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Introduction

The 42-924 and 42-925 represent Pickering's first offering of PXI Chassis that feature full PXI Express support. With a full complement of hybrid slots, our chassis can support any PXISA members' modules. This introduction is part of our strategy to better integrate PXI and PXIe technology moving forward.

This SIP will talk a little about our statement of intent regarding our PXI & PXIe products, what PXI Express is, 42-924 & 925 product highlights and features, and an analysis of the competition. If you find that any information here is incorrect or needs updating, please contact either Bob Stasonis or Kim Otte.

PXI & PXIe Statement of Intent

With over 1000 PXI products, Pickering has a continuous R&D program, introducing many new and innovative PXI products each year. Most recent designs are now being released simultaneously in both PXI and PXIe formats.

Because the software and hardware functionality between PXI and PXIe versions are identical, we have already ported several hundred of our current PXI modules to also be available in PXIe, and we will continue to work our way thru our extensive PXI module range to add identical functionality PXIe versions.

PXI will continue to be an important platform for products that do not require the bandwidth that PXIe offers, both now and well into the future. Pickering will stay committed to both formats with our typical 15 to 20-year product support. If there is a specific Pickering PXI product that you need to be available in PXIe, please contact your local Pickering sales office for further assistance.

Talking Points

As stated in the introduction, the 42-924 and 925 chassis allow Pickering to better integrate PXI and PXIe for customer applications. As we have promoted PXI solely in the past, how do we better present the change in direction?

Keep in mind that PXIe is a versatile modular platform and a natural extension of standard PXI, especially when hybrid slots are included. With exceptionally high bandwidth, it extends the breadth of coverage that the PXI platform addresses, particularly in high-end data acquisition and RF instrumentation applications.

Many of our products are being used in systems that utilize PXIe instrumentation, and as such, it became important for us to expand our chassis offering to accommodate PXIe modules.

But not all products require the bandwidth that PXIe offers, and nearly all vendors, including Pickering, continue to provide standard PXI products as part of their portfolio.

So, PXI and PXIe will almost always be working together in test applications for the foreseeable future.

New product introductions from Pickering will continue in standard PXI, and it remains a key platform in many new modern test system designs of our customers.

To illustrate our long-term commitment to both platforms, we have introduced several new products recently, which are 'dual-footprinted' and capable of being ordered as either PXI or PXIe. As both form/factors from Pickering are software compatible, customers should feel secure that they are investing in a sustainable platform for the life of their program with either PXI or PXIe… or both.

Our new chassis release offers full PXI hybrid capability at a price/performance point that we believe will significantly differentiate us from what is currently available in the market. With fully hybrid capable slots, systems engineers will have the flexibility needed to choose whichever product best fits their application, regardless of the bus (PXI or PXIe). This is a significant advantage over other vendor's chassis that have PXIe-only slots or limited hybrid slots.

Another significant advantage of these new chassis is that the innovative cooling design moves the air from front to back. This means that in most use cases, unlike some of our competition's products that exhaust air out the top, they only require 4U of rack space. The exception is high-power applications which would require additional free space in the rack to improve ventilation. In these special cases, blanking plates, and air baffles (which we will add to our accessory range) in unpopulated slots may also be required to help dissipate the heat.

We expect these chassis to be a calling card that opens doors to new accounts and act as a pull-through for our other module business.

42-924 & 42-925 PXIe chassis

- High-Performance 8-Slot or 18-slot PXIe Backplane
- 7 or 16 Hybrid Compatible Slots
- Ultra-High-Performance Gen 3 PCIe Switching with a Default Four-Link (4x4) System Slot
- High Data Bandwidth (Max. 16 GB/s System & 4GB/s Slot-to-Slot)
- Rear Panel External 10MHz Clock Input/ Output
- 400W or 1,200 W Industrial Grade Power Supply
- Remote Chassis Monitoring System
- Low Audible Operating Noise
- Airflow from front to back for a true 4U system footprint

Our PXIe chassis offering is meant to serve as a test platform for all our switch modules and any instruments required for a test application. By having a full complement of Hybrid slots, our chassis are one of the more versatile products on the market as it appears that NI is phasing out the PXIe-1085 and perhaps the PXIe-1086 (see the competition section for more information). Only Pickering and Keysight will have chassis that have all hybrid slots.

It is important to note that our chassis are Gen 3 compliant, the latest version implemented in PXIe. However, one word of caution—our chassis support up to a 4-link by 4-lane data configuration. As each lane is 4 GB in bandwidth, the max data rate is 16 GB per second. Gen 3 supports up to 24 GB/second, so in this instance, we are not the fastest bandwidth on the market. However, as there are few, if any, peripherals on the market that need this large a "pipe," this should not be detrimental to our chassis sales.

42-924 8-slot PXIe pricing:

UK GDP	EUROPE EURO	USA USD	CHINA RMB	KOREA KRW	JAPAN JPY	INDIA INR
3,395	3,735	4,430	37,225	5,980,500	652,100	398,750

42-925 18-slot pricing:

UK GDP	EUROPE EURO	USA USD	CHINA RMB	KOREA KRW	JAPAN JPY	INDIA INR
6,545	7,195	8,540	71,750	11,529,000	1,257,100	768,750

Discounting

Like most of our larger Pickering PXI/LXI chassis, the 42-924 and 42-925 are built by a 3rd party and are low margin products. Discounting is not encouraged.

Competition

Here are two charts comparing the Pickering chassis to the known competition. You will note that in the 18-slot hybrid chassis market, we are priced very competitively. The exception is the ADLINK offering; however, it has far fewer hybrid slots, so it is not directly competitive.

In the 8-slot market, we are priced at or below most of the competition. We have also added the VX Instruments chassis to our comparison

In the area of slot count, we count the hybrid slots twice. That shows how many PXIe modules can be supported in the chassis. So, for example, the ADLINK PXES-2780 has 10 hybrid slots. As these are both PXI and PXIe, we have counted them as 16 Express slots.

As noted in the talking points, in most cases, our chassis only require 4U of rack space. NI's PXIe-1084 (low cost) and PXIe-1095 (high-performance) chassis require an extra U of rack space.

See the tables below for details.

42-295 18-slot chassis

| Supplier	Part No	PCIe Gen. level	Max System Bandwidth	Slot count	Hybrid slot count	Power Supply Capacity	Express slot count	List Price	Price per slot count
	Pickering								
Pickering	42-925-001	Gen 3.0	16 GB/s	18	16	1,200W	16	$8540	$474
	Adlink								
Adlink	PXES-2780	Gen 2.0	4 GB/s	18	10	1,120W	16	$4202	$233
	PXES-2785	Gen 3.0	24 GB/s	18	6	1,000W	10	$5,388	$299
	Keysight								
Keysight	M9018B PXIe Chassis: 18-slot, 3U, 8 GB/s	Gen 2.0	8 GB/s	18	16	850W	16	$9,649	$536
	M9019A PXIe Chassis: 18-slot, 3U, 24 GB/s, Gen 3	Gen 3.0	24 GB/s	18	16	800W	16	$11,815	$656.39
	Marvin Test								
Marvin Test	GX7100e Series - 3U / 6U PXIe Chassis	Gen 2.0	6 GB/s	14-slot 3U & 6U	One 3U PXIe, three 3U hybrid, two PXI-1 and seven 6U hybrid slot compatible instruments	650W	10	$12,815	$1,165
	NI								
NI	PXIe-1065	Gen 1.0	3 GB/s	18	4	1,000 W	7	$7,325	$407
	PXIe-1066DC *	Gen 2.0	3 GB/s	18	4	1,000 W	7	$12,880	$716
	PXIe-1084	Gen 2.0	4 GB/s	18	17	1,200 W	17	$5,878	$327
	PXIe-1084 **	Gen 2.0	4 GB/s	18	17	1,200 W	17	$6,404	$356
	PXIe-1085	Gen 2.0	12 GB/s	18	16	1,200 W	17	$11,500	$639
	PXIe-1085	Gen 3.0	24 GB/s	18	16	1,200 W	17	$11,627	$646
	PXIe-1086	Gen 2.0	12 GB/s	18	16	1,200 W	17	$14,206	$789
	PXIe-1086DC *	Gen 2.0	12 GB/s	18	16	1,200 W	1	$16,999	$944
	PXIe-1095	Gen 3.0	24 GB/s	18	5	1,800 W	12	$9,874	$549
	PXIe-1095 **	Gen 3.0	24 GB/s	18	5	1,800 W	12	$10,790	$599
	* AC or DC Input								
	** External Clock option								

42-294 8-slot chassis

Supplier	Part No	PCIe Gen. level	Max System Bandwidth	Slot count	Hybrid slot count	Power Supply Capacity	Express slot count	List Price	Price per slot count
	Pickering								
Pickering	42-924-001	Gen 3.0	16 GB/s	7	7	1,200W	7	$4,430	$554
	Adlink								
Adlink	PXES-2301	Gen 2.0	8 GB/s	6	5	320	6		
	Keysight								
Keysight	M9010A	Gen 3.0	24 GB/s	10	8	830	8	$5,410	$541
	Marvin Test								
Marvin Test	GX7600 9-slot, 3 U PXIe chassis	2	3 GB/s	9	2	600W	5	$6,370	$708
	NI								
NI	PXI3-1062Q** ***	Gen 2.1	3 GB/s	8	2	600 W	3	$4,687	$586
	PXIe-1082**	Gen 2.1	3 GB/s	8	3	650 W	7	$4,498	$562
	PXI3-1082 DC* **	Gen 2.1	3 GB/s	8	3	650 W	7	$5,445	$681
	VX instruments	2		6370					
VX Instruments	PXCe4006 6-slot PXIe Chassis	Gen 2.1	6 GB/s	6-slot	1 PXI Express slot 4 PXI/PXI Express full hybrid slots	200W	5	$3,570	$595
	PXCe4012 12-slot PXIe Chassis	Gen 2.1	6 GB/s	12 slot	7 PXI Express slots and 4 PXI/PXI Express hybrid peripheral slots	1,100W	11	$6,987	$582
	Trigger Option for Either Chassis							$1,030	
	* AC or DC Input								
	** External Clock option								
	*** Four PXI only slots								

Mass Interconnect Support

Pickering has already reached out to MacPanel concerning our new PXIe chassis. They have already researched and have engineered the necessary mechanics to support the 42-924 and 42-925 chassis in the Scout™ mass interconnect system. They will have this information on their web site at the time of our product announcement. See the renderings below.

We have reached out to VPC, and we fully expect that they will offer similar support.
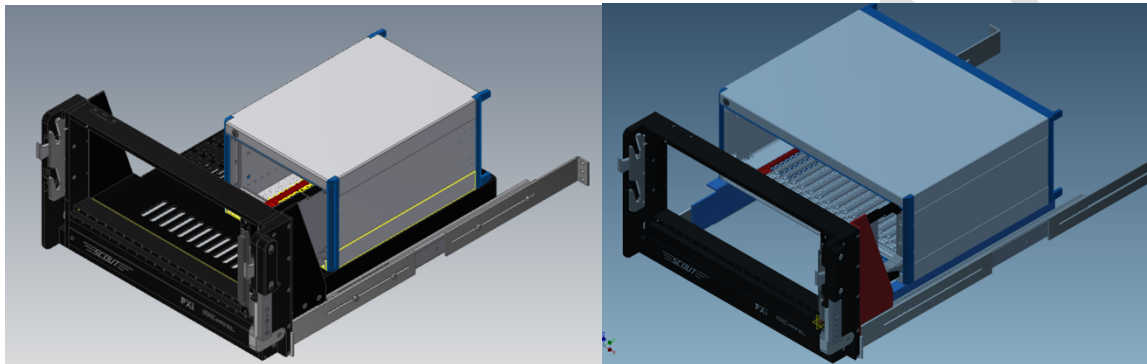

Appendix - PXI Express

(Source: Marvin Test)

What is PXI Express?

The PXI Express specification integrates PCI Express signaling into the PXI standard. This increases backplane bandwidth from 132 MB/s and up to 24 GB/s, a 180 times improvement. It also enhances PXI timing and synchronization features by incorporating a 100 MHz differential reference clock and differential trigger lines. PXI Express maintains backward compatibility with the PXI standard.

How does PXI Express compare to other buses in bandwidth and latency?
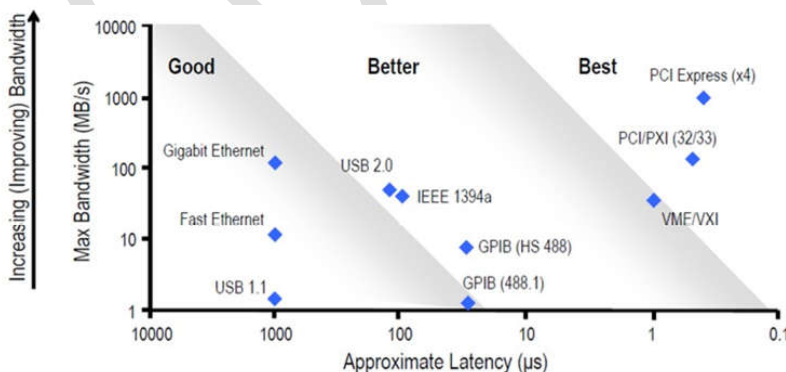
Bandwidth is the rate at which data is sent across a bus, expressed in megabytes per second; latency is the delay in transmission of data across a bus. Figure 1 compares data rates and latency in several test platforms.

Figure 1 - PXIe bandwidth and latency

What are the different types of slots in a PXI Express chassis?
A PXI Express chassis can include the following:

- A system slot, which accepts an embedded or remote PXI Express controller
- PXI peripheral slots, which accept PXI modules
- PXI Express hybrid peripheral slots, which accept PXI Express peripheral modules, 32-bit CompactPCI peripheral modules, and hybrid-compatible PXI peripheral modules

Figure 2 - PXIe chassis slot types

- A system timing slot that accepts both PXI Express peripheral modules and PXI Express system timing modules.

Does PXI Express replace PXI?
No. PXI Express is part of the PXI platform. Many applications, including general data acquisition and motion control, do not require the increased bandwidth of PXI Express, so you need to choose which specification within the PXI platform is right for you.

Is PXI Express backward compatible with PXI?
Yes. PXI Express maintains both software and hardware compatibility with PXI peripheral modules.

- PCI Express uses the same OS and driver model as PCI, resulting in complete software compatibility between PXI and PXI Express.
- **Hardware:** PXI Express chassis can provide hybrid peripheral slots that accept PXI Express peripheral modules and hybrid slot compatible PXI peripheral modules.

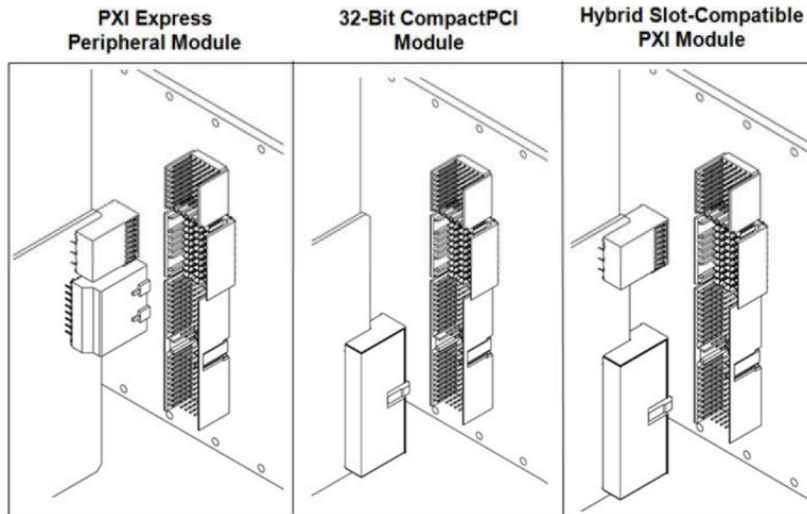## *What is a PXI Express hybrid slot?*

Figure 3 - A PXI Express hybrid slot accepts PXI Express peripheral modules, 32-bit CompactPCI boards, and hybrid slot-compatible PXI modules.

The PXI Express hybrid peripheral slots, shown in Figure 3, can accept either PXI Express peripheral modules, 32-bit CompactPCI boards, or hybrid slot-compatible PXI modules.

What is a hybrid slot-compatible PXI module?

PXI modules that do not include a J2 connector are already hybrid slot compatible. For modules that include the J2 connector, you must replace that physical connector to achieve compatibility with PXI Express hybrid peripheral slots (See Figure 3).

What do x1, x4, and x16 mean?

With PCI Express, data is sent serially through pairs of transmit and receive connections called lanes, which give data the ability to transfer at up to 1,500 MB/s per direction (Gen 3). Multiple lanes can be grouped into x1 ("by-one"), x2, x4, x8, x12, x16, and x32 links to increase bandwidth to the slot. For example, a x16 slot would have a bandwidth of 24 GB/s per direction (1,500 MB/s * 16).

What is a "Gen" Level?

Gen is an abbreviation for "Generation" and reflects the hardware and software specifications of the PXI Express chassis your chassis and controller support.

Gen 1.x - x1: 250 MB/s. x16: 4 GB/s.

Gen 2.x - x1: 500 MB/s. x16: 8 GB/s.

Gen 3.x - x1: 1,500 MB/s. x16: 24 GB/s.