

DELGEN

DPI Modules

User's Manual

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1 Welcome

1.1 Introduction

The DPI bus is a cheap communication bus between microcontroller based modules.

1.2 How This Book Is Organized

You can find following chapters in it:

Chapter 1 contains a view on all the information in this book.

Chapter 2 gives info on the DPIBUS standard.

The DynamicC DPIBUS library functions are listed in **Chapter 3**.

Chapter 4 lists all available DELGEN DPI Modules.

1.3 More Questions

If you have questions while using your X-Graph module or one of the X-Graph Software Modules, check first if the information is available in this book or the other X-Graph Users Manuals. If you cannot find the answer check the information and forum on the X-graph website (www.x-graph.be). Finally you can also contact your local distributor or the X-Graph technical support by e-mail (techsup@x-graph.be).

This manual includes information on the X-Graph modules. It is strongly advised to download and read documentation on the Rabbit processor from the Rabbit Semiconductor (www.rabbitsemiconductor.com) website.

This manual is complimentary to the documentation found on these websites.

2 DPIBus: a RS485 Pheripheral Expansion Bus

The DPI bus is a cheap communication bus between microcontroller based modules.

The module price is kept low because both hardware and software use ready available components:

- Reliable and well-known RS485 software protocol
- Any standard RS485 driver can be used
- Very small software overhead required. A typical microcontroller requires one UART or a software UART could be used.
- Standard UTP cabling and connectors
- Power is available, no need for a dedicated power supply on each module

DELGEN offers an DPIBus custom design service. We design and manufacture DPIBus devices with custom specifications. Free of charge for any order of 100pcs or more.

2.1 Daisy-chain and Hubs

Each DPI device should have preferable two DPI connectors. One is required, but with two connectors a daisy-chain can be made without the need for a passive or active hub. DELGEN offers a passive 6-port hub to connect single-port devices.

Using appropriate RS485 drivers up to 128 devices can be connected to the same bus. If more devices are required an active hub can be used to expand the total allowed number of devices (total is virtually unlimited). DELGEN also offers an active hub with 3 DPI channels (each 2 connectors) and two full RS232C ports. This hub uses a Rabbit 3000 for active hub management.

Any RS485 driver can be used, devices are available from many manufacturers including TI, Analog Devices, Maxim, ... The driver type limits the total allowed number of device on one bus. This might be 32 devices up to 400.

A RS485 bus must be passive terminated on both sides. A star configuration is normally not allowed. Each DPI device must have an internal jumper to enable/disable termination. For small, short distance, low-speed DPI implementations the termination might not be required.

RS485 transmission line lengths can be up to 1000 meters.

2.2 Transmission Speed

The transmission speed is limited by the used drivers and UART capabilities of the connected devices. The default DPI speed is 115kBaud but this can be reduced to 9600 baud or increased to 10MBit.

The default speed is generally fast enough to implement standard I/O functionality. Higher speeds might be required between hubs or fast I/O devices. A mixed speed design can be used (one DPI bus with the communication speed dependent on the selected device), or separate DPI busses can be used for different communication speeds.

2.3 Software Protocol

Although the RS485 interface allows for multi-master software protocols, this increases the software overhead and thus the price. The default DPI protocol uses a single master approach. Any device could be assigned master in a project, but generally this would be

one of the active hubs or the X-Graph module. A multi-master protocol could be implemented too, but no drivers are available from DELGEN.

Each active hub is by default master for all the DPI busses it controls. An active hub is also a slave device of another active hub or general master via one DPI bus. This systems distributes the software load of complex DPI bus systems. Each active hub must manages all the devices connected to it. It only needs to communicate results to its master.

2.4 Physical Connections

Standard UTP cable and connectors are used.

Each UTP cable has 8 wires. Two are used for the RS485 communication, four are used for power distribution and two are available for dedicated applications.

3 DynamicC DPIBUS Library

DELGEN is currently upgrading the X-Graph DPI library. Information on this new library will be added to this manual in the next release.

4 DPIBus Modules

DELGEN offers an DPIBus custom design service. We design and manufacture DPIBus devices with custom specifications. Free of charge for any order of 100pcs or more.

Several standard DPIBus modules are available from stock.

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Change List

1.0

Initial release