

USER GUIDE

Differential Digital Flying Lead Cable

Accessory for Differential NI Digital Waveform Generator/Analyzers

This guide explains how to set up and use the NI SHB12X-H3X24 cable with differential NI digital waveform generator/analyzer modules.

The NI SHB12X-H3X24 cable is a differential cable that breaks out each NI digital waveform generator/analyzer channel into separate wires with a 1 x 3 header receptacle at the end. The header receptacles contain a positive terminal, a complementary terminal, and a ground terminal. The NI SHB12X-H3X24 cable allows you to connect differential NI high-speed digital waveform generator/analyzer devices, such as the NI 656x LVDS device, to various types of devices and circuits for interfacing, testing, or analysis. The 1 x 3 header receptacles are installed with 1 x 3 receptacle housing but may be used with an included 8 x 3 housing.

This cable offers connectivity similar to that found on a typical logic analyzer so that it can be used in logic analyzer-type applications. Unlike a typical logic analyzer, however, this cable also allows for simultaneous pattern generation and acquisition, so it also can be used in stimulus/response applications.

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What You Need to Get Started

To set up and use the NI SHB12X-H3X24 cable, you need the following items:

- Compatible NI digital waveform generator/analyzer, installed in a PXI chassis, compactPCI chassis, or PCI slot
- The documentation included with the NI digital waveform generator/analyzer and driver software

You may also need the following optional software:

- NI Digital Waveform Editor
- NI LabVIEW SignalExpress

Related Documentation

The NI digital waveform generator/analyzer ships with several documents designed to familiarize you with the module. The documentation set includes the following items:

- *NI Digital Waveform Generator/Analyzer Getting Started Guide*—Read this printed document to set up the hardware and configure it to complete your first acquisition or generation.
- *NI Digital Waveform Generator/Analyzer Help*—This online document provides more in-depth information about the hardware capabilities of the module, theory of operation, programming flow, and software reference.
- NI digital waveform generator/analyzer specifications—These printed documents provide specifications for the device.

Parts Locator

Refer to Figure 1 to locate connectors and components on the NI SHB12X-H3X24 cable. The leads are shown in more detail in Figure 2.

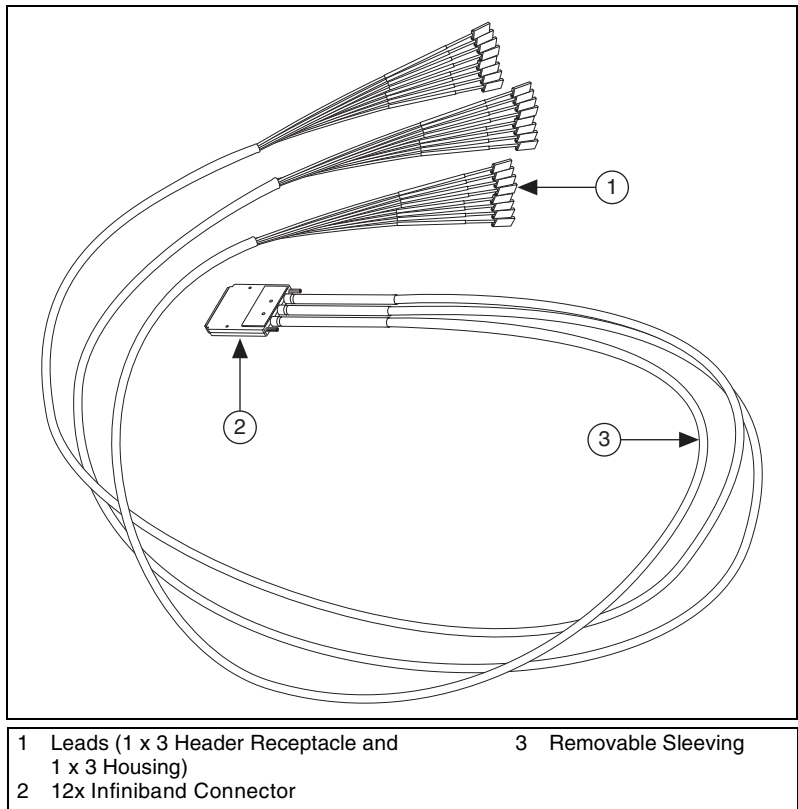


Figure 1. Parts Locator Diagram

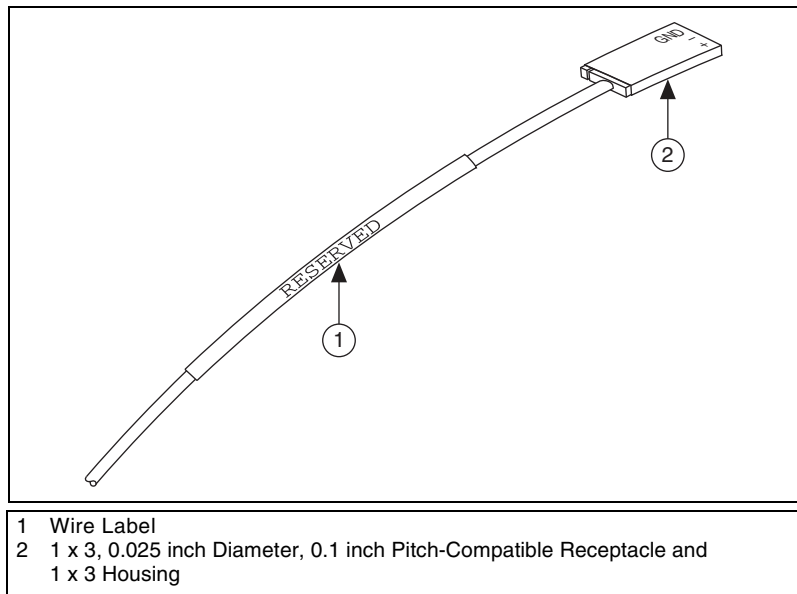


Figure 2. Detailed Parts Locator Diagram for Leads

Connecting Signals

Each DIO, PFI, and clock channel of the NI digital waveform generator/analyzer connects to a corresponding set of leads on the NI SHB12X-H3X24 cable.

The NI SHB12X-H3X24 cable is separated into three bundles of eight channels. Each channel is split into one 1 x 3 header receptacle for connecting the channel and its associated ground. Table 1 describes the channels and shows how they are grouped by bundle.

Table 1. NI Digital Waveform Generator/Analyzer Signal Descriptions and Grouping

Channel	Signal Description	Bundle
DIO <0..15>	Bidirectional digital data channels 0 through 15. Refer to the hardware documentation for your NI digital waveform generator/analyzer for information about the number of available DIO channels on the device.	DIG <0..3>:Bundle A DIG <4..11>:Bundle B DIG <12..15>:Bundle C
STROBE	For devices that have a STROBE channel, this signal is the external Sample clock source for dynamic acquisition.	Bundle C
CLKOUT LVPECL CLKOUT LVDS	For devices that have a DDC CLK OUT channel, this signal is the exported Sample clock signal.	Bundle C
PFI <1..3> PFI <4> ¹	Programmable functional interface PFI <1..4>.	Bundle A
RESERVED	Leave unconnected.	Bundle C
¹ PFI 4 may not be supported by your device.		

Using the Accessory

The NI SHB12X-H3X24 cable breaks out every channel through a 100 Ω differential characteristic impedance microcoaxial cable. This cable is then split into a lead with a 1 x 3 header receptacle that allows connection to 0.025 inch diameter, 0.1 inch pitch connectors, and provides access to both polarities and ground. This cable was designed for both acquisition and generation operations with differential NI digital waveform generator/analyzers. Refer to the *Termination* sections in the *NI Digital Waveform Generator/Analyzer Help* to learn how to correctly terminate signals to achieve optimal signal quality.

The receptacles on the SHB12X-H3X24 attach to standard 0.1 inch pitch header pins (0.025 inch x 0.025 inch square pin). For best signal integrity, connect both signal polarities and ground to the DUT, as shown in Figure 3.

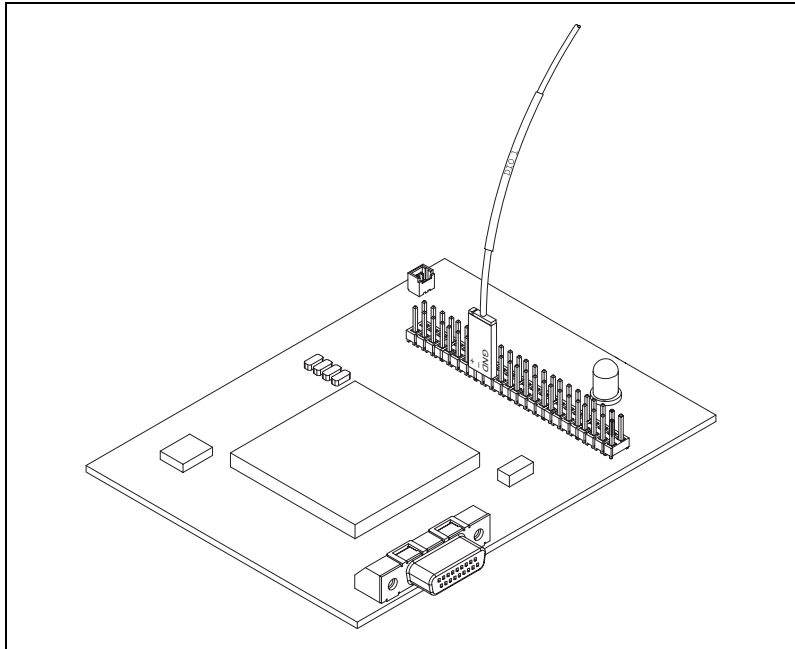


Figure 3. Using the NI SHB12X-H3X24 Cable to Interface to a DUT

Generation

Similar to the SHB12X-B12X differential cable, the NI SHB12X-H3X24 cable allows you to perform pattern generation. The $100\ \Omega$ differential output impedance of NI digital waveform generators/analyzers, coupled with the $100\ \Omega$ differential characteristic impedance of this cable, allows generation of clean signals up to the full rate of the device. The 0.1 inch pitch-compatible receptacles provide a large array of connectivity options.

Acquisition

Direct Pattern Acquisition

The NI SHB12X-H3X24 cable also allows acquisition of digital signals from the DUT to the digital input device by connecting the flying leads directly to the circuit board.

This cable is designed with a $100\ \Omega$ differential characteristic impedance. For optimal signal quality, the digital signal source should have an output impedance that is as close to $100\ \Omega$ differential as possible. For more information about signal integrity, refer to the *Termination* topic for the device in the *NI Digital Waveform Generator/Analyzer Help*.

Refer to the *NI Digital Waveform Generator/Analyzer Help* and NI-HSDIO shipping examples for information on how to change the input threshold voltages and input impedance.

Interfacing to a DUT Interface Board

Many times when you are evaluating an IC, you can purchase an evaluation or interface board. Such a board typically contains a socket for the IC you want to evaluate, as well as any supporting components that are necessary for IC functioning. The evaluation board frequently provides 0.1 inch pitch header pins as an interface to the digital inputs and outputs of the IC.

Using an NI SHB12X-H3X24 cable and a differential NI digital waveform generator/analyzer, you can communicate with your IC using the header pins on the evaluation board. Slide the receptacle for each channel onto the appropriate header pin. In this application example, the NI digital device and the EEPROM can send data directly to each other. The receptacles on the SHB12X-H3X24 attach to standard 0.1 inch pitch header pins (0.025 inch × 0.025 inch square pin). For best signal integrity, NI recommends you connect both signal polarities and ground for each chamber in use.

For bussed interfaces, use included 8 x 3 receptacle housing for easy connectivity. Remove 1 x 3 receptacle housing prior to installation of 8 x 3 receptacle housing.

Specifications

Digital I/O

DIO channels..... 16, differential
Control I/O channels 7, differential



Note Your device may not support all control channels.

Typical propagation delay..... 6.7 ns
Typical channel-to-channel skew..... 50 ps
Typical characteristic impedance..... 100 Ω differential
Typical input capacitance..... 65 pF

Physical

Length	1.5 m
I/O connectors.....	12x Infiniband Connector (1), 1 x 3, 0.025 inch Diameter, 0.1 inch Pitch-Compatible Receptacle (24)

Environmental Management

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment but also to NI customers.

For additional environmental information, refer to the *NI and the Environment* Web page at ni.com/environment. This page contains the environmental regulations and directives with which NI complies, as well as any other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)



EU Customers At the end of their life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit ni.com/environment/weee.htm.

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