10	14.5	14.4	14.4	0.9	0.9	0.9	367.4	476.5	325.4
128K Sequential Write	10	8.2	8.2	8.2	1.0	1.0	1.0	1178.2	1170.3	1178.1
128K Sequential Read	10	8.2	8.2	8.2	1.0	1.0	1.0	1180.0	1154.4	1180.0

128K Random Write	10	8.1	8.1	8.6	1.0	1.0	1.1	519.7	859.0	647.7
128K Random Read	10	11.1	7.9	7.9	1.4	1.0	1.0	400.0	731.0	613.2
USB 1.1 MainBoard										

3). Run Drives Benchmark–SIsoft

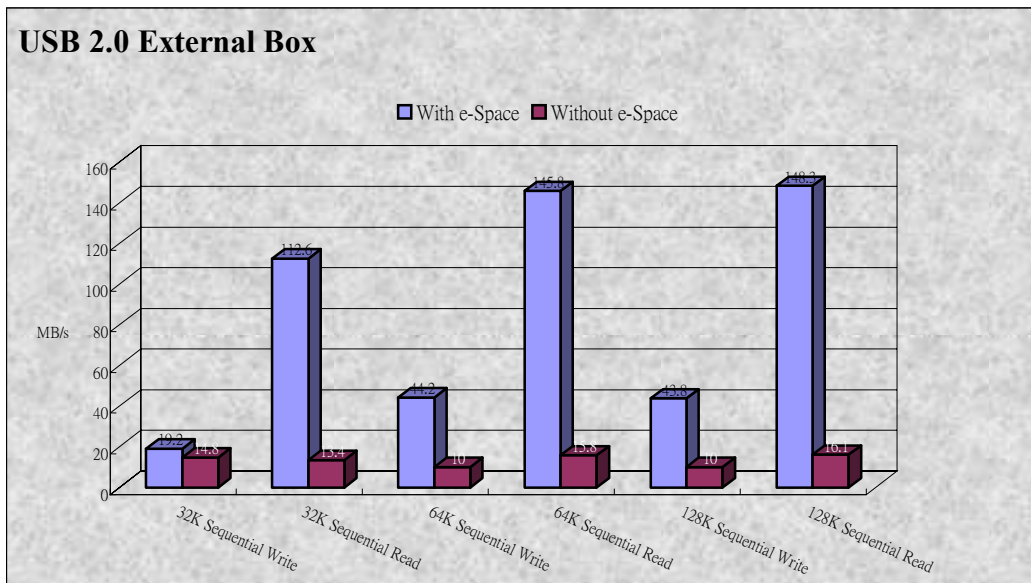
Device			Read Speed (MB/S)			Write Speed (MB/S)			Average Access Time (ms)
			Buffered	Sequential	Random	Buffered	Sequential	Random	
USB 2.0 MainBoard	2.5 Box	TR-621-2.5	18	18	4	16	16	4	12
		Wise	13	13	3.7	13	13	4	12
	3.5 Box	DATAFAB	18	18	5	16	16	4	9
USB 1.1 MainBoard	2.5 Box	TR-621-2.5	1.0	0.9	0.8	1.0	1.0	1.0	9
		Wise	1.0	1.0	0.8	1.0	1.0	1.0	10
	3.5 Box	DATAFAB	1.0	1.0	0.9	1.0	1.0	1.0	8

➤ Performance comparison of USB 2.0 Box with E-space & without E-space

E-Space is a management solution which improves the system performance overall. It combines compression/ decompression and defragment functions using schedule control synchronously and can compress/decompress the files selected by their extensions, sizes, access time, modify time etc. As well as it can operate disk defragment termly. This saves the disk space and reduces the time the computer spends locating files, so it will optimize HDD environment and enhance the performance of the whole system.

We just spend a little time to compress files in the DRAM and will acquire much improvement of the performance, because the speed of DRAM is 100 times than it of HDD. For example, a 100MB file is compressed in 50% compression ratio and when you read this file the system performance will double.

Data transfer performance will be improved when you use e-Space with external box too.



USB 2.0 Frequently Asked Questions

1: What maximum speed was finally chosen for the USB 2.0 spec?

A: The USB 2.0 specification has a design data rate of 480 mega bits per second.

2: What is USB-IF?

A: USB Implementers Forum, Inc. is a non-profit corporation founded by the group of companies that developed the Universal Serial Bus specification. The USB-IF was formed to provide a support organization and forum for the advancement and adoption of Universal Serial Bus technology. The Forum facilitates the development of high-quality compatible USB peripherals (devices), and promotes the benefits of USB and the quality of products that have passed compliance testing.

3: How can I identify the USB 2.0 products that have passed USB-IF testing program?



A: Please note the USB logo. If you see this logo on one product, it means this product has passed USB Org. certification and has high and guaranteed quality.

4: Aren't the requirements for cables different at the new higher speed or will USB 1.1 cables work with USB 2.0?

A: Fully compliant USB 1.1 cables will work fine at USB 2.0 speeds. USB cables are not all fully USB 1.1 compliant and it is important to evaluate cables that you intend to include in your products. The USB-IF has started a program for accurately testing cables to make it

easier to pick a good quality USB cable that will work correctly for both USB 1.1 now and USB 2.0 in the future.

5: Which Operating Systems can e-Space be applied to?

A: e-Space can run under Windows NT 4.0, Windows 2000 and Windows XP only in 'NTFS' file system.

6: Why should I use 'NTFS' file system under Windows NT 4.0, Windows 2000 and Windows XP? What's the benefit of 'NTFS' file system?

A: Windows NT 4.0, Windows 2000 and Windows XP support two kinds of file systems --- 'NTFS' file system and 'FAT32' file system. Choosing 'NTFS' file system can make system more secure and protect file privacy. At the same time, you can fully take the advantage of the e-space's benefit.

7: An external box is connected to a PC (the OS must support NTFS) without e-Space after another PC with e-Space has compressed the files in this box, what will happen?

A: Files can be read normally. This is because that the decompression of files is executed by OS automatically and not by e-Space. Once the system supports 'NTFS' file format it can read the files compressed by e-Space even when it is without e-Space.

8: Does TR-621 2.5 need any external power adapter if being connected to PC or notebook?

A: TR-621 2.5 can work without any external power adapter because it can get power from USB 2.0 port. But in our package there includes PS/2 power cable. If users use this power cable or any external power adapter (5V, 1A or 2A recommended), it can get better performance.