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Find the *National Instruments PXI-6651* at our website: *Click HERE*

PXI and PXI Express Timing and Synchronization Control

NI PXI-665x, NI PXIe-6672

- Works with all PXI and PXI Express modules
- Multichassis PXI synchronization
- Onboard routing of internal and external clock and trigger signals
- PXI slot 2 star trigger controller (PXI-665x)
- PXI Express system timing slot star trigger controller (NI PXIe-6672)
- Onboard high-stability references
  - OCXO, 50 ppb (PXI-6653)
  - TCXO, 1 ppm (PXI-6652 and NI PXIe-6672)
- Reference clock import and export with PLL capabilities
- DC to 105 MHz, high-resolution DDS clock generation
- Software trigger generation
- Frequency measurement capabilities

Operating Systems

- Windows Vista/XP
- LabVIEW Real-Time

Recommended Software

- LabVIEW
- LabWindows™/CVI

Driver Software (included)

- NI-Sync



>> *For complete specifications, see the* **NI PXI-665x** *and the* **NI PXIe-6672** *user manuals at* **ni.com/manuals**.

Overview and Applications

The National Instruments PXI-665x and NI PXIe-6672 timing and synchronization control modules use the trigger bus, star trigger, and system reference clock features of PXI to implement advanced multimodule or multichassis synchronization. You can vastly improve the accuracy of measurements, implement advanced triggering schemes, or synchronize multiple modules and/or multiple chassis to act as a single system for high-channel-count applications.

Features	NI PXI-6651 Slave Module	NI PXI-6652 Master Module	NI PXI-6653 Master Module	NI PXIe-6672 Master Module
Front Panel Connectivity				
CLK10 in	✓	✓	✓	✓
CLK10 out	–	✓	✓	✓
General-purpose PFI lines	2 SMB	6 SMB	6 SMB	6 SMB
Programmable voltage threshold	✓	✓	✓	✓
Trigger Routing				
Star trigger source (PXI_STAR)	✓	✓	✓	✓
PXI trigger bus (PXI_TRIG)	✓	✓	✓	✓
Onboard Clock Sources				
10 MHz timebase	–	TCXO (1 ppm)	OCXO (50 ppb)	TCXO (1 ppm)
DDS programmable clock	–	DC to 105 MHz	DC to 105 MHz	DC to 105 MHz

Table 1. NI PXI-665x and NI PXIe-6672 Features

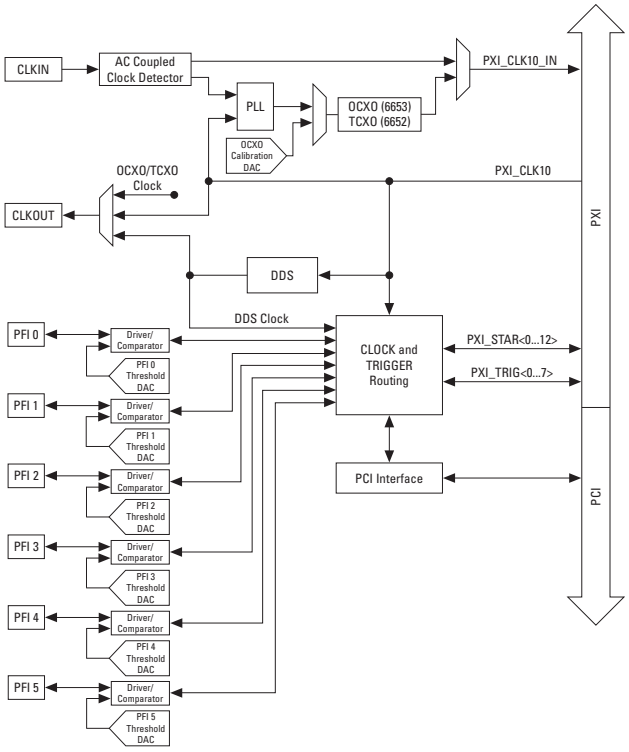


Figure 1. Block Diagram of PXI-6652 and PXI-6653 Master Modules

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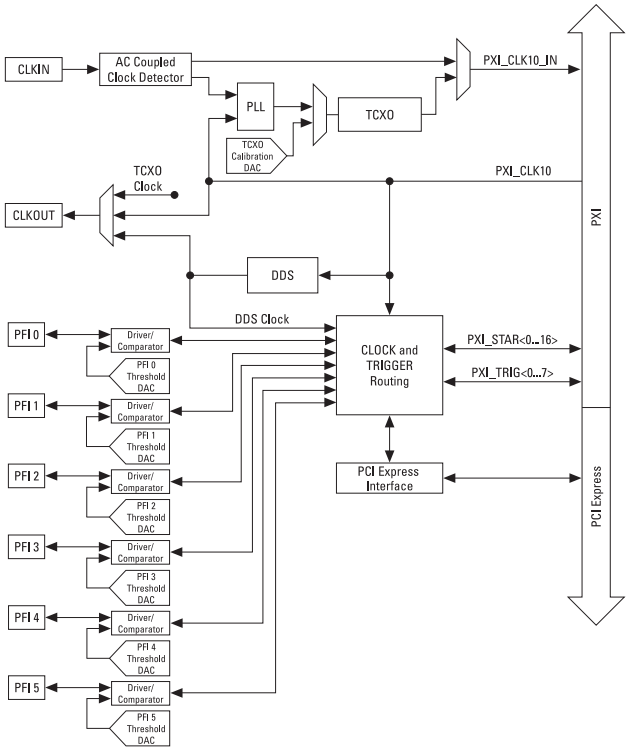


Figure 2. Block Diagram of NI PXIe-6672 Master Module

PXI Backplane Overview

PXI-665x and NI PXIe-6672 modules provide full control of the following timing and synchronization features of the PXI and the PXI Express backplane, respectively.

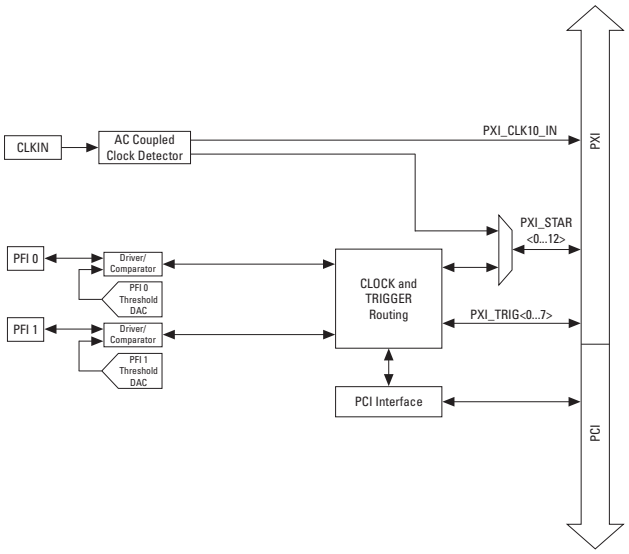


Figure 3. Block Diagram of PXI-6651 Slave Module

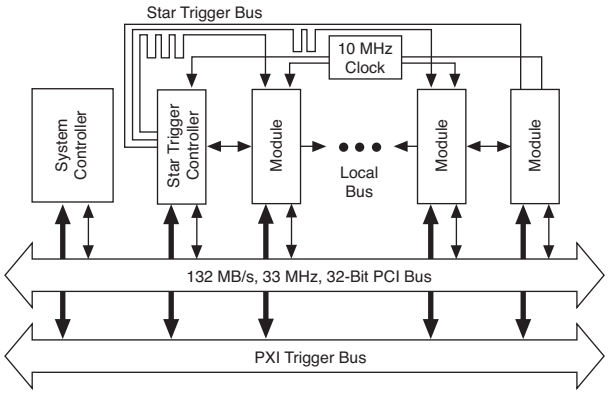


Figure 4. Diagram of Synchronization Features in the PXI Backplane

- Star trigger (PXI_STAR) – 13 or 17 equal-trace-length, point-to-point lines for providing low-skew (<1 ns) trigger or clock signals from slot 2 to slots 3 through 15 in a PXI chassis or the system timing slot to slots 2 through 17 in a PXI Express chassis.
- Trigger bus (PXI_TRIG) – Eight bused TTL lines for general-purpose routing of triggers, clocks, and handshaking signals.
- 10 MHz clock (PXI_CLK10) – For improved accuracy, capable devices, such as the NI PXI-5xxx modular instruments, can phase-lock to this high-accuracy low-jitter 10 MHz reference clock.

To act as a PXI star trigger controller or to provide a high-accuracy 10 MHz reference clock, a PXI-665x module must be installed in slot 2 of the PXI chassis, as shown in Figure 4, and the NI PXIe-6672 must be installed in the system timing slot of the PXI Express chassis.

High-Stability 10 MHz Timebase

When installed in slot 2 of a PXI chassis, the PXI-6652 and PXI-6653 modules can override the built-in 10 MHz reference clock on a PXI chassis, and when installed in the system timing slot of a PXI Express chassis, the NI PXIe-6672 can override the built-in 10 MHz reference clock on a PXI Express chassis. Typically, most chassis provide a 10 MHz reference clock with 25 ppm accuracy (10 MHz ±250 Hz). This accuracy is improved to 1 ppm with the PXI-6652 and NI PXIe-6672, and to 50 ppb with the PXI-6653. Many modules, such as the PXI-5xxx modular instruments, have phase-locked-loop (PLL) circuitry to synchronize with the 10 MHz reference clock.

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High-Resolution DDS Clock

The onboard direct digital synthesis (DDS) clock of the PXI-6652, PXI-6653, and NI PXIe-6672 modules provides an extremely high-resolution programmable clock source that can generate clocks from DC to 105 MHz in frequency with <1.1 µHz (PXI-6653 and PXI-6652) or <0.075 Hz (NI PXIe-6672) resolution. Use this clock as a common timebase for data acquisition modules.

NI-Sync Software

The included NI-Sync driver software provides powerful and easy-to-use control of PXI-665x and NI PXIe-6672 modules. You can use NI application development environment (ADE) software such as LabVIEW or LabWindows/CVI, or other ADEs such as Visual C/C++ for programming these modules. For example programs specific to NI-Sync, please visit **ni.com/examples**.

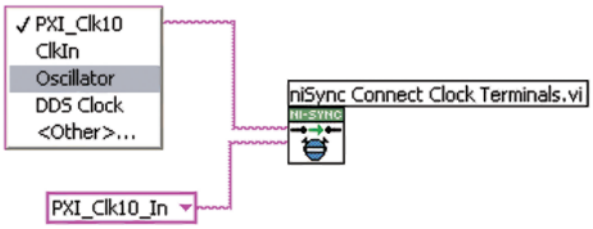


Figure 5. The NI-Sync driver software provides an easy-to-use interface to PXI-665x and NI PXIe-6672 modules.

Multichassis Synchronization

Using a combination of master PXI-6652 and PXI-6653 modules with slave PXI-6651 modules, you can tightly synchronize multiple PXI chassis, and using a combination of NI PXIe-6672 modules, you can tightly synchronize multiple PXI Express chassis. With these modules, you can create very high-channel-count synchronized systems for data acquisition, control, and instrumentation.



Figure 6. In this example, three PXI chassis containing 13 PXI-4472 eight-channel 102.4 kS/s simultaneous-sampling dynamic signal acquisition modules are synchronized. The result is a 312-channel synchronized acquisition system.

>> *For complete specifications, see the* **NI PXI-665x** *and the* **NI PXIe-6672** *user manuals at* **ni.com/manuals**.

Ordering Information

NI PXI-6653 (Master, OCXO).....778715-01
NI PXI-6652 (Master, TCXO).....778726-01
NI PXI-6651 (Slave).....778725-01
NI PXIe-6672 (Master, TCXO).....780063-01

Cables

SMB-210.....188858-01
Dual SMB Plug to Dual SMB Plug Coax, 50 Ω, 1 m

SMB-200.....188859-01
SMB Plug to SMB Plug Coax, 50 Ω, 1 m

BUY NOW!

For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to **ni.com/pxi**.

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We also offer service programs that provide automatic upgrades to your application development environment and higher levels of technical support. Visit **ni.com/ssp**.

Hardware Services

NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with **ni.com/pxiadvisor**.

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