Product Specification

PXI 3060
PCI 3060

MOST25   Interface

User Manual   Version 1.3

GOEPEL electronic

Get the total Coverage!

printed: 09.11.2012

Issue: November 2012

1 Board Installation

1.1 Hardware Installation

Warning Please make absolutely certain that all of the installation procedures described below are carried out with your system switched off.

The PCI™, CompactPCI™ or PXI™ system is to be opened according to its conditions. A free slot is to be selected in your system.
Now, the slot cover is to be taken away from the slot selected. To do this, unscrew the fixation screws if necessary and remove the cover from the slot.

Warning When installing the board, touch it at its edges only.
Never touch the surface of the board, because otherwise it may be destroyed by electrostatic charges.

Insert the board carefully into the prepared slot. In the case of PXI boards, use the lever at the front plate in order to push in the board finally.
When the board has been inserted properly, it is to be fixed.

1.2 Driver Installation

Due to the plug and play capability of Windows® 2000/ XP, for every newly recognized hardware component a driver installation is started automatically via the hardware assistant. The hardware assistant can carry out the installation of the device driver by using the *inf* file contained on the enclosed CD.

It is not absolutely essential to restart the system.

> At present, the available device driver only supports Windows® 2000/ XP systems.

> The following step is only required in case you do not use the **G-API** (see also [Programming via G-API](#)).

If you want to create your own software for the boards, you possibly need additional files for user specific programming (**.LLB*, **.H*). These files are not automatically copied to the computer and have to be transferred individually from the supplied CD to your development directory.

After driver installation, you can check (for example by means of the Windows® Device manager) whether the boards are properly imbedded by the system:

Figure 1-1:
Display of Device Manager

2 PXI/ PCI 3060 Hardware

2.1 Definition

The PXI 3060/ PCI 3060 MOST25 interface-boards are communication boards of GOEPEL electronic GmbH.

These boards can be used in media technology, for example for the check of entertainment applications in automotive technology.

PXI 3060/ PCI 3060 boards offer the following resources:

- 1 optical MOST25 interface
- supports 3 operation modes: Master, Slave, Bypass
- Spy function: Possibility of monitoring the MOST data
  as passive bus member (board in Bypass mode)
  OR as active bus member (board in Master or Slave Mode)
- Independent timer onboard with time stamp resolution of 8 ns
- The master frame rate can be switched over
  between 44.1 kHz and 48 KHz
- Analogue Audio LINE IN and LINE OUT connections
- Ring break dignosis function via frontal plug connector
- Extended trigger functions with two trigger inputs and four trigger outputs to the frontal plug connector or the backplane
- The MOST interface has a 32 bits µController
  (TriCore TC1796, 150 MHz) with 8 Mbyte SRAM onboard
- Visualisation of the controller states by 4 LEDs
  arranged on the front panel (see LED Display)

Figure 2-1:
PXI 3060

Figure 2-2:
PCI 3060

2.2   Technical Data

2.2.1   General

The PXI 3060 communication board is a plug-in board developed for the PXI™ bus (**P**CI e**X**tensions for **I**nstrumentation). Basis of this bus is the CompactPCI™ bus.

The board can be plugged into any desired slot of a CompactPCI™ or PXI™ system (except for slot 1). It can be definitely identified also in the case that several boards of this type are used in the same rack.

The PCI 3060 communication board is a PC plug-in board for the PCI Local Bus Rev. 2.2.
It can be operated at any PCI slot (32 bits, 33 MHz, 3.3 V)

Both boards do not have jumpers for hardware detection and are automatically integrated into the respective system.

2.2.2   Dimensions

The dimensions of both boards correspond to standard dimensions of the accompanying bus system:

¨   PXI 3060 MOST Interface Board: 160 mm x 100 mm (L x W)
¨   PCI 3060 MOST Interface Board: 168 mm x 106 mm (L x W)

2.2.3   PXI 3060/ PCI 3060 Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Remarks
U_{BAT}	Battery voltage		12	27	V	Relevant only for Ring break diagnosis
	Transmission rate			25	MBaud	
	External trigger input	3.3		27	V	
	External trigger output		5.0		V	

2.3   Construction

2.3.1   General

In their basic version, both boards have one MOST25 interface.

Figure 2-3 and Figure 2-4 show schematically the structure of the boards as block diagrams.

An ASIC is used as the interface to the PCI or cPCI bus on the PXI 3060/ PCI 3060 boards. It includes all the function blocks required for the communication with the computer bus. To exchange trigger signals with other GOEPEL electronic PCI boards, an additional plug connector is on the PCI 3060 board with eight lines configurable as input or output (indicated as Rear Connector in Figure 2-4).
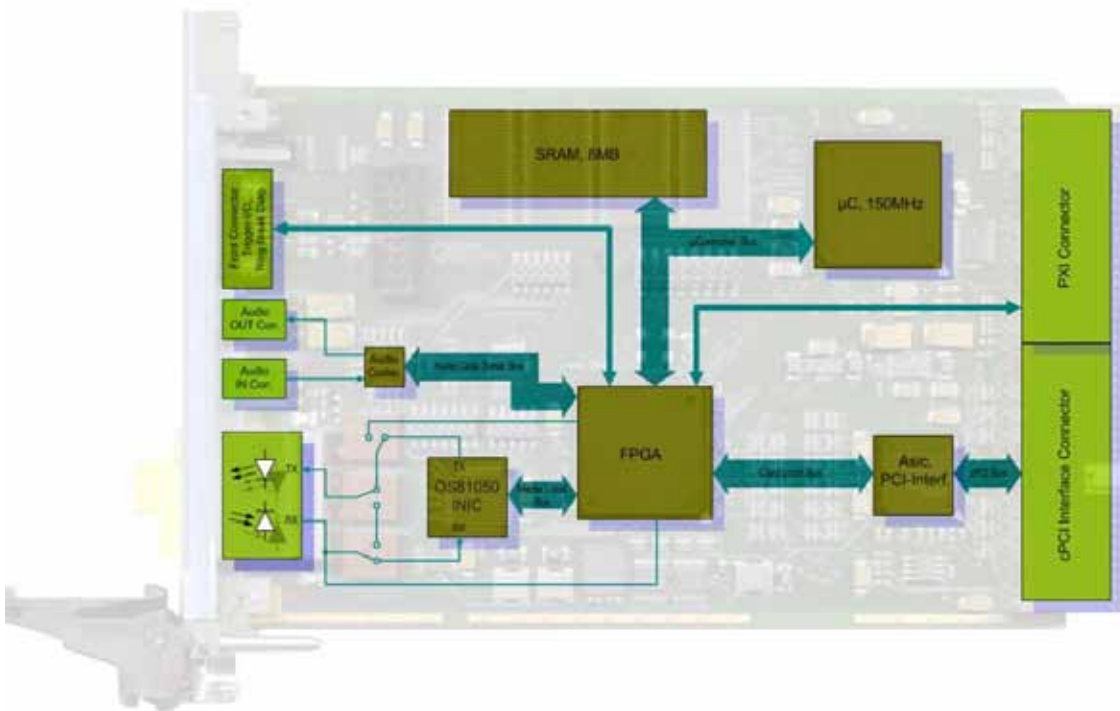

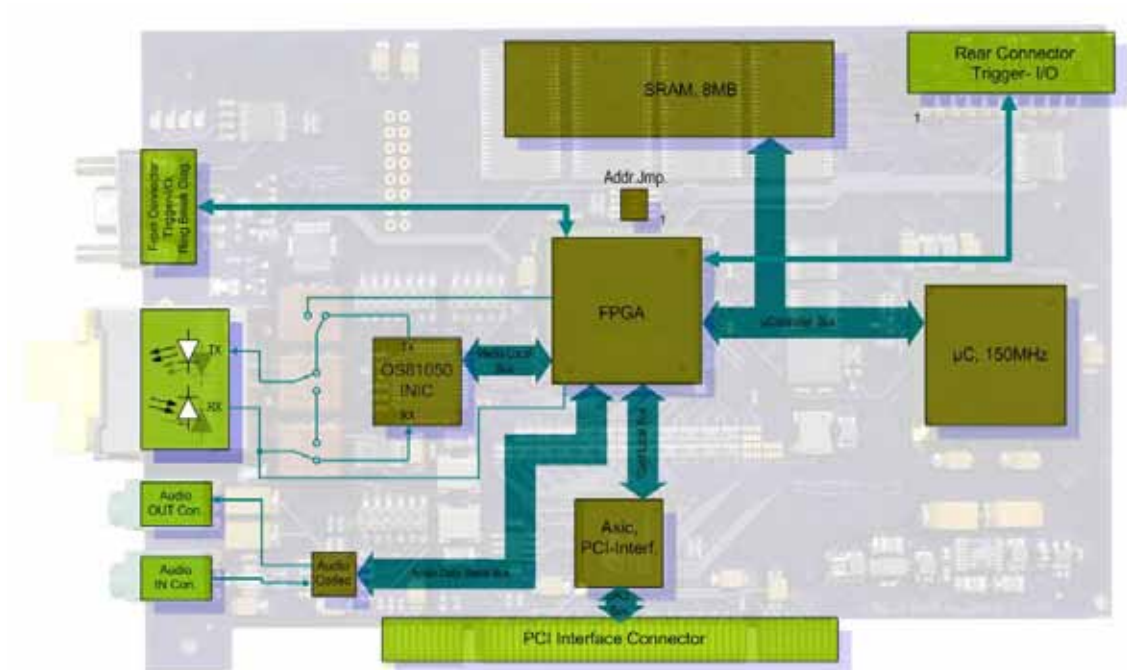*Figure 2-3: Block diagram of a PXI 3060 Communication Board*

Figure 2-4: Block diagram of a PCI 3060 Communication Board

The configuration elements of Figure 2-4 are described in the following table:

Addr. Jmp.	The jumper field on the PCI 3060 board is for clearly identifying the board in a system with several PCI 3060 (analogously to "geographical addressing" of the PXI specification). A corresponding binary value (0..15) can be set with the jumper fileld. This binary value can be read out with the supplied software.
Rear Connector	Connector on the PCI 3060 to exchange trigger signals with other PCI boards of GOEPEL electronic

2.3.2 Addressing

PXI 3060: PXI racks have an own geographical slot addressing of the backplane. Numbering starts with 1 and can be seen at the cover's front side.
Mount always an embedded controller or an MXI card at slot 1.

The PXI 3060 board can read out this geographical slot address.

PCI 3060: PCI racks do not have an own geographical slot addressing. There is a separate address jumper field (Addr. Jmp. in Figure 2-4) for clear identification of the board in a system with several PCI 3060 boards. You can select up to 16 addressing variants by this. The corresponding binary value (0..15) set with the Addr. Jmp. field can be read out by the delivered software.

2.3.3 Trigger Behavior

The MOST interface has eight trigger input/ output connections (Trigger[0..7]) at backward connectors of the board as well as two additional input and four additional output connections at the frontal connector. By the corresponding driver configuration, these connections can be interconnected.

2.3.4 MOST Interface

For proper operation of a MOST interface in a network, all partners must communicate with the same system clock. This depends, among others, on the Master frame rate of the system.

PXI 3060/ PCI 3060 boards support the following Master frame rates:

- ¨ 48 kHz and
- ¨ 44.1 kHz

(G-API command G_Most_Node_SetProperties, parameter ClockMode)

2.3.5 Connector Assignment

Type: miniDSub 9 poles, male

The XS1 frontal connector offers four trigger outputs, two trigger inputs and the connections for the Ring break diagnosis to the user.

As an option, GOEPEL electronic can deliver a cable for connecting the frontal connector. One cable end is designed as a counterpart to XS1 (that means with a miniDSub 9 poles, female). The other end is not connected and can configured by the user himself.

The connector assignment and the colors of the belonging wires are identical for PXI 3060 and PCI 3060 according to the following table:

No.	XS1 contact	Signal name	Remarks	Wire color
1	1	TRGO_1	Trigger output 1	black
2	6	TRGO_2	Trigger output 2	green
3	2	TRGO_3	Trigger output 3	yellow
4	7	TRGO_4	Trigger output 4	blue
5	4	TRGI_1	Trigger input 1	orange
6	5	TRGI_2	Trigger input 2	red
7	3	GND	Ground potential	brown
8	8	UBatt	Reference potential Ring break diagnosis	white
9	9	RingDiag	Data line Ring break diagnosis	magenta
			No function	gray

2.3.6 LED Display

The LEDs arranged at the front panel indicate the current operation state of the microcontroller of the MOST interface.
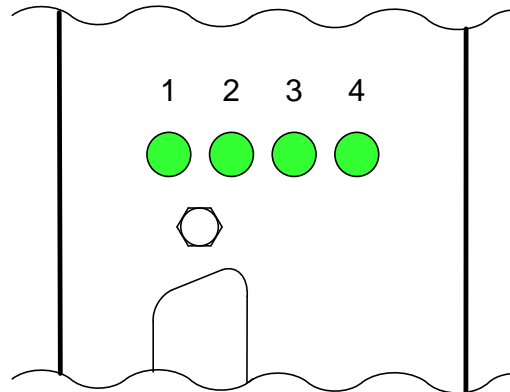

Figure 2-5
LED Display

The following table shows important display states of these LEDs:

State				Remarks
LED 1	LED 2	LED 3	LED 4	
alternately blinking				Bootloader software runs Error reason (probably): Software reset not executed
				Firmware runs
ON (shortly)				Display while a Firmware command is executed
		ON		MOST bus: Light on
			ON	MOST bus: Locked

This LED display is effected with low priority and can be affected by other running programs.

2.4   Delivery Notes

PXI 3060/ PCI 3060 boards are delivered as follows with one MOST25 interface per board:

- ¨ PXI 3060.00
- ¨ PCI 3060.00

As an option, the cable described in section <u>Connector Assignment</u> can be delivered:

- ¨ CAB 3060.10

3   Software

There are three ways to integrate PXI 3060/ PCI 3060 hardware in your own applications:

- ¨ [Programming via G-API](#)
- ¨ [Programming via DLL Functions](#)
- ¨ [Programming with LabVIEW](#)

3.1 Programming via G-API

The G-API (GOEPEL-API) is a programming environment based on "C" for GOEPEL electronic hardware under Windows®. So the G-API is the preferred programming environment for this hardware. It provides a wide, hardware independent command set for CAN, LIN, K-Line, FlexRay, MOST, LVDS, ADIO and Diagnostic services. No matter whether a PXI/ PCI, USB and Ethernet device is used, the commands remain the same.

The hardware abstraction introduced with the G-API gives the test application parallel access to the hardware, allowing one application to access multiple hardware interfaces, as well as multiple applications can access the same hardware interface in parallel.

Another feature introduced by the G-API is the asynchronous hardware access. This means no execution blocking for pending firmware commands. The command acknowledgement is provided via a callback mechanism.

With the Hardware Explorer GOEPEL electronic provides an efficient hardware configuration and management tool, offering users an easy way to manage their hardware configurations and identifying specific hardware interfaces by logical names. Using logical interface names in the application saves from rebuilding the application when porting it to another interface or controller board, as the interface can be easily reassigned in the Hardware Explorer. Furthermore, the Hardware Explorer provides a simple means of testing the interaction between hardware and software by executing the integrated self-tests.

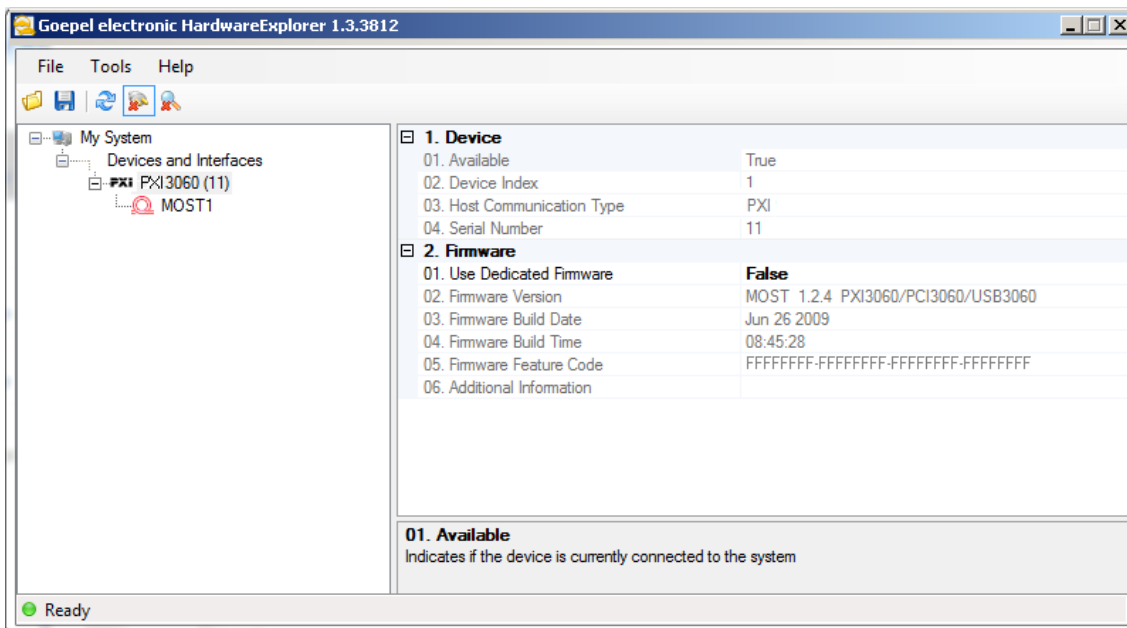The figure below shows the GOEPEL electronic Hardware Explorer:

Figure 3-1: Hardware Explorer

Please consult the G-API documentation for further information. This documentation and the installation software are located in the *G-API* folder of the supplied "Product Information" CD.

3.2 Programming via DLL Functions

Programming via DLL Functions is possible also in future for existing projects which can not be processed with the GOEPEL electronic programming interface G-API.

We would be pleased to send the GOEPEL Firmware documentation to you on your request. Please get in touch with our sales department in case you need that.

The GPxi3060 expression used in the following function description stands for PXI 3060/ PCI 3060.

For the used structures, data types and error codes refer to the headers – you find the corresponding files on the supplied CD.

3.2.1 Windows Device Driver

The DLL functions for programming using the Windows device driver are described in the following chapters:

- Driver Info
- XilinxReadWriteRegister
- WriteInstruction
- ReadResponse

The following type definitions are used:

S32 – signed long

U8 – unsigned char

U16 – unsigned short

U32 – unsigned long

3.2.1.1 *Driver Info*

The Pxi3060_DriverInfo function is for the status query of the hardware driver.

Format:

```
S32 Pxi3060__DriverInfo(t_Driver_Info *pDriverInfo, U32 LengthInByte);
```

Parameters:

Pointer, for example pDriverInfo, to a data structure
See the *Pxi3060_UserInterface.h* file on the supplied CD

LengthInByte
Size of the storage area pDriverInfo is pointing to, in bytes

Description:

The Pxi3060_DriverInfo function returns information regarding the status of the hardware driver.

For this reason, the address of a pDriverInfo pointer has to be transferred to the function.
The structure pDriverInfo is pointing to is filled with various information within the function.

3.2.1.2 XilinxRead WriteRegister

The Pxi3060__XilinxReadWriteRegister allows the access to the FPGA.

Format:

```
S32 Pxi3060__XilinxReadWriteRegister(U8 *pData, U32 *DataLength);
```

Parameters:

Pointer, for example pData,
to a data structure
See the *Pxi3060_UserInterface.h* file on the supplied CD.

DataLength
Size of the storage area pData is pointing to, in bytes

Description:
See above

3.2.1.3 Write-Instruction

The Pxi3060__WriteInstruction function is for sending a command to the PXI 3060/ PCI 3060 controller.

Format:

```
S32 Pxi3060__WriteInstruction(U8 *pData, U16 DataLength);
```

Parameters:

Pointer, for example pData, to the Write data area, consisting of Command header and Command bytes (currently max. 4096 bytes per command)

DataLength
Size of the storage area pData is pointing to, in bytes

Description:

The Pxi3060__WriteInstruction function sends a command to the PXI 3060/ PCI 3060 controller.

In the header of the structure pData is ponting to, there is the information regarding the PXI 3060/ PCI 3060 board to be activated. Therefore this parameter has not to be given separately.

3.2.1.4 Read-Response

The `Pxi3060_ReadResponse` function is for reading a response from the PXI 3060/ PCI 3060 controller.

Format:

```
S32 Pxi3060__ReadResponse(U8 Device, U8 Node, U8 *pData, U32 *DataLength);
```

Parameters:

Device
Index of the PXI 3060/ PCI 3060 board, beginning left with 1

Node
MOST node, for PXI 3060/ PCI 3060 = 1

Pointer, for example pData, to the Reading data area, consisting of Response header and Response bytes (currently max. 4096 bytes per response)

DataLength

Value of the parameter before function call:
Size of the buffer pointed by pData in bytes

Value of the parameter after function call:
Number of bytes actually read

Description:

The Pxi3060_ReadResponse function reads back the oldest response written by the PXI 3060/ PCI 3060 controller.

If several responses have been provided by the controller, but not sent, they are not lost but stored in the form of a list.

On calling up, the Pxi3060_ReadResponse function continues to provide data until this list contains no more entries.

3.3 Programming with LabVIEW

3.3.1 LabVIEW via the G-API

The supplied CD contains VIs for activating PXI/ PCI 3060 boards under LabVIEW.

These LabVIEW VIs use the functions of the GOEPEL G-API.

3.3.2 LLB using the Windows Device Driver

The supplied CD contains VIs for activating PXI/ PCI 3060 boards under LabVIEW.

The functions described in the Windows Device Driver section are used for this.

3.4 Further GOEPEL Software

PROGRESS, Program Generator and myCAR of GOEPEL electronic GmbH are comfortable software programs for testing with GOEPEL hardware.

Please refer to the corresponding User Manual to get more information regarding these programs.