

### Introduction

The XR22800IL32-0A-EB is an evaluation board for the XR22800IL32-F. The XR22800IL32-F is a Hi-Speed USB 2.0 compound device with an embedded hub and 3 downstream USB functions: 10/100 Ethernet controller, multi-master capable I<sup>2</sup>C controller and an Enhanced Dedicated GPIO Entity (EDGE) controller. This manual is intended to guide users to operate these different functions of XR22800IL32-F on a windows 7 platform.

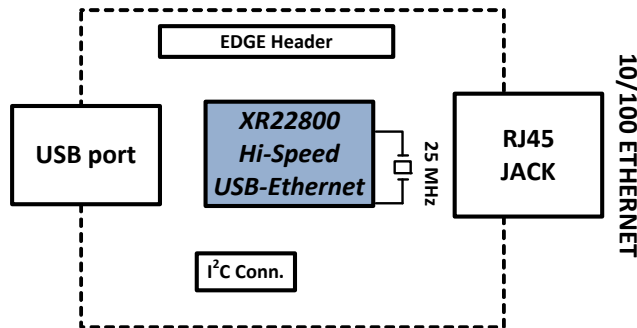
**Table 1: Ordering Information**

Device Ordering Part Number	Evaluation Board Ordering Part Number	Device Package	Device Location
XR22800IL32-F	XR22800IL32-0A-EB	32-pin QFN	U7

### Board Layout and Outline

#### Evaluation Board outline

Figure 1 provides shows the topography of the evaluation board.



**Figure 1: Outline XR22800 Evaluation Board**

Evaluation Board Layout

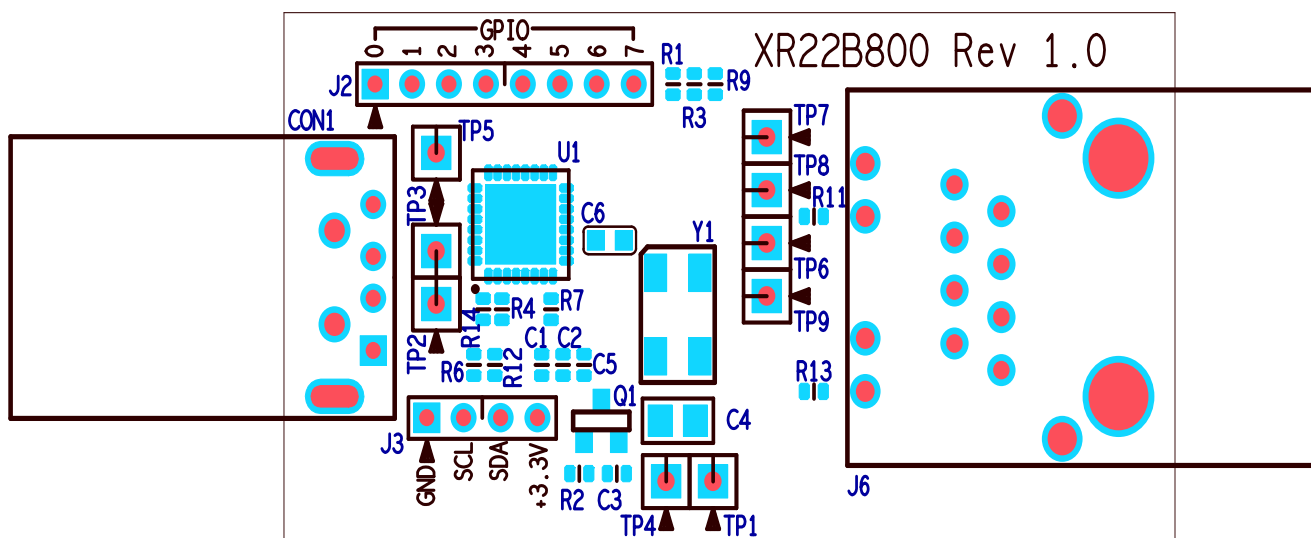


Figure 2: XR22800 Evaluation board Top View

## Software Drivers

This section provides assistance regarding installation of driver for the embedded hub and all the downstream USB functions of the XR2280x. The hub and the HID functions (I<sup>2</sup>C and EDGE) are supported by Windows' in-box generic drivers therefore no custom driver need to be installed and the Windows system should automatically load drivers for these functions. The XR22800IL32-0A-EB is shipped with an installation CD that contains the latest Windows Xp/7 custom drivers for the Ethernet function. This driver can also be downloaded from the XR22800's product web page.

### Device Enumeration

When the device is first plugged into the system the embedded hub is enumerated first. It appears in the Device Manager under the "Other devices" tab as shown in the Figure 3. In order to access the Device Manger, go to start and in the search box enter "devmgmt.msc" and hit carriage return key on the keyboard.

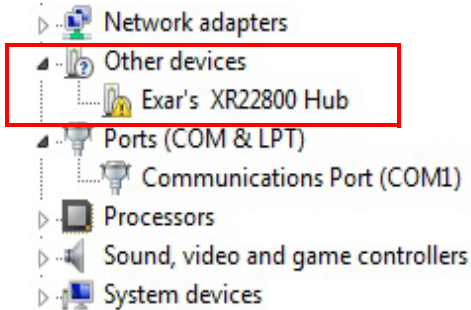


Figure 3: XR22800 hub enumeration

The downstream USB functions are initially enumerated as shown in Figure 4 in Device Manager under "Other devices" tab before their drivers are installed.



Figure 4: Enumeration of USB downstream ports

## Driver Installation

As mentioned previously the drivers for the embedded hub and HID functions should be installed automatically. This section provides assistance in installing custom driver for the Ethernet function.

### Driver Installation for Embedded HUB

Once the driver for the embedded hub is installed it will appear under “Universal Serial Bus Controller” tab as “Generic USB Hub” as shown in Figure 5. The users will have to read the Hardware IDs of the “Generic USB Hub” devices to differentiate between different generic hubs attached to the system.

In order to access Hardware IDs right click on “Generic USB Hub” and select “Properties”

In Properties page go to “Details” tab, in the Property drop-down menu select “Hardware Ids”

The Hardware ID of that device is showed under “Value” window.

For XR22800IL32-F, the value shown in this window: USB\VID\_04E2&PID\_0800

Where 04E2 is the Vendor ID(VID) of Exar and 0x0800 is the Product ID(PID).

The downstream functions are enumerated only after the hub driver has been successfully installed.

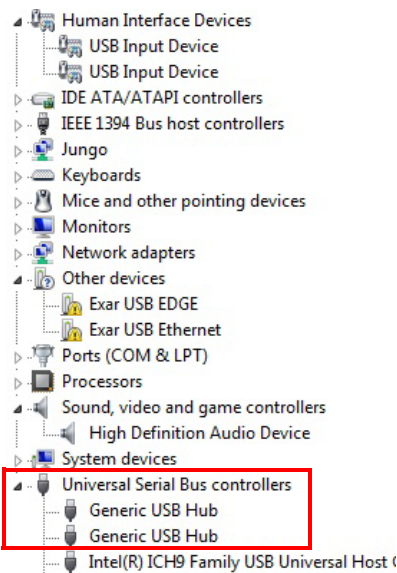
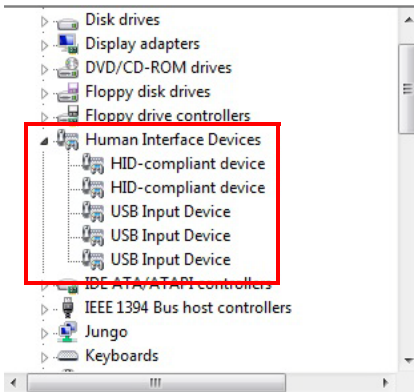


Figure 5: XR22800IL56-F embedded hub in Device manager

**Driver Installation for HID (I<sup>2</sup>C and EDGE) devices**

Drivers for the HID devices will be installed automatically after the Hub drivers are installed and they will appear under “Human Interface devices” tab in Device Manager. To differentiate between HID devices read the Hardware IDs. The product ID for HID-I<sup>2</sup>C is 0x1100 and for HID-EDGE is 0x1200.

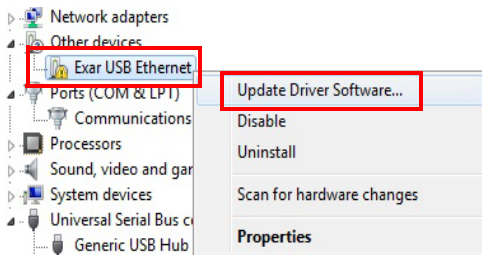


**Figure 6: HID devices in Device Manager**

**Installing Custom Driver for Ethernet Function**

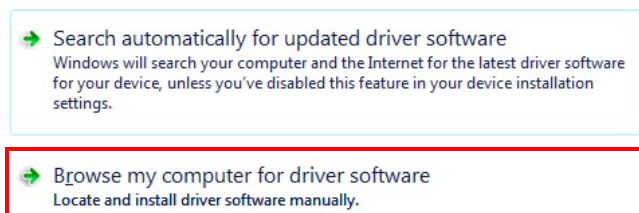
In the installation disc goto folder “Driver/Ethernet” and copy its contents on the hard drive. Extract all contents of the “zip” folder.

Go to device Manger and right click on “Exar USB Ethernet” under the “Other devices” tab and select “Update Driver”.

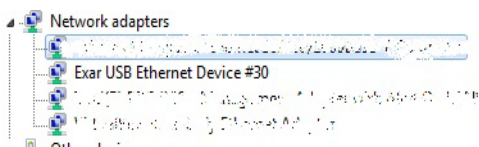


On the next wizard page select option “Browse my computer for driver software”

How do you want to search for driver software?



On the next wizard page select the option “Let me pick from a list of device drivers on my Computer” then click button “Have Disk...” and browse to the folder where all the driver files were extracted and select the “xrusbnet.inf” file. On successful installation of driver the device will be listed under “Network Adapters.”



## Software Application and Utilities

After successful installation of drivers, the next step in the process is to operate XR22800. The installation disc contains various test applications for testing the various USB functions. It contains test application for I<sup>2</sup>C and EDGE functions. The user may use a web browser for evaluating the Ethernet function.

The following screen-shots and information are provided to operate the 3 different types of embedded functions for all tests including Suspend/Resume testing. Each type of function is described separately but can/will be run simultaneously.

### Ethernet 10/100 - PID 0x1300

After successful installation of Ethernet driver plug in a cat-5 ethernet cable into the RJ45 ethernet jack. The device properties related to ethernet port can be modified from Device Manager. Right Click on “Exar USB Ethernet Device” instance under “Network Adapter” and select Properties. In Properties select Advanced tab as shown below in Figure 7

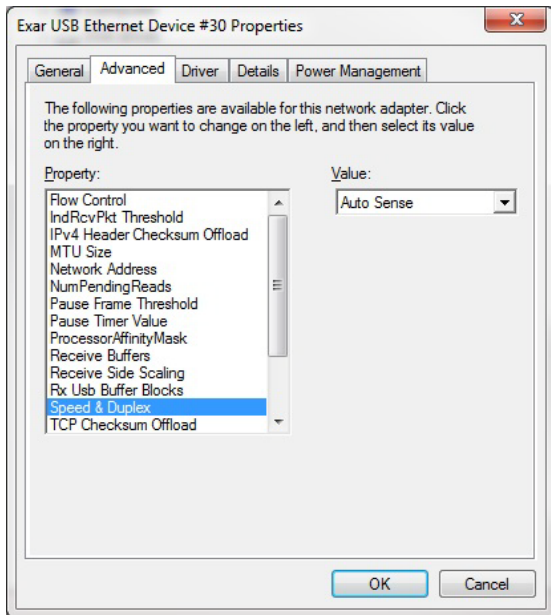


Figure 7: Ethernet device Properties

This tab provides access to modify various properties related to Ethernet e.g. Flow control, Remote Wake-up modes, Speed and Duplex modes etc. In Speed & Duplex property, the user can select among different link speed configurations supported by XR22800IL32-F in “Speed & Duplex” property. The different speed configurations are Auto Sense, 100M Full-Auto, 100M Full- Fixed, 100M Half- Auto, 100M Half- Fixed, 10M Full- Auto, 10M Full- Fixed, 10M Half- Auto and 10M Half-Fixed. All of this mode are explained in brief below:

Table 2: Speed and Duplex Settings

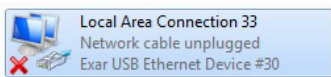
Property Name	Description
Auto Sense (Default)	XR22800IL32-F automatically determines the link speed through the process of Auto-Negotiation, where XR22800IL32-F advertises itself to be 10M & 100M Full & Half capable to the link partner.
100M Full/Half -Auto	During this mode XR22800IL32-F will always advertise itself to be 100M Full/Half capable only to the link partner.
10M Full/Half -Auto	During this mode XR22800IL32-F will always advertise itself to be 10M Full/Half capable only to the link partner.

**Table 2: Speed and Duplex Settings**

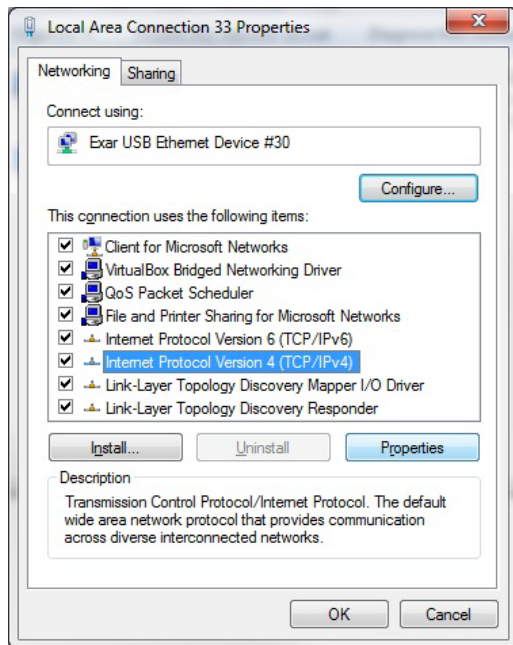
Property Name	Description
100M Full/Half-Fixed	During this mode XR22800IL32-F is forced to 100M Full/Half mode. There is no link negotiation with the link partner.
10M Full/Half-Fixed	During this mode XR22800IL32-F is forced to 10M Full/Half mode. There is no link negotiation with the link partner.

The XR22800IL32-F supports static and dynamic IPs. Follow the steps below to configure the static IP (if the static IP is assigned):

1. Go to the Start menu
2. In the Search box, search for “View network connections” and hit carriage return
3. Right click on Local Area Connection # icon of Exar USB Ethernet shown in figure below and select properties



4. On the properties page select “Internet Protocol Version 4” and click on Properties button as shown in Figure 8



**Figure 8: Local Area Connection Properties window**

5. The Static IPs can be configured as shown in the figure. For DHCP select the option “Obtain the IP address automatically”

Obtain an IP address automatically

Use the following IP address:

IP address:

Subnet mask:

Default gateway:

Obtain DNS server address automatically

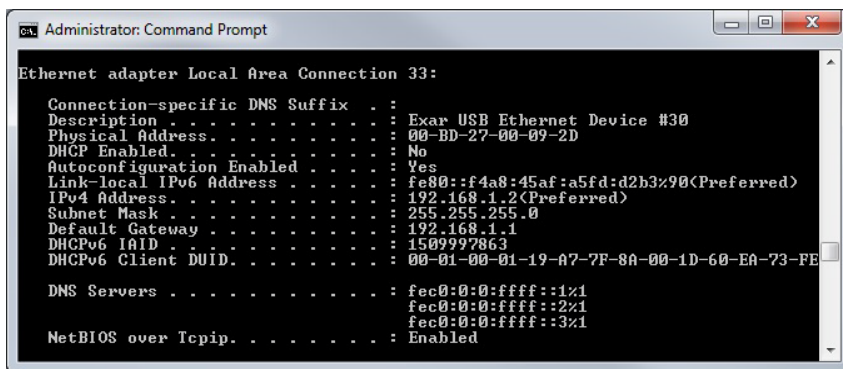
Use the following DNS server addresses:

Preferred DNS server:

Alternate DNS server:

IP settings can be confirmed by following the below mentioned step:

1. Go to Start menu and search for “cmd” and hit carriage return
2. In the command prompt enter “ipconfig /all”
3. It will display information for all the network adapters connected to the system. The user should look for Ethernet adapter whose description says “Exar USB Ethernet Device # ” as shown in figure below



```

Administrator: Command Prompt

Ethernet adapter Local Area Connection 33:

    Connection-specific DNS Suffix . . . : 
    Description . . . . . : Exar USB Ethernet Device #30
    Physical Address. . . . . : 00-BD-27-00-09-2D
    DHCP Enabled. . . . . : No
    Autoconfiguration Enabled . . . . . : Yes
    Link-local IPv6 Address . . . . . : fe80::f4a8:45af:a5fd:d2b3%90(Preferred)
    IPv4 Address. . . . . : 192.168.1.2(Preferred)
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1
    DHCPv6 IAID . . . . . : 1509997863
    DHCPv6 Client DUID. . . . . : 00-01-00-01-19-A7-7F-8A-00-1D-60-EA-73-FE

    DNS Servers . . . . . : fec0:0:0:ffff::1x1
                           fec0:0:0:ffff::2x1
                           fec0:0:0:ffff::3x1
    NetBIOS over Tcpip. . . . . : Enabled
  
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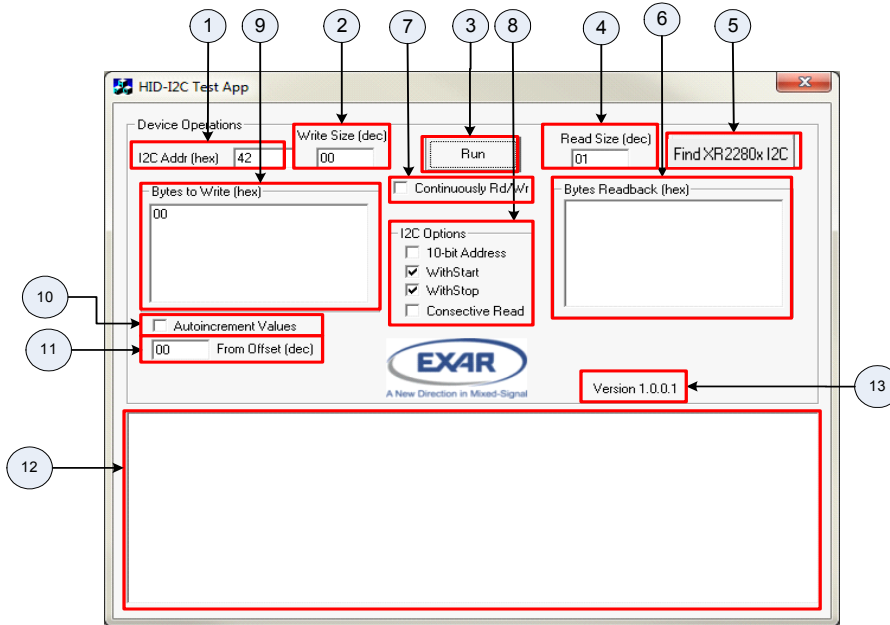
Figure 9: Local Area Connection adapter information

Once the User is done configuring the ethernet port based on their network requirement the ethernet port will be ready to be used. Use a web browser to verify the functionality of the Ethernet port.



**HID-I<sup>2</sup>C - PID 0x1100**

The XR22800IL32-0A-EB evaluation board provides an interface (header J4) to connect its I<sup>2</sup>C master to an I<sup>2</sup>C slave device. The installation disc contains an HID-I<sup>2</sup>C utility to control this HID-I<sup>2</sup>C master function. The figure shows the snapshot of HID-I<sup>2</sup>C utility.



**Figure 10: HID-I<sup>2</sup>C utility**

Connect I<sup>2</sup>C slave device to the XR22800IL32-0A-EB evaluation board via 4-pin header J3. The evaluation board has 47K pull-up installed on SDA and SCL pin refer to the schematic for more details. Run the HID-I<sup>2</sup>C test app. Push “Find XR2280x I2C” button. Each portion of HID-I<sup>2</sup>C utility is described in table below:

**Table 3: HID I<sup>2</sup>C GUI Description**

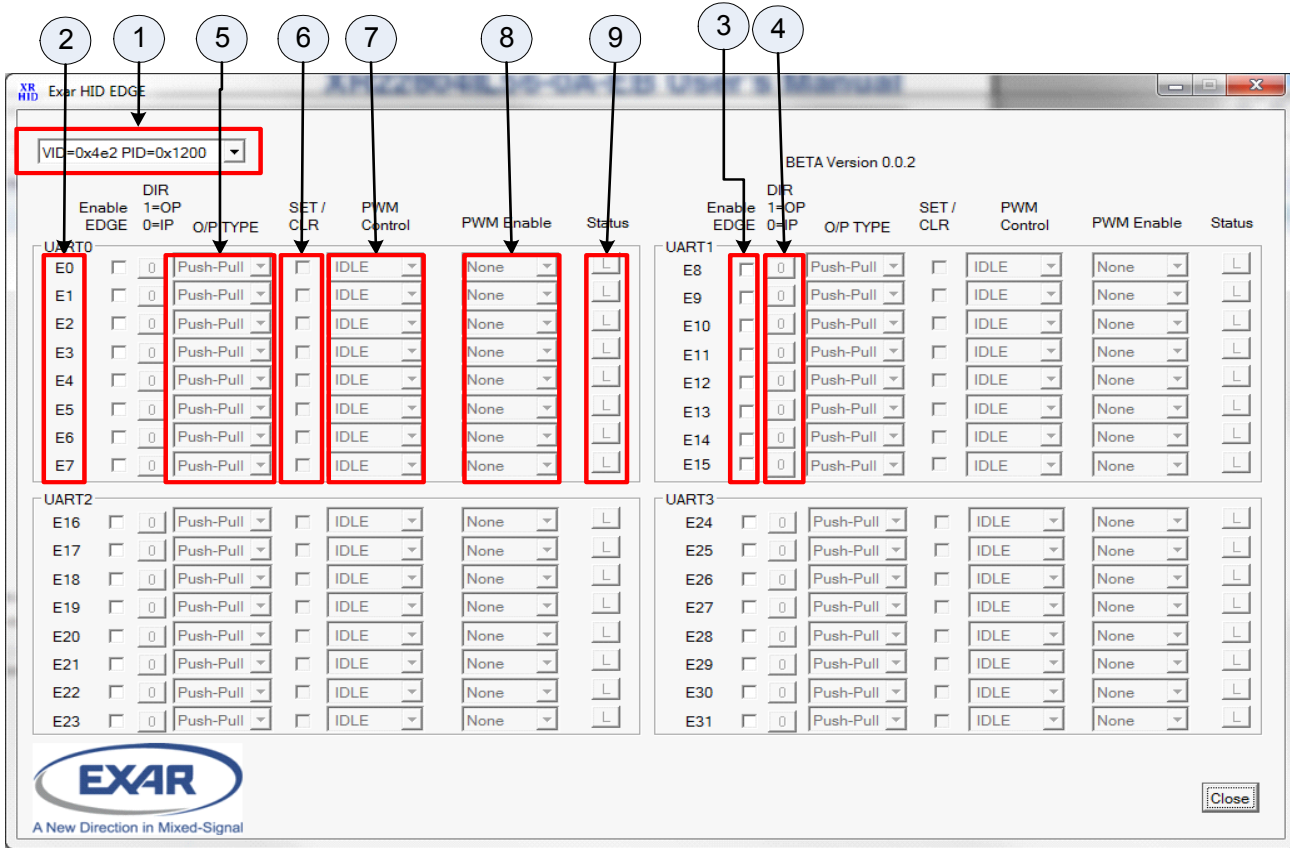
GUI Item	Name	Description
1	I2C Addr	Enter the address of the Slave i <sup>2</sup> c device. The value entered should be in hexadecimal format and right shifted by one bit. e.g.- If Slave address= “60” the value entered in this box will be “30”
2	Write Size	Enter in decimal the number of bytes, without including the slave address, to be sent to slave device
3	Run	Push this button to execute Read/Write command
4	Read Size	Enter in decimal the number of bytes expected to be read from the slave device
5	Find XR2280x I2C	Push this button to force the utility to look for XR2280x device
6	Bytes Readback	This window display the bytes read from the slave device. The number of bytes read is defined by GUI item #4. This window will also display status of any operation in terms of whether it “succeeded” or “failed”
7	Continuously Rd/Wr	Enable this box in order to perform read/write operation continuously. De-selecting the check box will stop the operation.

Table 3: HID I<sup>2</sup>C GUI Description

GUI Item	Name	Description
8	I2C options	These settings controls the I <sup>2</sup> C protocol
	a. 10-bit Address	Check this box to enable 10-bit slave addressing mode
	b. WithStart	Check this box to initiate I <sup>2</sup> C transaction with start bit. The master sends a start bit followed by the address byte to select a slave and initiate a transfer.
	c. WithStop	Check this box to end I <sup>2</sup> C transaction with stop bit. The master sends a stop bit, this relinquishes the bus, and another master may then claim it.
	d. Consecutive Read	Check this box to perform consecutive read operation
9	Bytes to Write	Enter the data string that needs to be send to slave device. If there is more than one data byte they should be separated by space. For eg: For write operation- In order to send data string 0x22, 0x3C, 0x4A, 0x55, 0x56 and 0x8F to slave device enter these values in box as below: "22 3C 4A 55 56 8F" In most slave devices the first byte is the address in slave device where the following data should be written. For this example 0x22 is that address. For Read Operation- Enter the Address in the slave device that needs to be accessed. For e.g: if the address of location in slave device is 0x22 enter "22" in the box. The value read will be shown in Bytes Readback (GUI item #6)
10	Autoincrement Values	Enable the check box to auto-increment, by 1, the data byte, specified by the offset (GUI item #11), in Byte to Write (GUI item #9). for e.g: if data string in "Byte to Write"= "22 3C 4A 55 56 8F" offset= 1, after every transaction data byte, in this case 0x3C, will be incremented by 1 and the remaining string remains the same.
11	From Offset	Enter the offset location, in decimal system, of the byte in the data string in "Bytes to Write" box
12	Message window	All the messages related to HID-I <sup>2</sup> C is displayed in this box
13	Version	It describes the version number for the existing application

**HID-EDGE- PID 0x1200**

The XR22800IL32-0A-EVB evaluation board has a header (J2) for testing EDGE pins. The installation disc contains an application to control configure the EDGE pins. The user needs to confirm the jumper settings before proceeding with this test. The figure below shows the snapshot of HID-EDGE utility.



**Figure 11: HID-EDGE Application**

**Table 4: HID I<sup>2</sup>C GUI Description**

GUI Item	Name	Description
1	Device Info	This box displays device information: Vendor ID(VID), Product ID(PID)
2	EDGE pin number	Element in this column references to the EDGE pin number. E.g: E0= Edge Pin 0, E1= Edge Pin 1 etc
3	Enable EDGE	Check this box to configure this pin to EDGE. Uncheck this box to configure this pin to UART
4	DIR	Click on the box to the pin from input to output and vice-versa 1= This pin is configures as output pin 0= This pin is configured as input pin
5	O/P TYPE	A drop-down menu provides three options: 1. Push-Pull: select this option to set output pin to be PUSH-PULL 2. Open-Drain: select this option to set output pin to be an open drain pin 3. Tri-State: select this option to set output pin to be a Tri-state pin

Table 4: HID I<sup>2</sup>C GUI Description

GUI Item	Name	Description
6	SET/CLR	Check this box to set the output HIGH. Uncheck this box to set the output LOW
7	PWM Control	A drop-down menu provides three options: 1. IDLE: select this option to leave PWM output idle 2. Stp_LOW: select this option driver output LOW when PWM is idle. 3. One Shot: If output is high, run one low cycle and stop high. If output is low, run one high cycle and stop low. Cleared to IDLE when completed. 4. RUN: select this option for PWM output to toggle HIGH-LOW. 5. Stp_HIGH: select this option driver output HIGH when PWM is idle.
8	PWM Enable	A drop-down menu provides an option to select among two PWMs. Select None to disable PWM mode
9	Status	If configured as output this box display state of the pin. 1= pin state is HIGH 0= pin state is LOW

For further details on any of the above functions refer to the datasheet.

## Revision History

Revision	Date	Description
1A	June 2014	Initial release

### For Further Assistance:

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Exar Technical Documentation: <http://www.exar.com/techdoc/>

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