

GXSW

Switching Instruments

GX6062

200 MHz Multiplexer Scanner

PXI Board

User's Guide

Last Updated: December 12, 2016

Safety and Handling

Each product shipped by Marvin Test Solutions is carefully inspected and tested prior to shipping. The shipping box provides protection during shipment, and can be used for storage of both the hardware and the software when they are not in use.

The circuit boards are extremely delicate and require care in handling and installation. Do not remove the boards from their protective plastic coverings or from the shipping box until you are ready to install the boards into your computer.

If a board is removed from the computer for any reason, be sure to store it in its original shipping box. Do not store boards on top of workbenches or other areas where they might be susceptible to damage or exposure to strong electromagnetic or electrostatic fields. Store circuit boards in protective anti-electrostatic wrapping and away from electromagnetic fields.

Be sure to make a single copy of the software diskette for installation. Store the original diskette in a safe place away from electromagnetic or electrostatic fields. Return compact disks (CD) to their protective case or sleeve and store in the original shipping box or other suitable location.

Warranty

Marvin Test Solutions products are warranted against defects in materials and workmanship for a period of 12 months. Marvin Test Solutions shall repair or replace (at its discretion) any defective product during the stated warranty period. The software warranty includes any revisions or new versions released during the warranty period. Revisions and new versions may be covered by a software support agreement. If you need to return a board, please contact Marvin Test Solutions Customer Technical Services Department via <https://www.MarvinTest.com/magic/> - the Marvin Test Solutions on-line support system

If You Need Help

Visit our web site at <http://www.marvintest.com> for more information about Marvin Test Solutions products, services and support options. Our web site contains sections describing support options and application notes, as well as a download area for downloading patches, example, patches and new or revised instrument drivers. To submit a support issue including suggestion, bug report or question please use the following link: <http://www.marvintest.com/magic>

You can also use Marvin Test Solutions technical support phone line (949) 263-2222. This service is available between 7:30 AM and 5:30 PM Pacific Standard Time.

Our address (check our website for latest address): Marvin Test Solutions, 1770 Kettering, Irvine, CA 92614, USA.

Disclaimer

In no event shall Marvin Test Solution or any of its representatives be liable for any consequential damages whatsoever (including unlimited damages for loss of business profits, business interruption, loss of business information, or any other losses) arising out of the use of or inability to use this product, even if Marvin Test Solution has been advised of the possibility for such damages.

Copyright

Copyright © 2003-2016 by Marvin Test Solutions, Inc. All rights reserved. No part of this document can be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written consent of Marvin Test Solutions.

Trademarks

ATEasy®, CalEasy, DIOEasy®, DtifEasy, WaveEasy	Marvin Test Solutions (prior name is Marvin Test Solution - Marvin Test Systems Inc.)
C++ Builder, Delphi	Embarcadero Technologies Inc.
LabView, LabWindows tm /CVI	National Instruments
Microsoft Developer Studio, Microsoft Visual C++, Microsoft Visual Basic, .NET, and Windows	Microsoft Corporation

All other trademarks are the property of their respective owners.

Table of Contents

Safety and Handling	i
Warranty	i
If You Need Help.....	i
Disclaimer	i
Copyright	i
Trademarks	ii
Chapter 1 - Introduction	1
Manual Scope and Organization.....	1
Manual Scope.....	1
Manual Organization.....	1
Conventions Used in this Manual	1
Chapter 2 - Overview	3
Introduction	3
Features.....	3
Board Description.....	4
Architecture	5
GX6062 Group Relays.....	6
Specifications.....	7
Contact Specifications.....	7
DC specifications	7
Environmental	7
Power Requirements	8
Physical	8
Virtual Panel Description.....	9
Virtual Panel Initialize Dialog	10
Virtual Panel Setup Page	11
Virtual Panel About Page.....	12
Chapter 3 - Installation and Connections	13
Getting Started	13
Packing List	13
Unpacking and Inspection.....	13
System Requirements.....	13
Installation of the GXSW Software	14
Setup Maintenance Program	14
Overview of the GXSW Software	15

Installation Folders	15
Configuring Your PXI System using the PXI/PCI Explorer.....	16
Board Installation.....	17
Before you Begin	17
Electric Static Discharge (ESD) Precautions	17
Installing a Board	17
Plug & Play Driver Installation	19
Removing a Board	19
Connectors and Jumpers	20
JP1 – Chassis Ground Jumper	20
Connections	20
Connectors and Accessories	21
Groups Relays Connectors.....	22
Chapter 4 - Functions Reference.....	25
Introduction	25
GX6062 Functions.....	26
Gx6062Close	27
Gx6062ConnectChannels	28
Gx6062ConnectGroupToExternalCoax.....	30
Gx6062DisconnectChannels.....	31
Gx6062DisconnectGroupToExternalCoax	33
Gx6062GetBoardSummary	34
Gx6062GetChannel	35
Gx6062GetDaisyChainMode.....	36
Gx6062GetGroupRelays.....	37
Gx6062Initialize	38
Gx6062InitializeVisa	39
Gx6062Open.....	40
Gx6062Panel	41
Gx6062Reset	42
Gx6062SetDaisyChainMode	43
Gx6062SetGroupRelays	44
GxSWGetErrorString	46
Index	49

Chapter 1 - Introduction

Manual Scope and Organization

Manual Scope





The purpose of this manual is to provide all the necessary information to install, use, and maintain the **GX6062** instrument. This manual assumes the reader has a general knowledge of PC based computers, Windows operating systems, and some understanding of digital to analog conversion.

Manual Organization

The GX6062 manual is organized in the following manner:

Chapter	Content
Chapter 1 - Introduction	Introduces the GX6062 manual. Lists all the supported board and shows warning conventions used in the manual.
Chapter 2 – Overview	Describes the GX6062 features, board description, its architecture, specifications and the panel description and operation.
Chapter 3 –Installation and Connections	Provides instructions on how to install the GX6062 Board and its accompanying software.
Chapter 4 – Functions Reference	Contains a listing of the general GX6062 functions. Each function is described along with its syntax, parameters, and special programming comments. Samples are given for each function.

Conventions Used in this Manual

Symbol Convention	Meaning
	Static Sensitive Electronic Devices. Handle Carefully.
	Warnings that may pose a personal danger to your health. For example, shock hazard.
	Cautions where computer components may be damaged if not handled carefully.
	Tips that aid you in your work.

Formatting Convention	Meaning
Monospaced Text	Examples of field syntax and programming samples.
Bold type	Words or characters you type as the manual instructs. For example: function or panel names.
<i>Italic type</i>	Specialized terms. Titles of other references and information sources. Placeholders for items you must supply, such as function parameters

Chapter 2 - Overview

Introduction

The GX6062 is a 200 MHz bandwidth, 6U high-density PXI switching card. The GX6062 has twelve groups of 1x4 Multiplexers configured by software to provide switch paths. Each switching group can be connected to the adjacent group. First and last group can be connected to one another using two additional relays providing a shorter connection path when possible for better bandwidth performance or to Daisy Chain to other GX6062 cards. All 60 channels of the GX6062 are differential.

Features

The GX6062 is a one-slot 6U PXI high-density switching instrument. The switching instrument has the following features:

- High density, high frequency switching with bandwidth greater than 200 MHz
- 60 differential channels.
- Twelve groups of 1x4 Multiplexer.
- Twelve individual groups allow multiple configurations
- Groups can be connected to form up to 1x59 multiplexer
- Both the first and last group can be Daisy Chained to other GX6062 boards to obtain bigger switching matrix.
- Occupies one PXI/CompactPCI 6U bus slot.

Board Description

The GX6062 is a 200 MHz bandwidth, 6U high-density PXI switching card. The GX6062 has twelve groups of 1x4 Multiplexers configured by software to provide switch paths. Each switching group of the GX6062 has five channels. There are five relays to connect any one of the channels to the bus. In addition, there is a sixth relay to connect the group's bus to the bus of the adjacent group.

Groups A (first group) and L (last group) can be connected to one another using two additional relays. The connection is done through the default-installed cable providing a shorter connecting path when possible for better bandwidth performance. Groups A (first group) and L (last group) can also be Daisy Chained to other Gx6062 cards. All 60 channels of the GX6062 are differential.

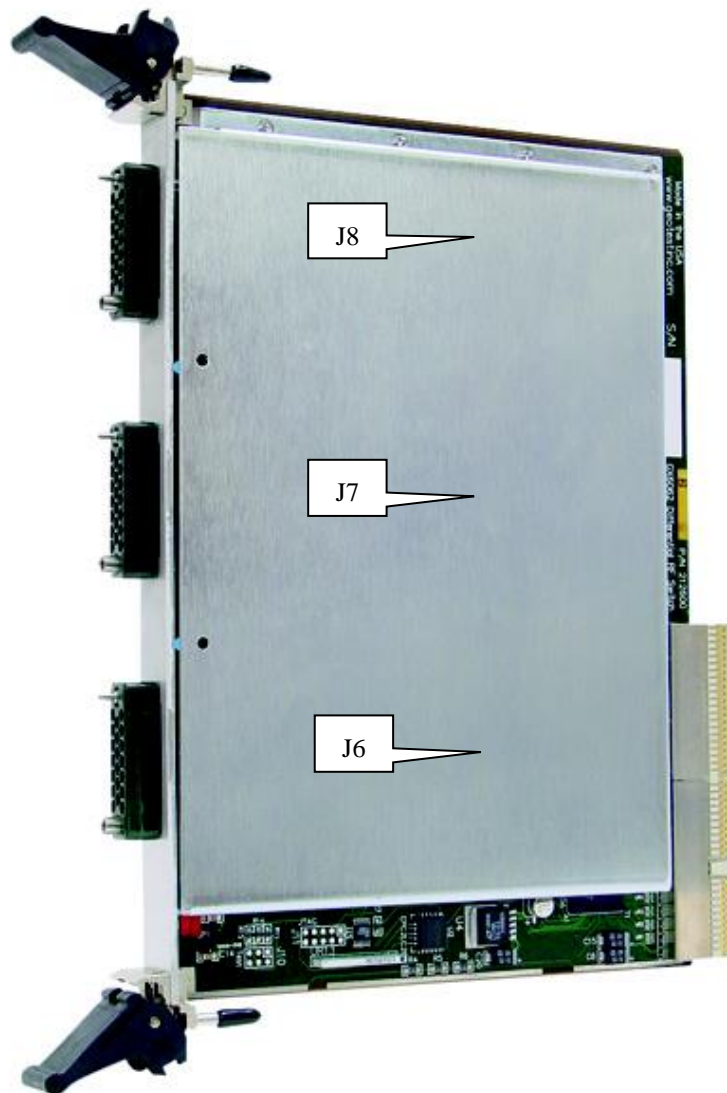


Figure 2-1: GX6062- 200 MHz Multiplexer Scanner PXI Board

Architecture

The architecture of the GX6062 consists of twelve switching groups, A through L. Each group has five coax channels and each provides switching to any of the other channels in the same group and to any other channel in any of the other groups in the card. Each switching group can be connected to an adjacent group. The first and last groups (Groups A and L) can be Daisy Chain to another card. To control the relays in the switching groups, there is a bank of read back registers.

The GX6062 architecture is shown in Figure 2-2:

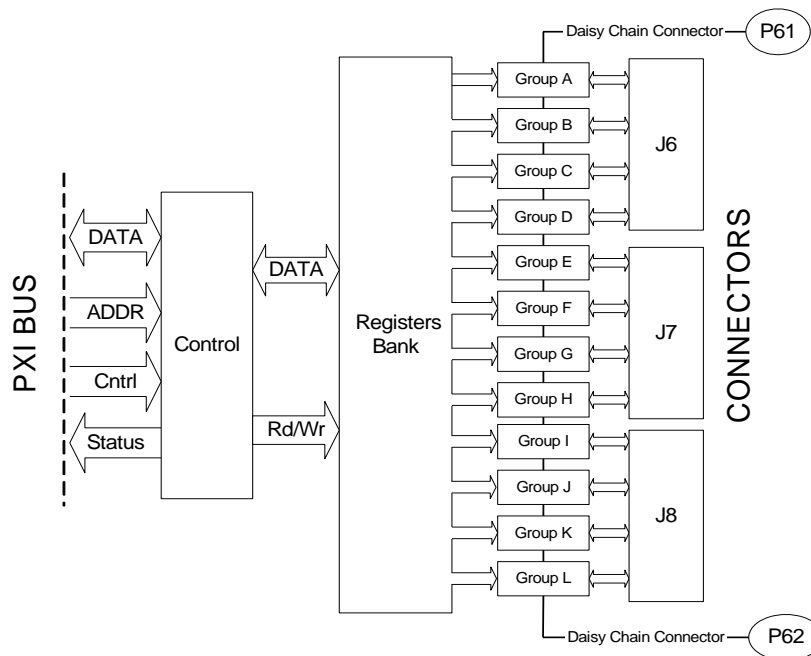


Figure 2-2: GX6062 Architecture

GX6062 Group Relays

The GX6062 62 Relays are organized as follow (see Figure 2-3).

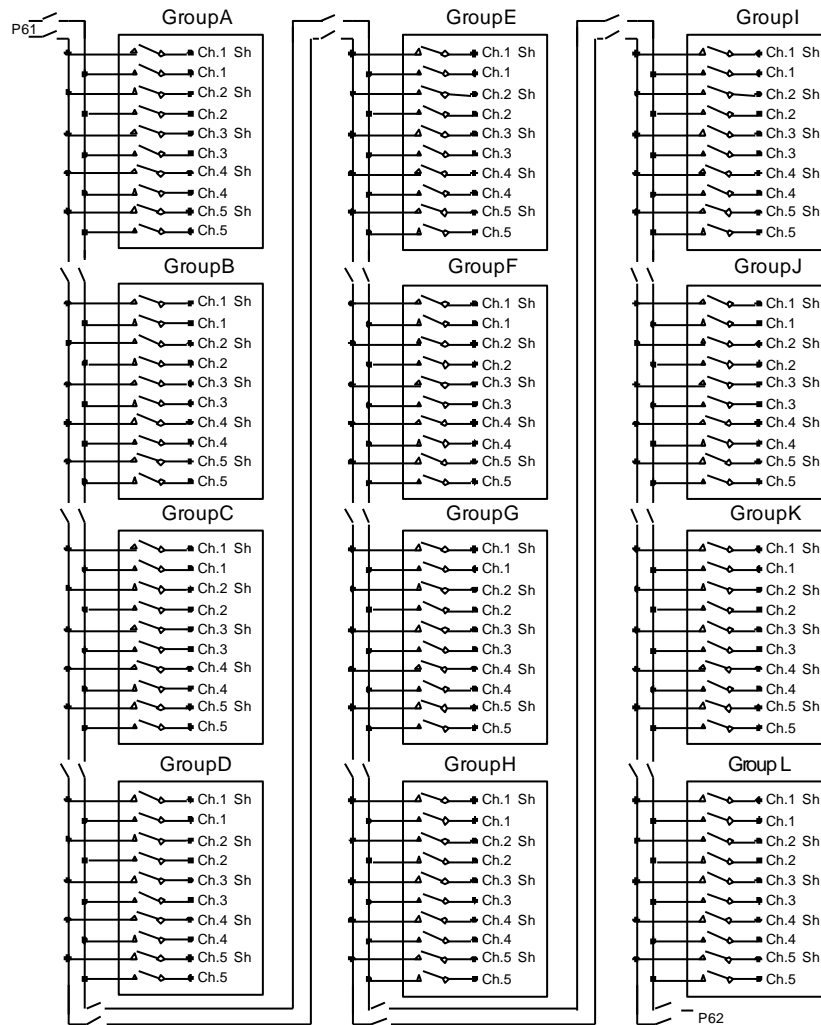


Figure 2-3: GX6062 Group Relays

*Relays P61 and P62 are for Daisy connection.

Sh – Shield Relay Description

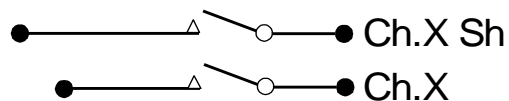


Figure 2-4: A Typical GX6062 Channel Switching

For every channel there are two relays, one for the signal (Ch. X) and one for the shield (Ch. X Sh). Each time a channel is closed/opened the signal and the shield lines will be closed/ opened together. All relays are reed coaxial, Form A 50 Ohms impedance with magnetic screening.

Specifications

The following table outlines the specifications of the GX6062.

Contact Specifications

Maximum switchable voltage (signal to ground)	200VDC Resistive load
Maximum switchable current	0.5A DC Resistive load
Maximum carry current	1 A DC Resistive load

DC specifications

Relay Contact Resistance	<0.2 Ω
RF specifications	
Impedance	50 Ohm
Bandwidth (-3 dB)	>200MHz
Insertion Loss	<0.7 dB at 100MHz
Crosstalk across groups (50-ohm terminator)	10 MHz <-40 dB 100 MHz <-40 dB 200 MHz <-35 dB
Isolation between channels (50-ohm terminator)	10 MHz <-40 dB 100 MHz <-40 dB 200 MHz <-35 dB
VSWR (50-ohm terminator)	1.2: 1 at 100 MHz

Environmental

Temperature Operating Storage	0 to +40 °C -10 to +70 °C
Vibration	5g at 500Hz
Shock (½ Sine)	5g for 6mS

Power Requirements

3.3 V Power:	160mA
5V Typical Power:	20mA per channel
5V Maximum Power:	1.25A max

Physical

Size	6U PXI
Weight	GX6062: 570g

Virtual Panel Description

The GX6062 includes a virtual panel program, which enables full utilization of the various configurations and controlling modes. To fully understand the front panel operation, it is best to become familiar with the functionality of the board.

To open the virtual panel application, select **GX6062 Panel** from the **Marvin Test Solution, GXSW** menu under the **Start** menu. The GX6062 virtual panel opens as shown here:

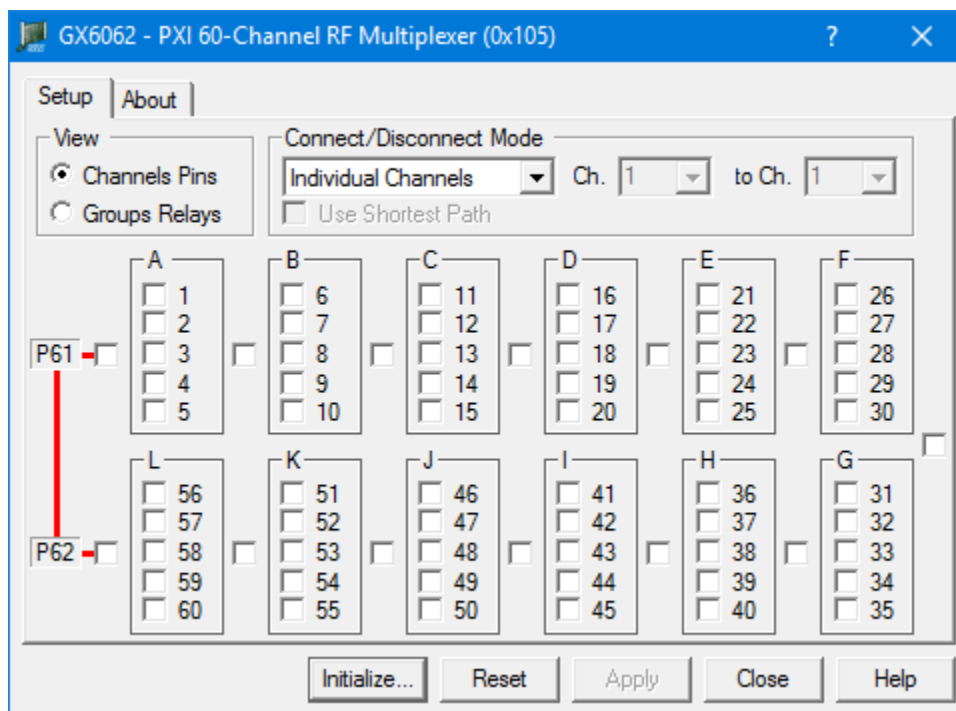


Figure 2-5: GX6062 Virtual Panel

The following controls are shown:

Initialize Opens the Initialize Dialog (see Initialize Dialog paragraph) in order to initialize the board driver. The current settings of the selected counter **will not change after calling initialize**. The panel will reflect the current settings of the counter after the Initialize dialog closes.

Reset: Resets all relays to an open state and sets panel parameters to the default state.

Apply: Apply current settings.

Close: Closes (exits) the GX6062 panel.

Help: Opens the GX6062 on-line help window.

Virtual Panel Initialize Dialog

The Initialize dialog initializes the driver for the selected counter board. The counter settings **will not change** after initialize is called. Once initialize, the panel will reflect the current settings of the counter.

The Initialize dialog supports two different device drivers that can be used to access and control the board:

1. **Use Marvin Test Solutions' HW** – this is the device driver installed by the setup program and is the default driver. When selected, the **Slot Number** list displays the available counter boards installed in the system and their slots. The chassis, slots, devices and their resources are also displayed by the HW resource manager, **PXI/PCI Explorer** applet that can be opened from the Windows Control Panel. The PXI/PCI Explorer can be used to configure the system chassis, controllers, slots and devices. The configuration is saved to PXISYS.INI and PXIeSYS.INI located in the Windows folder. These configuration files are also used by VISA. The following figure shows the slot number 0x105 (chassis 1 Slot 5). This is the slot number argument (nSlot) passed by the panel when calling the driver **Gx6062Initialize** function used to initialize driver with the specified board.

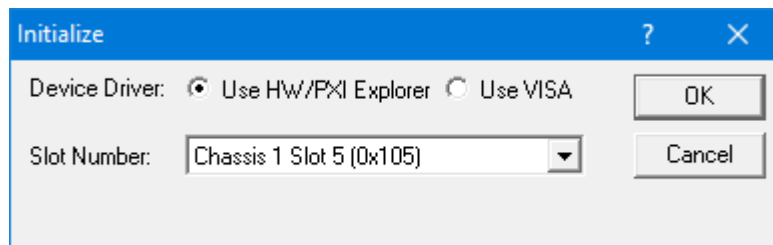


Figure 2-6: Initialize Dialog Box using Marvin Test Solutions' HW driver

2. **Use VISA** – this is a third-party device driver usually provided by National Instrument (NI-VISA). When selected, the **Resource** list displays the available boards installed in the system and their VISA resource address. The chassis, slots, devices and their resources are also displayed by the VISA resource manager, **Measurement & Automation** (NI-MAX) and in Marvin Test Solution **PXI/PCI Explorer**. The following figure shows PXI9::12::INSTR as the VISA resource (PCI bus 9 and Device 12). This is VISA resource string argument (*szVisaResource*) passed by the panel when calling the driver **Gx6062InitializeVisa** function to initialize the driver with the specified board.

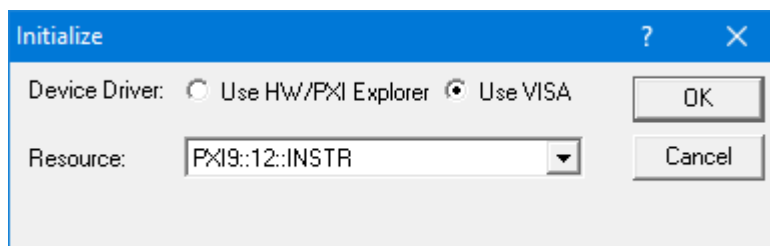


Figure 2-7: Initialize Dialog Box using VISA resources

Virtual Panel Setup Page

After the board is initialized the panel is enabled and will display the current setting of the board. The following picture shows the **Setup** page settings:

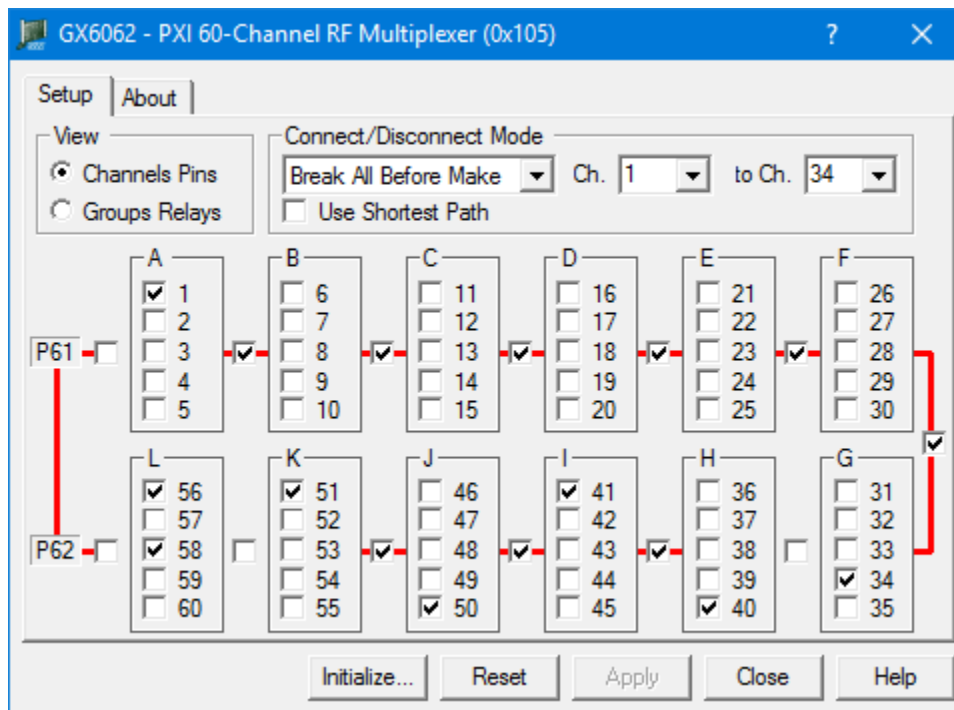


Figure 2-8: GX6062 Virtual Panel (Initialized)

The following controls are shown in the Setup page:

View Channel Pins or Groups Relay: Display either the Channels Pins numbers or the Groups Relay numbers.

Connection Mode (drop down list): Display/set the Connect/Disconnect mode. Connect modes are **Break All Before Make**, **Break Before Make**, **Make Before Break** and **Make**. Disconnect modes are **Break All** and **Break**. The two channels to be connected are specified (first and last) by the following drop down. See the **Gx6062ConnectChannels** function call for description of these modes

Ch (drop down): Display/set the first channel to be connected/disconnected according to Connection Mode

to Ch. (drop down): Display/set the second channel to be connected/disconnected according to Connection Mode.

Channels/Relays Group Box (1 to 60): Set/displays the current Channels/ Group relays setting (closed or open). When a box is checked, the relay is closed. Similarly, unchecked boxes mean relays are open.

Use Shortest Path (Check box): When checked, specified: if Connect/Disconnect mode should try to use the **Shortest Path** available. The shortest path can accomplish using the path between the First (A) and Last (L) groups. Only if there are no Daisy Chain connections and the default factory cable connecting First (A) and Last (L) groups is installed.

Check boxes between groups: Display/set the relays that connect/disconnect the specified adjacent groups.

P61: Display/set relays that connect/disconnect group A to the External Coax (Pin61). By default this connector is connected to P62 enabling a shorter connecting path between channels (factory installed). It also enables to Daisy Chain the board to other GX6062 boards.

P62: Display/set relays that connect/disconnect group L to the External Coax (Pin62). By default, this connector is connected to P61 enabling a shorter connecting path between channels (factory installed). It also enables to Daisy Chain the board to other GX6062 boards.

Virtual Panel About Page

Clicking on the **About** tab will show the **About page** as shown in Figure 2-9:

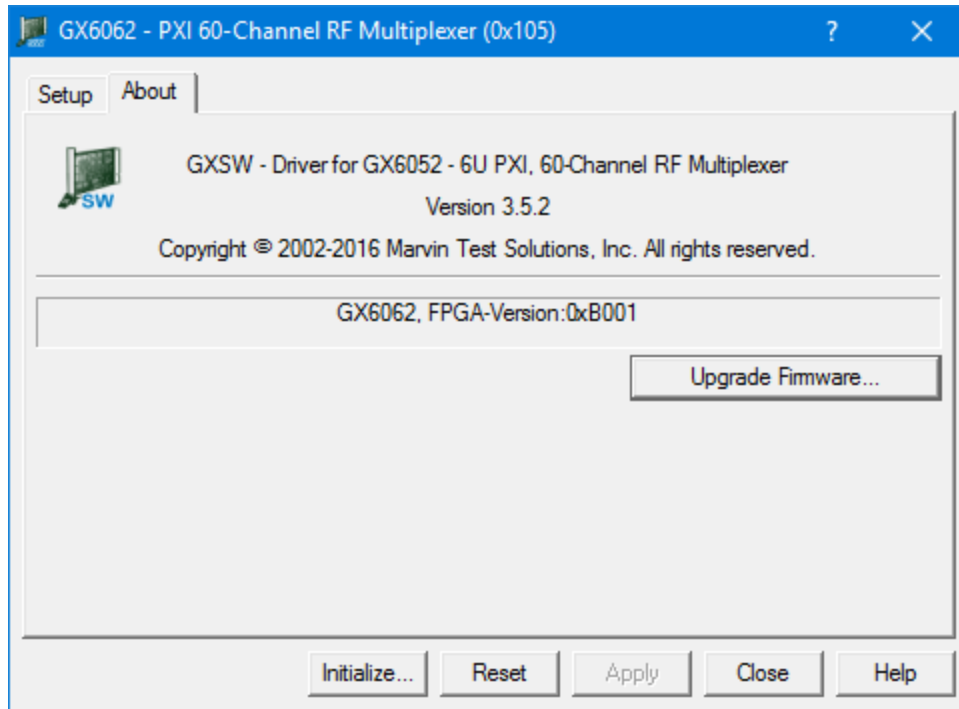


Figure 2-9: GX6062 Virtual Panel – About Page

The top part of the **About** page displays version and copyright of the GX6062 driver. The bottom part displays the board summary, including the EEPROM version, the board Revision, the FPGA version, the board serial number and the calibration time. The **About** page also contains a button **Upgrade Firmware...** used to upgrade the board FPGA. This button maybe used only when the board requires upgrade as directed by Marvin Test Solution support. The upgrade requires a firmware file (.jam) that is written to the board FPGA. After the upgrade is complete you must shut down the computer to recycle power to the board.

Chapter 3 - Installation and Connections

Getting Started

This section includes general hardware installation procedures for the GX6062 board and installation instructions for the GX6062 (GXSW) software. Before proceeding, please refer to the appropriate chapter to become familiar with the board being installed.

To Find Information on...	Refer to...
Hardware Installation	This Chapter
GX6062 Driver Installation	This Chapter
GX6062 Function Reference	Chapter 4

Packing List

All GX6062 boards have the same basic packing list, which includes:

1. GX6062 Board
2. CD that includes the GXSW software

Unpacking and Inspection

After removing the board from the shipping carton:



Caution - Static sensitive devices are present. Ground yourself to discharge static.

1. Remove the board from the static bag by handling only the metal portions.
2. Be sure to check the contents of the shipping carton to verify that all of the items found in it match the packing list.
3. Inspect the board for possible damage. If there is any sign of damage, return the board immediately. Please refer to the warranty information at the beginning of the manual.

System Requirements

The GX6062 instrument board is designed for use with a 3U or 6U cPCI or PXI compatible chassis. The software is compatible with any computer system running Windows XP SP3, VISTA, 7, 8, and 10 (32/64 bit) operating systems. In addition, Microsoft Windows Explorer version 4.0 or above is required to view the online help.

Each board requires one unoccupied 3U PXI bus slot.

Installation of the GXSW Software

Before installing the board, it is recommended that you install the GXSW software as described in this section. To install the GXSW software, follow the instruction described below:

1. Insert the Marvin Test Solution CD-ROM and locate the **GXSW.EXE** setup program. If your computer's Auto Run is configured, when inserting the CD, a browser will show several options. Select the Marvin Test Solution Files option, then locate the setup file. If Auto Run is not configured, you can open the Windows explorer and locate the setup files (usually located under \Files\Setup folder). You can also download the file from Marvin Test Solutions' web site (www.marvintest.com).
2. Run the GXSW setup and follow the instruction on the Setup screen to install the GXSW driver.

Note: When installing under Windows, you may be required to restart the setup after logging-in as a user with Administrator privileges. This is required in-order to upgrade your system with newer Windows components and to install kernel-mode device drivers (HW driver) which are required by the GXSW driver to access resources on your board.

3. The first setup screen to appear is the Welcome screen. Click **Next** to continue.
4. Enter the folder where GXSW is to be installed. Either click Browse to set up a new folder, or click Next to accept the default entry. The default entry for 32 bit machines is **C:\Program Files\Marvin Test Solutions\GXSW**, and for 64 bit Windows **C:\Program Files (x86)\Marvin Test Solutions\GXSW**.
5. Select the type of Setup you wish and click **Next**. You can choose between **Typical**, **Run-Time** and **Custom** setups types. The **Typical** setup type installs all files. **Run-Time** setup type will install only the files required for controlling the board either from its driver or from its virtual panel. The **Custom** setup type lets you select from the available components.

The program will now start its installation. During the installation, Setup may upgrade some of the Windows shared components and files. The Setup may ask you to reboot after completion if some of the components it replaced were used by another application during the installation – do so before attempting to use the software.

You can now continue with the installation to install the board. After the board installation is complete you can test your installation by starting a panel program that lets you control the board interactively. The panel program can be started by selecting it from the Start, Programs, GXSW menu located in the Windows Taskbar.

Setup Maintenance Program

You can run the Setup again after GXSW has been installed from the original disk or from the Windows Control Panel – Add Remove Programs applet. Setup will be in the Maintenance mode when running for the second time. The Maintenance window show below allows you to modify the current GXSW installation. The following options are available in Maintenance mode:

- **Modify.** When you want to add, or remove GXSW components.
- **Repair.** When you have corrupted files and need to reinstall.
- **Remove.** When you want to completely remove GXSW.

Select one of the options and click **Next** and follow the instruction on the screen until Setup is complete.

Overview of the GXSW Software

Once the software is installed, the following tools and software components are available:

- **GXSW Panel** – Configures and controls the GX6062 various features via an interactive user interface.
- **GXSW driver** - A DLL based function library (GXSW.DLL (32 bit) or GXSW64.DLL (64 bit), located in the Windows System folder) used to program and control the board.
- **Programming files and examples** – Interface files and libraries for support of various programming tools such as C#, C++, VB, VB6, LabVIEW. A complete list of files and development tools supported by the driver is included in subsequent sections of this manual.
- **Documentation** – On-Line help and User's Guide for the GX6062 board, GXSW driver and panel.
- **HW driver and PXI/PCI Explorer applet** – HW driver allows the GXSW driver to access and program the supported boards. The explorer applet configures the PXI chassis, controllers and devices. This is required for accurate identification of your PXI instruments later on when installed in your system. The applet configuration is saved to PXISYS.ini and PXIeSYS.ini and is used by Marvin Test Solutions instruments HW driver and VISA. The applet can be used to assign chassis numbers, Legacy Slot numbers and instrument alias names. The HW driver is installed and shared with all Marvin Test Solutions products to support accessing the PC resources. Similar to HW driver, VISA provides a standard way for instrument manufacturers and users to write and use instruments drivers. VISA is a standard maintained by the VXI Plug & Play System Alliance and the PXI Systems Alliance organizations (<http://www.vxipnp.org/>, <http://www.pxisa.org/>). The VISA resource manager such as National Instruments **Measurement & Automation** (NI-MAX) displays and configures instruments and their address (similar to Marvin Test Solutions' PXI/PCI Explorer). The GXSW driver can work with either HW or VISA to control an access the supported boards.

Installation Folders

The GX6062 driver files are installed in the default folder **C:\Program Files\Marvin Test Solutions\GXSW**, or on 64 bit machines they are installed in the default folder **C:\Program Files (x86)\Marvin Test Solutions\GXSW**. You can change the default GXSW folder to one of your choosing at the time of installation.

During the installation, GXSW Setup creates and copies files to the following folders:

Name	Purpose / Contents
...\Marvin Test Solution\GXSW	The GXSW folder. Contains panel programs, programming libraries, interface files and examples, on-line help files and other documentation.
...\Marvin Test Solution\HW	HW device driver. Provide access to your board hardware resources such as memory, IO ports and PCI board configuration. See the README.TXT located in this directory for more information.
...\ATEasy\Drivers	ATEasy drivers folder. GXPIO Driver and example are copied to this directory only if ATEasy is installed to your machine.
...\Windows\System (Windows 9x/Me), or ... \Windows\System32 when running Windows NT/2000/XP/VISTA	Windows System directory. Contains the GXSW DLL driver, HW driver shared files and some upgraded system components, such as the HTML help viewer, etc.

Configuring Your PXI System using the PXI/PCI Explorer

To configure your PXI/PCI system using the **PXI/PCI Explorer** applet follow these steps:

1. **Start the PXI/PCI Explorer applet.** The applet can be start from the Windows Control Panel or from the Windows Start Menu, **Marvin Test Solution, HW, PXI/PCI Explorer**.
2. **Identify Chassis and Controllers.** After the PXI/PCI Explorer is started, it will scan your system for changes and will display the current configuration. The PXI/PCI Explorer automatically detects systems that have Marvin Test Solution controllers and chassis. In addition, the applet detects PXI-MXI-3/4 extenders in your system (manufactured by National Instruments). If your chassis is not shown in the explorer main window, use the Identify Chassis/Controller commands to identify your system. Chassis and Controller manufacturers should provide INI and driver files for their chassis and controllers which are used by these commands.
3. **Change chassis numbers, PXI devices Legacy Slot numbering and PXI devices Alias names.** These are optional steps and can be performed if you would like your chassis to have different numbers. Legacy slots numbers are used by older Marvin Test Solution or VISA drivers. Alias names can provide a way to address a PXI device using a logical name (e.g. "DMM1"). For more information regarding slot numbers and alias names, see the **GX6062Initialize** and **GX6062InitializeVisa** functions.
4. **Save your work.** PXI Explorer saves the configuration to the following files located in the Windows folder: PXISYS.ini, PXIeSYS.ini and GxPxiSys.ini. Click on the **Save** button to save your changes. The PXI/Explorer will prompt you to save the changes if changes were made or detected (an asterisk sign '*' in the caption indicated changes).

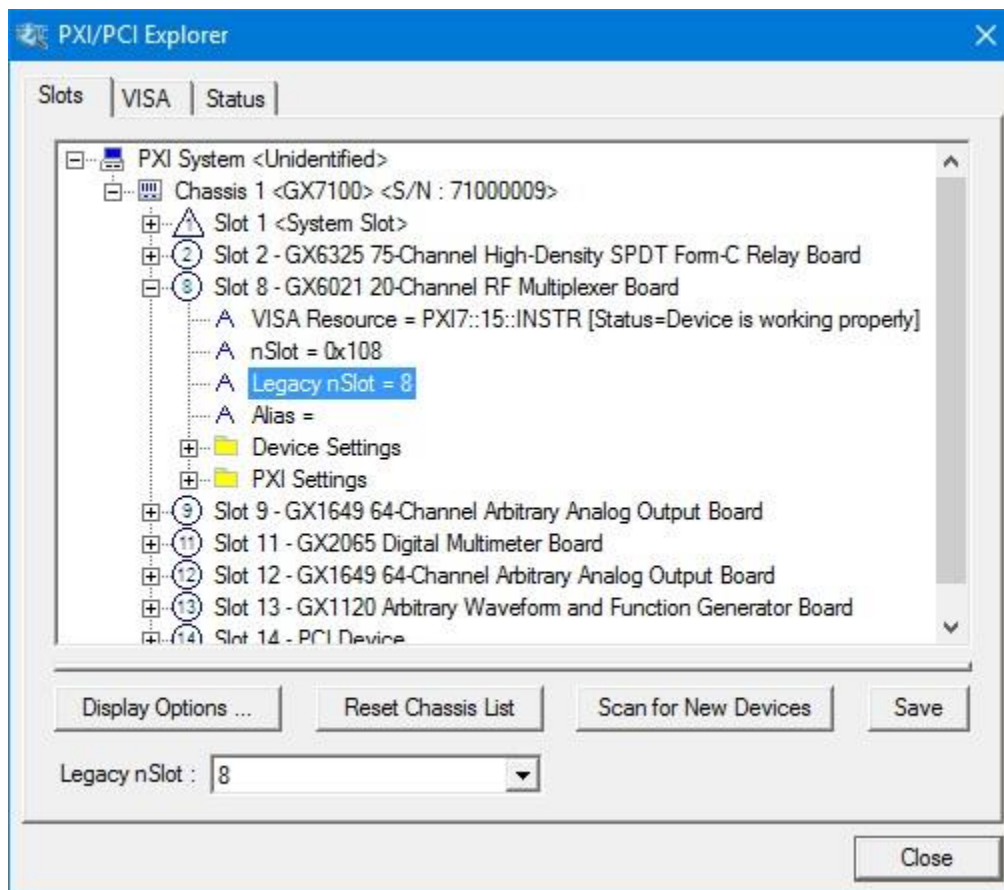


Figure 3-1: PXI/PCI Explorer

Board Installation

Before you Begin

Install the GXSW driver as described in the prior section.

Configure your PXI/PC system using **PXI/PCI Explorer** as described in the prior section.

Verify that all the components listed in the packing list (see previous section in this chapter) are present.

Electric Static Discharge (ESD) Precautions

To reduce the risk of damage to the GX6062 board, the following precautions should be observed:

- Leave the board in the anti-static bags until installation requires removal. The anti-static bag protects the board from harmful static electricity.
- Save the anti-static bag in case the board is removed from the computer in the future.
- Carefully unpack and install the board. Do not drop or handle the board roughly.
- Handle the board by the edges. Avoid contact with any components on the circuit board.



Caution – Do not insert or remove any board while the computer is on. Turn off the power from the PXI chassis before installation.

Installing a Board

Install the board as follows:

1. Install first the GXSW Driver as described in the next section.
2. Turn off the PXI chassis and unplug the power cord.
3. Locate a PXI empty slot on the PXI chassis.
4. Place the module edges into the PXI chassis rails (top and bottom).
5. Carefully slide the PXI board to the rear of the chassis, make sure that the ejector handles are pushed **out** (as shown in Figure 3-2).

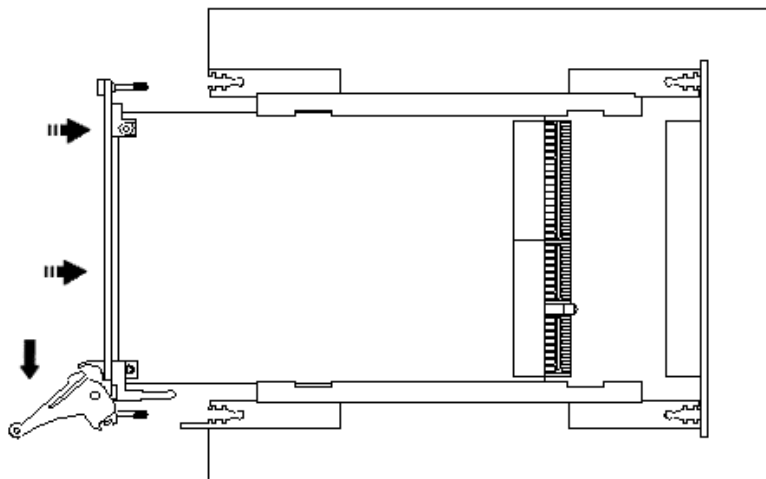


Figure 3-2: Ejector handles position during module insertion

6. After you feel resistance, push in the ejector handles as shown in Figure 3-3 to secure the module into the frame.

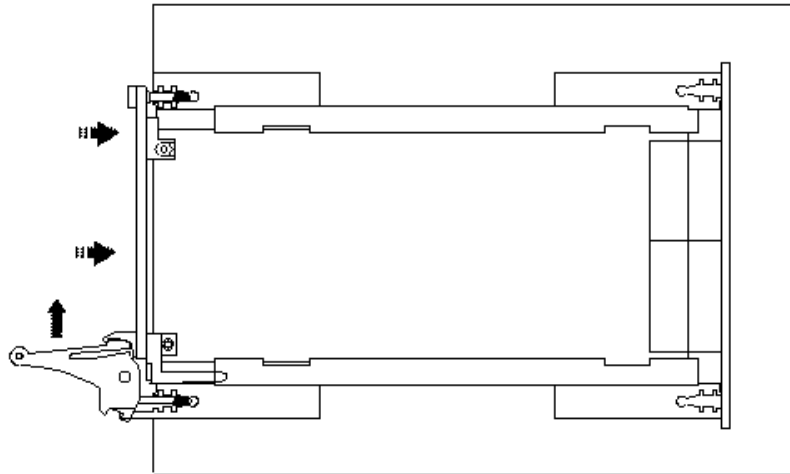


Figure 3-3: Ejector handles position after module insertion

7. Tighten the module's front panel to the chassis to secure the module in.
8. Connect any necessary cables to the board.
9. Plug the power cord in and turn on the PXI chassis.

Plug & Play Driver Installation

Plug & Play operating systems such as Windows notifies the user that a new board was found using the **New Hardware Found** wizard after restarting the system with the new board.

If another Marvin Test Solutions board software package was already installed, Windows will suggest using the driver information file: HW.INF. The file is located in your Program Files\Marvin Test Solutions\HW folder. Click **Next** to confirm and follow the instructions on the screen to complete the driver installation.

If the operating system was unable to find the driver (since the GXSW driver was not installed prior to the board installation), you may install the GXSW driver as described in the prior section, then click on the **Have Disk** button and browse to select the HW.INF file located in **C:\Program File\Marvin Test Solutions\HW**. On 64 bit systems the HW.INF file is located in **C:\Program File (x86)\Marvin Test Solutions\HW**.

If you are unable to locate the driver click **Cancel** to the found New Hardware wizard and exit the New Hardware Found Wizard, install the GXSW driver, reboot your computer and repeat this procedure.

The Windows Device Manager (open from the System applet from the Windows Control Panel) must display the proper board name before continuing to use the board software (no Yellow warning icon shown next to device). If the device is displayed with an error, you can select it and press delete and then press F5 to rescan the system again and to start the New Hardware Found wizard.

Removing a Board

Remove the board as follows:

1. Turn off the PXI chassis and unplug the power cord.
2. Locate a PXI slot on the PXI chassis.
3. Disconnect and remove any cables/connectors connected to the board.
4. Un-tighten the module's front panel screws to the chassis.
5. Push out the ejector handles and slide the PXI board away from the chassis.
6. Optionally – uninstall the GXSW driver.

Connectors and Jumpers

Figure 3-4 shows the available GX6062 board connectors and jumpers followed by their description:

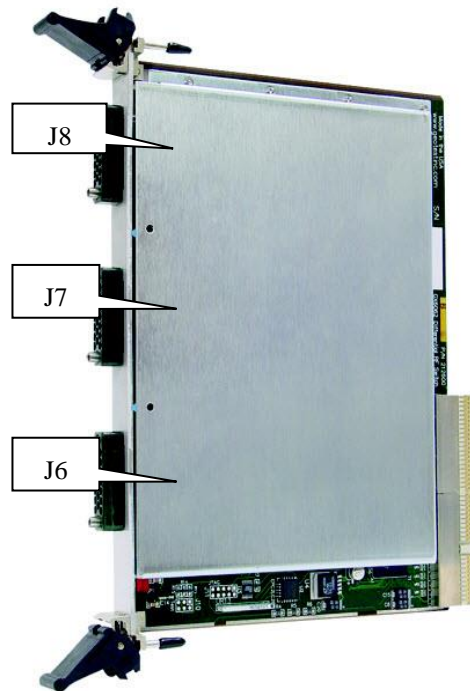


Figure 3-4: GX6062 Connectors and Jumpers

JP1 – Chassis Ground Jumper

JP1 jumper connects the chassis ground to the logic ground. When jumper is not installed (default), chassis and logic ground are separate. This does not preclude them being connected elsewhere, such as in the power supplies. When the jumper is installed, chassis and logic ground are connected on the board.

Connections

Connections to the GX6062 may be made with three D Type, 50 pin male plug connector. Each GX6062 is shipped with three mating connectors.

Connectors and Accessories

The following accessories are available from Marvin Test Solution for GX6062 switching instruments.

Part / Model Number	Description
GT96403	Mating Coax Connector with 20 Coax Pins
GT96404	Mating Coax Connector with 20 Coax Pins crimped (one end) to 3 foot wires
GT96405	Mating Coax Connector with 20 Coax Pins crimped (both ends) to 3 foot wires
GT96406	Mating Coax Connector with 20 Coax Pins crimped to 3 foot wires with BNC connectors.

Groups Relays Connectors

The following table describes the GX6062 Coax connectors' pins:

Pin	Function	Pin	Function
A	CH 1A	M	CH 1C
B	CH 2A	N	CH 2C
C	CH 3A	P	CH 3C
D	CH 4A	R	CH 4C
E	CH 5A	S	CH 5C
F	CH 1B	T	CH 1D
H	CH 2B	U	CH 2D
J	CH 3F	V	CH 3D
K	CH 4B	W	CH 4D
L	CH 5B	X	CH 5D

Table 3-1: Group A-D Connector J6

Pin	Function	Pin	Function
A	CH 1E	M	CH 1G
B	CH 2E	N	CH 2G
C	CH 3E	P	CH 3G
D	CH 4E	R	CH 4G
E	CH 5E	S	CH 5G
F	CH 1F	T	CH 1H
H	CH 2F	U	CH 2H
J	CH 3F	V	CH 3H
K	CH 4F	W	CH 4H
L	CH 5F	X	CH 5H

Table 3-2: Group E-H Connector J7

Pin	Function	Pin	Function
A	CH 1I	M	CH 1K
B	CH 2I	N	CH 2K
C	CH 3I	P	CH 3K
D	CH 4I	R	CH 4K
E	CH 5I	S	CH 5K
F	CH 1J	T	CH 1L
H	CH 2J	U	CH 2L
J	CH 3J	V	CH 3L
K	CH 4J	W	CH 4L
L	CH 5J	X	CH 5L

Table 3-3: Group I-L Connector J8

Chapter 4 - Functions Reference

Introduction

The GX6062 driver functions reference chapter is organized in alphabetical order. Each function description contains the function name, purpose, syntax, parameters description and type followed by a Comments, an Example (written in C), and a See Also sections.

All function parameters syntax follows the same rules:

- Strings are ASCIIZ (null or zero character terminated).
- The first parameter of most functions is *nHandle* (16-bit integer). This parameter is required for operating the board and is returned by the **Gx6062Initialize** or the **Gx6062InitializeVisa** functions. The *nHandle* is used to identify the board when calling a function for programming and controlling the operation of that board.
- All functions return a status with the last parameter named *pnStatus*. The *pnStatus* is zero if the function was successful, or less than a zero on error. The description of the error is available using the **GxSWGetErrorString** function or by using a predefined constant, defined in the driver interface files: GXSW.H, GXSW.BAS, GXSW.PAS or GX6062.DRV.
- Parameter name are prefixed as follows:

Prefix	Type	Example
a	Array, prefix this before the simple type.	<i>anArray</i> (Array of Short)
n	Short (signed 16-bit)	<i>nMode</i>
d	Double - 8 bytes floating point	<i>dReading</i>
dw	Double word (unsigned 32-bit)	<i>dwTimeout</i>
hwnd	Window handle (32-bit integer).	<i>hwndPanel</i>
l	Long (signed 32-bit)	<i>lBits</i>
p	Pointer. Usually used to return a value. Prefix this before the simple type.	<i>pnStatus</i>
sz	Null (zero value character) terminated string	<i>szMsg</i>
w	Unsigned short (unsigned 16-bit)	<i>wParam</i>

Table 4-1: Parameter Name Prefixes

GX6062 Functions

The following list is a summary of functions available for the GX6062:

Driver Functions	Description
Gx6062Close	Closes the specified channel in a group.
Gx6062ConnectChannels	Connects two channels according to specified mode.
Gx6062ConnectGroupToExternalCoax	Connects either first or last group to the External Coax.
Gx6062DisconnectChannels	Disconnects two channels according to specified mode.
Gx6062DisconnectGroupToExternalCoax	Disconnects either first or last channel to External Coax.
Gx6062GetBoardSummary	Returns the board summary.
Gx6062GetChannel	Returns whether the specified channel is open or closed.
Gx6062GetDaisyChainMode	Returns the board Daisy Chain connection mode.
Gx6062GetGroupRelaysRelays	Returns the state of all channels of the specified group.
Gx6062Initialize	Initializes the GX6062 driver for the specified PXI slot.
Gx6062InitializeVisa	Initializes the driver for the specified slot using VISA. The function returns a handle that can be used with other GX6062 functions to program the board.
Gx6062Open	Opens specified channel in a group.
Gx6062Panel	Opens a virtual panel used to interactively control the GX6062 board.
Gx6062Reset	Opens all boards' channels and all connections between groups and to External Coax.
Gx6062SetDaisyChainMode	Saves the board Daisy Chain connection mode.
Gx6062SetGroupRelaysRelays	Opens or closes all channels in the specified group.
GxSWGetErrorString	Returns the error string associated with the specified error number.

Gx6062Close

Purpose

Closes specified relay in a group.

Syntax

Gx6062Close (*nHandle*, *nGroup*, *nRelay*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nHandle</i>	SHORT	Handle to a GX6062 board.
<i>nGroup</i>	SHORT	Specified group number, group number can be 0 (GX6062_GROUP_FIRST) to 11 (GX6062_GROUP_LAST).
<i>nRelay</i>	SHORT	Specifies the Relay numbers in the group as follow: <ul style="list-style-type: none"> • 0-4: Relays 0 through 4 in the group. • 5: Relay connecting two adjacent groups. Groups A to K only. • 6: Relay connecting the specified group to the External Coax connector. Group A to P61 and Group L to P62. Apply to Group A (first group) and Group L (last group) only.
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

The **Gx6062ConnectGroupToExternalCoax** function call can be also used to connect the specified group from the External Coax connector.

The **Gx6062GetChannel** function can be used to retrieve the current channel state.



Caution

1. Make sure that the switching will not cause a closed loop, which may cause distortions in high frequency signals.
2. When closing a relay, verify that all other relays on the same circuit that may cause a short are disconnected (a delay may be required between switching commands). Low Impedance sources such as power supplies may cause irreversible damage to this product when shorted to other signals.

Example

The following example closes group 2 relay 1:

```
SHORT    nStatus;
Gx6062Close (nHandle, 2, 1, &nStatus);
```

See Also

Gx6062Open, **Gx6062GetChannel**, **Gx6062SetGroupRelays**, **Gx6062GetGroupRelays**, **Gx6062ConnectGroupToExternalCoax**, **GxSWGetErrorString**

Gx6062ConnectChannels

Purpose

Connects two channels according to the specified mode.

Syntax

Gx6062ConnectChannels (*nHandle*, *nChannel1*, *nChannel2*, *nMode*, *bShortestPath*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nHandle</i>	SHORT	Handle to a GX6062 board.
<i>nChannel1</i>	SHORT	First channel to connect. Channel numbers are from 1 (GX6062_CHANNEL_FIRST) to 60 (GX6062_CHANNEL_LAST).
<i>nChannel2</i>	SHORT	Second channel to connect. Channel numbers are from 1 (GX6062_CHANNEL_FIRST) to 60 (GX6062_CHANNEL_LAST).
<i>nMode</i>	SHORT	Connection mode between the two specified channels can be as follow (see comments for details): <ul style="list-style-type: none"> • 0 = GX6062_CONNECT_BREAKALL_BEFORE_MAKE • 1 = GX6062_CONNECT_BREAK_BEFORE_MAKE • 2 = GX6062_CONNECT_MAKE_BEFORE_BREAK • 3 = GX6062_CONNECT_MAKE
<i>BOOL</i>	<i>bShortestPath</i>	Specified if connection should try to use the Shortest Path available. The shortest path can accomplish using the path between the First (A) and Last (L) groups. Only if there are no Daisy Chain connections and the default factory cable connecting First (A) and Last (L) groups is installed. 0: FALSE: Do not try to use the shortest path. 1: TRUE: Try to use the shortest path.
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

Each group has five channels with total of twelve groups. In order to correlate the channel number (*nChannel1* and *nChannel2*) to its group use the following formula:

Group number = (*nChannel*-1)/5, e.g. channel 8 is channel 3 in group B.

The following connection modes are available:

- 0 = GX6062_CONNECT_BREAKALL_BEFORE_MAKE:

Disconnects all relays in all groups

Close the desired relays (channels) and connect the path between them.

- 1 = GX6062_CONNECT_BREAK_BEFORE_MAKE:

Disconnects all relays in all groups in the path, i.e. relays between adjacent groups and all the relays in those groups.

Disconnect the relay preceding the first group and the relay following the second group.

Close the desired relays (channels) and connect the path between them.

Relays outside the path are not affected.

- 2 = GX6062_CONNECT_MAKE_BEFORE_BREAK:

Close the desired relays (channels) and connect the path between them.

Open all other relays in the path between them.

Disconnect the relay preceding the first group and the relay following the second group.

Relays outside the path are not affected.

- 3 = GX6062_CONNECT_MAKE: Connects the two specified relays together without changing the state of other relays in the path.

The **Gx6062GetChannel** function can be used to retrieve the current channel state.



Caution

1. Make sure that the switching will not cause a closed loop, which may cause distortions in high frequency signals.
 2. When closing a relay, verify that all other relays on the same circuit that may cause a short are disconnected (a delay may be required between switching commands). Low Impedance sources such as power supplies may cause irreversible damage to this product when shorted to other signals.
-

Example

The following example connect channel 3 to channel 15 using GX6062_CONNECT_BREAK_BEFORE_MAKE connection mode:

```
SHORT    nStatus;
Gx6062ConnectChannels (nHandle, 3, 15, GX6062_BREAK_BEFORE_MAKE, &nStatus);
```

See Also

Gx6062DisconnectChannels, **Gx6062ConnectGroupToExternalCoax**, **Gx6062SetGroupRelaysChannels**, **Gx6062GetChannel**, **GxSWGetErrorString**

Gx6062ConnectGroupToExternalCoax

Purpose

Connects the first or last group to the External Coax.

Syntax

Gx6062ConnectGroupToExternalCoax (*nHandle*, *nGroupAOrL*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nHandle</i>	SHORT	Handle to a GX6062 board.
<i>nGroupAOrL</i>	SHORT	Specified either first or last group number, group number can be 0 (GX6062_GROUP_FIRST) or 11 (GX6062_GROUP_LAST).
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

The first Group (GX6062_GROUP_FIRST) and the last group (GX6062_GROUP_LAST) have an additional relay. Both relays are connected to the output connector (P61 and P62). The relays enable the first and/or last groups to be connected to an External Coax cable. This connection enables either a Daisy Chain connection to other GX6062 boards or to make a Loop Back through the Factory install a Loop Back Coax Cable.

Using the default Factory install a Loop Back Coax Cable enable a short path connection between groups, e.g. connecting group 2 and 10.

Use the **Gx6062DisconnectGroupToExternalCoax** function in order to disconnect a group from the External Coax.

See the **Gx6062ConnectChannels** and **Gx6062DisconnectChannels** functions for details.

The **Gx6062GetChannel** function can be used to retrieve the current channel state.



Caution

1. Make sure that the switching will not cause a closed loop, which may cause distortions in high frequency signals.
2. When closing a relay, verify that all other relays on the same circuit that may cause a short are disconnected (a delay may be required between switching commands). Low Impedance sources such as power supplies may cause irreversible damage to this product when shorted to other signals.

Example

The following example connects the last group to the External Coax:

```
SHORT    nStatus;
Gx6062ConnectGroupToExternalCoax (nHandle, GX6062_GROUP_LAST, &nStatus);
```

See Also

Gx6062DisconnectGroupToExternalCoax, **Gx6062ConnectChannels**, **Gx6062DisconnectChannels**, **Gx6062Open**, **Gx6062SetGroupRelays**, **Gx6062GetChannel**, **GxSWGetErrorString**

Gx6062DisconnectChannels

Purpose

Disconnects two channels according to the specified mode.

Syntax

Gx6062DisconnectChannels (*nHandle*, *nChannel1*, *nChannel2*, *nMode*, *bShortestPath*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nHandle</i>	SHORT	Handle to a GX6062 board.
<i>nChannel1</i>	SHORT	First channel to disconnect. Channel numbers are from 1 (GX6062_CHANNEL_FIRST) to 60 (GX6062_CHANNEL_LAST).
<i>nChannel2</i>	SHORT	Second channel to disconnect. Channel numbers are from 1 (GX6062_CHANNEL_FIRST) to 60 (GX6062_CHANNEL_LAST).
<i>nMode</i>	SHORT	Disconnect mode between the two specified channels can be as follow (see comments for details): <ul style="list-style-type: none"> • 0 = GX6062_DISCONNECT_BREAKALL • 1 = GX6062_DISCONNECT_BREAK
<i>bShortestPath</i>	BOOL	Specified if connection should try to use the Shortest Path available. The shortest path can accomplish using the path between the First (A) and Last (L) groups. Only if there are no Daisy Chain connections and the default factory cable connecting First (A) and Last (L) groups is installed. 0: FALSE: Do not try to use the shortest path. 1: TRUE: Try to use the shortest path.
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

Each group has five channels with total of twelve groups. In order to correlate the channel number (*nChannel1* and *nChannel2*) to its group use the following formula:

Group number = (*nChannel*-1)/5, e.g. channel 8 is channel 3 in group B.

The following modes are available:

- 0 = GX6062_DISCONNECT_BREAKALL: Disconnects all relays in all groups.
- 1 = GX6062_DISCONNECT_BREAK:
 - a. Open all the relays in the path, i.e. all relays between adjacent groups relays in those groups, as well as the connections to the preceding first group and the succeeding second group.
 - b. Relays outside the path are not affected.

The **Gx6062GetChannel** function can be used to retrieve the current channel state.

Example

The following example disconnect channel 3 to channel 15 using GX6062_DISCONNECT_BREAK_ALL connection mode:

```
SHORT    nStatus;  
Gx6062DisconnectChannels (nHandle, 3, 15, GX6062_DISCONNECT_BREAK_ALL, &nStatus);
```

See Also

**Gx6062ConnectGroupToExternalCoax, Gx6062DisconnectGroupToExternalCoax,
Gx6062SetGroupRelaysChannels, Gx6062GetChannel, GxSWGetErrorString**

Gx6062DisconnectGroupToExternalCoax

Purpose

Disconnects the first or last group from the External Coax.

Syntax

Gx6062DisconnectGroupToExternalCoax (*nHandle*, *nGroupAOrL*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nHandle</i>	SHORT	Handle to a GX6062 board.
<i>nGroupAOrL</i>	SHORT	Specified either first or last group number, group number can be 0 (GX6062_GROUP_FIRST) or 11 (GX6062_GROUP_LAST).
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

The first Group (GX6062_GROUP_FIRST) and the last group (GX6062_GROUP_LAST) have an additional relay. Both relays are connected to the output connector (P61 and P62). The relays enable the first and/or last groups to be connected to an External Coax cable. This connection enables either a Daisy Chain connection to other GX6062 boards or to make a Loop Back through the Factory install a Loop Back Coax Cable.

Using the default Factory install a Loop Back Coax Cable enable a short path connection between groups, e.g. connecting group 2 and 10.

Use the **Gx6062ConnectGroupToExternalCoax** function in order to connect a group to the External Coax.

See the **Gx6062ConnectChannels** and **Gx6062DisconnectChannels** functions for details.

The **Gx6062GetChannel** function can be used to retrieve the current channel state.



Caution

1. Make sure that the switching will not cause a closed loop, which may cause distortions in high frequency signals.
2. When closing a relay, verify that all other relays on the same circuit that may cause a short are disconnected (a delay may be required between switching commands). Low Impedance sources such as power supplies may cause irreversible damage to this product when shorted to other signals.

Example

The following example disconnects the last group to the External Coax:

```
SHORT  nStatus;
```

```
Gx6062DisconnectGroupToExtCoax (nHandle, GX6062_GROUP_LAST, &nStatus);
```

See Also

Gx6062ConnectGroupToExternalCoax, **Gx6062ConnectChannels**, **Gx6062DisconnectChannels**, **Gx6062Open**, **Gx6062SetGroupRelays**, **Gx6062GetChannel**, **GxSWGetErrorString**

Gx6062GetBoardSummary

Purpose

Returns the board summary.

Syntax

Gx6062GetBoardSummary (*nHandle*, *szSummary*, *nSumMaxLen*, *pnStatus*)

Parameters

Name	Type	Comments
<i>NHandle</i>	SHORT	Handle to a GX6062 board.
<i>SzSummary</i>	PSTR	Buffer to contain the returned board info (null terminated) string.
<i>NSumMaxLen</i>	SHORT	Size of the buffer to contain the board info string.
<i>PnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

The GX6062 summary string provides the following data from the on-board EEPROM in the order shown:

Instrument Name (e.g., GX6062)

FPGA version (e.g. 0xA003)

Daisy Chain connection (e.g. Daisy Chain via group A and L)

For example, the returned string could look like the following:

```
GX6062, FPGA-Version:0xB001
```

See Also

GxSWGetDriverSummary, **GxSWGetErrorString**

Gx6062GetChannel

Purpose

Returns whether the specified channel is open or closed.

Syntax

Gx6062GetChannel (*nHandle*, *nChannel*, *pnState*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nHandle</i>	SHORT	Handle to a GX6062 board.
<i>nChannel</i>	SHORT	Channel numbers are from 1 (GX6062_CHANNEL_FIRST) to 60 (GX6062_CHANNEL_LAST).
<i>pnState</i>	PSHORT	Returns channel state are as follow: <ul style="list-style-type: none"> • 0 = GX6062_STATE_OPEN • 1 = GX6062_STATE_CLOSE
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

Each group has five channels with total of twelve groups. In order to correlate the channel number (nChannel) to its group use the following formula:

Group number = (nChannel-1)/5, e.g. channel 8 is channel 3 in group B.

Example

The following example returns channel 15 state:

```
SHORT    nState, &nStatus

Gx6062GetChannel (nHandle, 15, &nState, &nStatus);
```

See Also

Gx6062Close, **Gx6062Open**, **Gx6062SetGroupRelays**, **Gx6062SetGroupRelays**, **Gx6062GetChannel**, **GxSWGetErrorString**

Gx6062GetDaisyChainMode

Purpose

Returns the board Daisy Chain connection mode.

Syntax

Gx6062GetDaisyChainMode (*nHandle*, *pnMode*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nHandle</i>	SHORT	Handle to a GX6062 board.
<i>pnMode</i>	PSHORT	Specifies the Daisy Chain mode: <ul style="list-style-type: none"> 0 = GX6062_DAISSY_CHAIN_NONE 1 = GX6062_DAISSY_CHAIN_VIA_FIRST_GROUP 2 = GX6062_DAISSY_CHAIN_VIA_LAST_GROUP 3 = GX6062_DAISSY_CHAIN_VIA_FIRST_AND_LAST_GROUP See comments for details.
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

Daisy Chain modes:

- 0 = GX6062_DAISSY_CHAIN_NONE: No daisy connection. By default, this implies that the factory Loop Back Cable should be installed.
- 1 = GX6062_DAISSY_CHAIN_VIA_FIRST_GROUP: Additional GX6062 board is connected through group A (factory Loop Back Cable not installed).
- 2 = GX6062_DAISSY_CHAIN_VIA_LAST_GROUP: Additional GX6062 board is connected through group L (factory Loop Back Cable not installed).
- 3 = GX6062_DAISSY_CHAIN_VIA_FIRST_AND_LAST_GROUP: Additional GX6062 boards are connected through groups A and L (factory Loop Back Cable not installed).

Example

The following example returns the Daisy Chain mode:

```
SHORT  nMode, nStatus;
Gx6062GetDaisyChainMode (nHandle, &nMode, &nStatus);
```

See Also

Gx6062SetDaisyChainMode, **Gx6062Open**, **Gx6062Close**, **Gx6062SetGroupRelays**, **Gx6062GetChannel**, **GxSWGetErrorString**

Gx6062GetGroupRelays

Purpose

Returns the state of all relays in the specified group.

Syntax

Gx6062GetGroupRelays (*nHandle*, *nGroup*, *pucRelaysState*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nHandle</i>	SHORT	Handle to a GX6062 board.
<i>nGroup</i>	SHORT	Specified group number, group number can be 0 (GX6062_GROUP_FIRST) to 11 (GX6062_GROUP_LAST).
<i>pucRelaysState</i>	PBYTE	Group relay state, each bit represents state of a relay: <ul style="list-style-type: none"> • 0: Open • 1: Closed See comments for details on each bit.
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

The *pucRelaysState* parameter returns the state of all channels of the specified group. The following table describes the *pucRelaysState* bit description:

Bit #	Description
0-4	Relays 0-4 in the group. A high ('1') represent closed relay, a low ('0') represent open relay.
5	Relay connecting the specified group to the adjacent group. A high ('1') represent closed relay, a low ('0') represent open relay. Note: Not applicable to the last group (Group L).
6	Relay connecting the specified group to the External Coax connector. Group A to P61 and Group L to P62. Note: Apply to Group A (first group) and Group L (last group) only

Example

The following example returns group B relays state:

```
SHORT    nStatus;
BYTE     ucRelaysState;
Gx6062GetGroupRelays (nHandle, 1, &ucRelaysState, &nStatus);
```

See Also

Gx6062SetGroupRelays, **Gx6062Open**, **Gx6062Close**, **Gx6062GetChannel**, **GxSWGetErrorString**

Gx6062Initialize

Purpose

Initializes the GX6062 driver for the specified PXI slot.

Syntax

Gx6062Initialize (*nSlot*, *pnHandle*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nSlot</i>	Short	GX6062 board slot number on the PCI bus.
<i>pnHandle</i>	PSHORT	Returned handle for the board. The handle is set to zero on error and $\neq 0$ on success.
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

The **Gx6062Initialize** function verifies whether or not the GX6062 board exists in the specified PXI slot. The function does not change any of the board settings. The function uses the HW driver to access and program the board.

The Marvin Test Solution HW device driver is installed with the driver and is the default device driver. The function returns a handle that for use with other Counter functions to program the board. The function does not change any of the board settings.

The specified PXI slot number is displayed by the **PXI/PCI Explorer** applet that can be opened from the Windows **Control Panel**. You may also use the label on the chassis below the PXI slot where the board is installed. The function accepts two types of slot numbers:

- A combination of chassis number (chassis # x 256) with the chassis slot number. For example, 0x105 (chassis 1 slot 5).
- Legacy nSlot as used by earlier versions of HW/VISA. The slot number contains no chassis number and can be changed using the PXI/PCI Explorer applet (1-255).

The returned handle *pnHandle* is used to identify the specified board with other GX6021 functions.

Example

The following example initializes two GX6062 boards at slot 1 and 2.

```
SHORT  nHandle1, nHandle2, nStatus;

Gx6062Initialize(1, &nHandle1, &nStatus);
Gx6062Initialize(2, &nHandle2, &nStatus);
if (nHandle1==0 || nHandle2==0)
    printf("Unable to Initialize the board");
```

See Also

Gx6062Reset, **GxSWGetErrorString**

Gx6062InitializeVisa

Purpose

Initializes the driver for the specified PXI slot using the default VISA provider.

Syntax

Gx6062InitializeVisa (*szVisaResource*, *pnHandle*, *pnStatus*)

Parameters

Name	Type	Comments
<i>szVisaResource</i>	LPCTSTR	String identifying the location of the specified board in order to establish a session.
<i>pnHandle</i>	PSHORT	Returned Handle (session identifier) that can be used to call any other operations of that resource
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, 1 on failure.

Comments

The **Gx6062InitializeVisa** opens a VISA session to the specified resource. The function uses the default VISA provider configured in your system to access the board. You must ensure that the default VISA provider support PXI/PCI devices and that the board is visible in the VISA resource manager before calling this function.

The first argument *szVisaResource* is a string that is displayed by the VISA resource manager such as NI Measurement and Automation (NI_MAX). It is also displayed by Marvin Test Solution PXI/PCI Explorer as shown in the prior figure. The VISA resource string can be specified in several ways as follows:

Using chassis, slot, for example: "PXI0::CHASSIS1::SLOT5"

Using the PCI Bus/Device combination, for example: "PXI9::13::INSTR" (bus 9, device 9).

Using alias, for example: "COUNTER1". Use the PXI/PCI Explorer to set the device alias.

The function returns a board handle (session identifier) that can be used to call any other operations of that resource. The session is opened with VI_TMO_IMMEDIATE and VI_NO_LOCK VISA attributes. On terminating the application the driver automatically invokes **viClose()** terminating the session.

Example

The following example initializes a GX6062 boards at PXI bus 5 and device 11.

```
SHORT nHandle, nStatus;
Gx6062InitializeVisa ("PXI5::11::INSTR", &nHandle, &nStatus);
if (nHandle==0)
{
    printf("Unable to Initialize the board")
    return;
}
```

See Also

Gx6062Initialize, **Gx6062Reset**, **GxSWGetErrorString**

Gx6062Open

Purpose

Opens specified channel/relay in a group.

Syntax

Gx6062Open (*nHandle*, *nGroup*, *nRelay*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nHandle</i>	SHORT	Handle to a GX6062 board.
<i>nGroup</i>	SHORT	Specified group number, group number can be 0 (GX6062_GROUP_FIRST) to 11 (GX6062_GROUP_LAST).
<i>nRelay</i>	SHORT	Specifies the Relay numbers in the group as follow: <ul style="list-style-type: none"> • 0-4: Relays 0 through 4 in the group. • 5: Relay connecting two adjacent groups. Groups A to K only. • 6: Relay connecting the specified group to the External Coax connector. Group A to P61 and Group L to P62. Apply to Group A (first group) and Group L (last group) only.
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

The **Gx6062DisconnectGroupToExternalCoax** function call can be also used to disconnect the specified group from the External Coax connector.

The **Gx6062GetChannel** function can be used to retrieve the current channel state.

Example

The following example opens group 2 relay 1:

```
SHORT    nStatus;
Gx6062Open (nHandle, 2, 1, &nStatus);
```

See Also

Gx6062Close, **Gx6062SetGroupRelays**, **Gx6062GetGroupRelays**, **GxSWGetErrorString**

Gx6062Panel

Purpose

Opens a virtual panel used to interactively control the GX6062 board.

Syntax

Gx6062Panel (*pnHandle*, *hwndParent*, *nMode*, *phwndPanel*, *pnStatus*)

Parameters

Name	Type	Comments
<i>pnHandle</i>	PSHORT	Handle to a GX6062 board. This number may be zero if the board is to be initialized by the panel window.
<i>hwndParent</i>	HWND	Sets the panel parent window handle. A value of 0 sets the desktop as the parent window.
<i>nMode</i>	SHORT	The mode in which the panel main window is created. 0 for modeless and 1 for modal window.
<i>phwndPanel</i>	LPHWND	Returned window handle for the panel (for modeless panel only).
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

The function is used to create the virtual panel. The panel window may be opened as a modal or a modeless window, depending on the *nMode* parameters.

If the mode is set to modal dialog (*nMode*=1), the panel will disable the parent window (*hwndParent*) and the function will return only after the window is closed by the user. In that case the *pnHandle* returns the handle created by the user using the panel Initialize dialog. This handle then may be used when calling other GX6062 functions.

If a modeless dialog was created (*nMode*=0), the function returns immediately after creating the panel window, returning the window handle to the panel - *phwndPanel*. It is the responsibility of the calling program to dispatch window messages to this window, so that the window can respond to messages.

Example

The following example opens the panel in modal mode:

```
HWND    hwndPanel;
SHORT   nHandle=0, nStatus;

Gx6062Panel (&nHandle, 0, 1, &hwndPanel, &nStatus);
```

See Also

Gx6062Initialize, **GxSWGetErrorString**

Gx6062Reset

Purpose

Open all boards' channels and all connections between groups and to External Coax.

Syntax

Gx6062Reset (*nHandle*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nHandle</i>	SHORT	Handle to a GX6062 board.
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

The function is normally called after calling the **Gx6062Initialize** function, since the initialize function will not reset the board.

Example

The following example initializes the driver and then resets the board.

```
Gx6062Initialize(1, &nHandle, &nStatus);  
if (nStatus<0)  
    return nStatus;    // return error  
Gx6062Reset (nHandle, &nStatus);
```

See Also

Gx6062Initialize, **Gx6062SetGroupRelays**, **GxSWGetErrorString**,

Gx6062SetDaisyChainMode

Purpose

Sets the board Daisy Chain connection mode.

Syntax

Gx6062SetDaisyChainMode (*nHandle*, *nMode*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nHandle</i>	SHORT	Handle to a GX6062 board.
<i>nMode</i>	SHORT	Specifies the Daisy Chain mode: <ul style="list-style-type: none"> • 0 = GX6062_DAISSY_CHAIN_NONE • 1 = GX6062_DAISSY_CHAIN_VIA_FIRST_GROUP • 2 = GX6062_DAISSY_CHAIN_VIA_LAST_GROUP • 3 = GX6062_DAISSY_CHAIN_VIA_FIRST_AND_LAST_GROUP See comments for details.
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

Daisy Chain modes:

0 = GX6062_DAISSY_CHAIN_NONE: No daisy connection. By default this imply that the factory Loop Back Cable should be installed.

1 = GX6062_DAISSY_CHAIN_VIA_FIRST_GROUP: Additional GX6062 board is connected through group A (factory Loop Back Cable not installed).

2 = GX6062_DAISSY_CHAIN_VIA_LAST_GROUP: Additional GX6062 board is connected through group L (factory Loop Back Cable not installed).

3 = GX6062_DAISSY_CHAIN_VIA_FIRST_AND_LAST_GROUP: Additional GX6062 boards are connected through groups A and L (factory Loop Back Cable not installed).

Example

The following example set the Daisy Chain mode to GX6062_DAISSY_CHAIN_VIA_GROUP_L:

```
SHORT  nStatus;
Gx6062setDaisyChainMode (nHandle, GX6062_DAISSY_CHAIN_VIA_GROUP_L, &nStatus);
```

See Also

Gx6062GetDaisyChainMode, **Gx6062Open**, **Gx6062Close**, **Gx6062SetGroupRelays**, **Gx6062GetChannel**, **GxSWGetErrorString**

Gx6062SetGroupRelays

Purpose

Opens or closes all channels in the specified group.

Syntax

Gx6062SetGroupRelays (*nHandle*, *nGroup*, *ucRelaysState*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nHandle</i>	SHORT	Handle to a GX6062 board.
<i>nGroup</i>	SHORT	Specified group number, group number can be 0 (GX6062_GROUP_FIRST) to 11 (GX6062_GROUP_LAST).
<i>ucRelaysState</i>	BYTE	Group relay state, each bit represents state of a relay: <ul style="list-style-type: none"> • 0: Open • 1: Closed See comments for details on each bit.
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

The *ucRelaysState* parameter sets the state of all channels of the specified group. The following table describes the *ucRelaysState* bit description:

Bit #	Description
0-4	Relays 0-4 in the group. A high ('1') represent closed relay, a low ('0') represent open relay.
5	Relay connecting the specified group to the adjacent group. A high ('1') represent closed relay, a low ('0') represent open relay. Note: Not applicable to the last group (Group L).
6	Relay connecting the specified group to the External Coax connector. Group A to P61 and Group L to P62. Note: Apply to Group A (first group) and Group L (last group) only



- Caution

1. Make sure that the switching will not cause a closed loop, which may cause distortions in high frequency signals.
 2. When closing a relay, verify that all other relays on the same circuit that may cause a short are disconnected (a delay may be required between switching commands). Low Impedance sources such as power supplies may cause irreversible damage to this product when shorted to other signals.
-

Example

The following example sets group B relays as follow: relays 1 and 2 closed, relays 3,4, and 5 open and connect the group to the next group.

```
SHORT    nStatus;  
Gx6062SetGroupRelays (nHandle, 1, 0x26, &nStatus);
```

See Also

Gx6062SetGroupRelays, Gx6062Open, Gx6062Close, Gx6062GetChannel, GxSWGetErrorString

GxSWGetErrorString

Purpose

Returns the error string associated with the specified error number.

Syntax

GxSWGetErrorString (*nError*, *pszMsg*, *nErrorMaxLen*, *pnStatus*)

Parameters

Name	Type	Comments
<i>nError</i>	SHORT	Error number as returned by the <i>pnStatus</i> of any of the driver functions. See table below for possible values. The number should be a negative number, otherwise the function returns the "No error has occurred" string.
<i>pszMsg</i>	LPSTR	Buffer containing the returned error string (null terminated string).
<i>nErrorMaxLen</i>	SHORT	Size of the buffer <i>pszMsg</i> .
<i>pnStatus</i>	PSHORT	Returned status: 0 on success, negative number on failure.

Comments

The function returns the error string associated with the *nError* as returned from other driver functions.

The following table displays the possible error values; not all errors apply to this board type:

Resource Errors

- 1 Board does not exist in this slot
- 2 Unable to open the HW device/Service
- 3 Different board exist in the specified PCI slot
- 4 PCI slot not configured properly. You may configure it by using the **PCIExplorer** from the Control Panel
- 5 Unable to register the PCI device
- 6 Unable to allocate system resource or memory for the PCI device
- 7 Too many boards
- 8 Unable to create panel
- 9 Unable to create a Windows timer

Parameter Errors

- 20 Invalid parameter
- 21 Invalid PCI slot number
- 22 Invalid board handle
- 23 Invalid channel number
- 24 Invalid bus number
- 25 Invalid mode
- 26 Invalid group number
- 27 Invalid string length

- 28 Invalid row number
- 29 Invalid column number
- 30 Invalid Relay number.
- 31 Invalid Daisy Chain Mode

Built In Test error/warning

- 50 BIT error: Adapter not connected
- 51 BIT error: Comparator Error
- 52 BIT error: Unable to open/close a relay in Group x , Row y Column z
- 53 BIT error: Error occurred while switching a relay in Group x (Row y Column z) in Row a , Column b
- 54 The board successfully passed the BIT. Only one BIT adapter was found and tested.

Board Errors/Warnings

- 60 Error: connection will create a closed loop

Miscellaneous Errors

- 99 Invalid or unknown error number

Example

The following example initializes the board. If the initialization failed, the following error string is printed:

```
CHAR    sz[256];
SHORT   nStatus, nHandle;
..
Gx6062Initialize(3, &Handle, &Status);
if (nStatus<0)
{
    GxSWGetErrorString(nStatus, sz, sizeof sz, &nStatus);
    printf(sz);          // prints the error string returns
}
```


Index

A

Adjacent groups	28, 31
Architecture	1, 5
ATEasy	15

B

Bandwidth.....	3, 4
Board Description.....	1, 4

C

Connections	20
Connectors	19, 22
Connectors and Accessories	21
Connectors and Jumpers	20
Copyright.....	i
Corrupt files.....	14

D

Directories	15
Disclaimer.....	i
Driver	
Directory	15
Files.....	15

F

Features.....	3
Functions Reference	25

G

Group Relays	6
Groups Connectors	22
Groups Relays Connectors.....	22
GX6062	1
GX6062 Functions.....	26
GX6062 Group Relays.....	6
Gx6062Close	27
Gx6062ConnectChannels	28
Gx6062ConnectGroupToExternalCoax	30
Gx6062DisconnectChannels.....	31
Gx6062DisconnectGroupToExternalCoax	33
Gx6062GetBoardSummary.....	34
Gx6062GetChannel	35
Gx6062GetDaisyChainMode.....	36
Gx6062GetGroupRelays.....	37
Gx6062Initialize	10, 16, 38
Gx6062InitializeVisa	10, 16, 39
Gx6062Open.....	40
Gx6062Panel	41
Gx6062Reset	42
Gx6062SetDaisyChainMode	43

Gx6062SetGroupRelays	44
GXSW	14
GXSW.EXE	14

H

Handle	17, 18
HW	15, 19

I

Installation Directories	15
Installation:.....	17, 19

J

JP1 – Chassis Ground Jumper	20
-----------------------------------	----

M

Manual Organization.....	1
--------------------------	---

P

Panel.....	9, 11, 12, 14
Panel Setup Page	11
PCI	15
Plug & Play	19
PXI.....	13, 16, 17, 18, 19
PXI/PCI Explorer	10, 16, 38, 39
PXIeSYS.INI.....	10
PXISYS.INI	10

R

README.TXT	15
Relay	6
Relay Description.....	6

S

Safety and Handling	i
Setup	14, 15
Setup Maintenance	14
Setup-and-Installation	13
Slot	10, 17, 19
Specifications	1, 7
System	
Directory	15

T

Trademarks.....	ii
-----------------	----

V

Virtual Panel 9, 10, 11, 12, 14

About Page.....	12
Initialize Dialog	10
VISA	10, 15, 16, 26, 38, 39