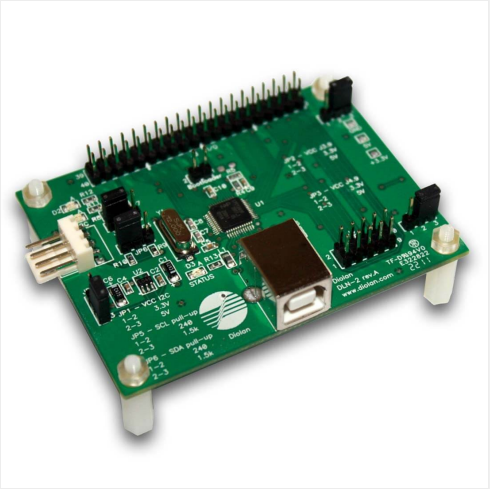
The product DLN-2 USB-I2C/SPI/GPIO Adapter has been added to comparison list.

DLN-2 USB-I2C/SPI/GPIO ADAPTER



USB-I2C, USB-SPI, USB-GPIO interfaces, eight 10-bit analog inputs, 2 PWM outputs and two 32-bit pulse counters. Pulse counters, digital and analog inputs can send events to your application (e.g. when voltage level reaches the predefined value).

Features

Key Features

- **USB-I2C interface** with configurable frequency from 1kHz to 1MHz, wide supply voltage range (2.3V to 5V), multimaster and clock stretching support;
- **USB-SPI interface** with configurable frequency (up to 18MHz), phase and polarity;
- **32 digital I/O pins** with embedded pull-up resistors;
- **8 10-bit analog inputs** (ADC);
- **2 PWM** outputs;
- **2 32-bit pulse & frequency counters;**
- **event-driven interface** for digital inputs, analog inputs and pulse counters
- 1 status LED and 2 user-configurable LED's;
- **no hidden fees:** API, updates, software and technical support are free;
- USB 2.0 full-speed (12 MHz) connection to personal computer;
- **backward compatible** with our well known U2C-12 USB-I2C/SPI/GPIO Interface Adapter;
- RoHS Compliant

General Description

DLN-2 USB-I2C/SPI/GPIO/PWM/ADC adapter is an ideal solution for interfacing your hardware from Windows, Linux or Mac OS X based computer.

The DLN-2 adapter allows you to send and receive data to/from I2C and SPI slave devices at high frequencies, control your hardware using PDM interface and digital outputs and monitor it with digital and analog inputs and pulse counters.

There are a lot of open source examples and ready to use programs that you can download for free from dlnware.com web site. There you can also find comprehensive documentation and examples that show how to interface the DLN-2 adapter from different programming languages.

The DLN-2 interface is available in two modifications:

- the assembled PCB board that you can connect to your hardware with the Diolan accessories;
- the preprogrammed microcontroller (system-on-chip) that you can embed into your hardware.

Event-Driven Interface

One of the most exciting features of DLN-2 USB-I2C/SPI/GPIO/PDW/ADC adapter is an event-driven interface.

You can configure the DLN-2 adapter to notify your application when a specific event occurs. Let's see that on example. Here is an example.

Let us assume that your application controls a voltage level at some circuit. If the voltage level exceeds 1.6V, it notifies a user about that.

The competitive adapters leave you with the only option to continuously poll the analog input for current value, unreasonably wasting computer resources and USB bandwidth.

The ADC module of the DLN-2 adapter can notify your application when the voltage level exceeds a preconfigured threshold. Your application can set the upper threshold value to 1.6V and continue its regular operation. When the predefined condition occurs, your application will receive an event and notify a user.

The event-driven interface is available for digital inputs, analog inputs and pulse counters.

U2C-12 USB-I2C/SPI/GPIO interface adapter compatibility

Before we developed the DLN-series adapters, we had a U2C-12 USB-I2C adapter that was used by thousands of our customers. After U2C-12 adapter was discontinued, we replaced it with the DLN-2 adapter, which has exactly the same form factor.

The DLN-2 adapter has more extended functionality in comparison with U2C-12 adapter. It supports additional interfaces and higher frequencies. These improvements required from us to change API.

Some of our customers didn't want to adapt their software to our new API. **We put our customers at the center of all we do** and we have developed the firmware for DLN-2 USB-I2C adapter that is fully compatible with the previous U2C-12 API. These adapters are available for purchase under part number DLN-2-U2C. For additional details refer to the U2C-12 compatibility article.

Specifications

USB-I2C Interface

The **I2C bus frequency** of the DLN-2 USB-I2C adapter can be configured in the range between 1kHz and 1MHz. This allows you to connect I2C slave devices that operate in Standard (100 kHz), Fast (400 kHz) and Fast Plus (up to 1 MHz) I2C bus frequency modes.

The DLN-2 interface adapter has two sets of **I2C pull-up resistors**: 240 Ohm and 1.5 K. You can select which set of pull-up resistors to use with the on-board jumpers. If an external I2C circuit is already equipped with pull-up resistors, you can disable the pull-up resistors that are located on the DLN-2 adapter.

You can connect these pull-up resistors either to the **DLN-2 power supply**, or to the **external power supply**. In case you use the DLN-2 power supply, you can select between two options - 3.3V or 5V. The external power supply can vary in the range between 2.3V and 5V.

The DLN-2 USB-I2C interface supports **multimaster** environment. It can detect if the I2C bus is occupied by another I2C master device.

If your I2C slave device is not able to co-operate with the clock speed given by U2C-12 adapter, it can slow down the communication with **clock synchronization (clock-stretching)**.

DLN-2 supports only I2C master interface. If you need to use I2C slave interface as well, consider switching to DLN-4S adapter.

Symbol	Parameter	Condition	Min	Max
Freq	I2C Bus Frequency	configurable	1 kHz	1 MHz

Symbol	Parameter	Condition	Min	Max
PullUp	Pull-Up Resistors	configurable with solder bridges	240 Ohm	1.5K
VIH	Input High Voltage		2.31V	5.5V
VIL	Input Low Voltage		-0.3V	0.99V
VOHi	Output High Voltage	Internal VCC	2.9V	
VOHe	Output High Voltage	External VCC	(VCC-0.4)V	
VOL	Output Low Voltage			0.4V

USB-SPI Interface

The **SPI bus frequency** can be configured in the range between 2kHz and 10 MHz. If you need a faster SPI interface, consider using DLN-4M adapter.

In addition to SPI bus frequency you can also configure the **clock polarity (CPOL) and phase (CPHA)**. DLN-2 USB-SPI Interface supports **all 4 SPI bus modes**.

DLN-2 adapter operates on 3.3V. However, its SPI interface pins are **5V-tolerant**. This allows using DLN-2 adapter with 5V SPI circuits.

DLN-2 adapter can perform half-duplex (read or write) and full-duplex (simultaneous read/write) data transactions.

DLN-2 supports only SPI master interface. If you need SPI slave interface, consider using DLN-4S adapter.

Symbol	Parameter	Condition	Min	Max
Freq	SPI Bus Frequency	configurable	2 kHz	10 MHz
SS	Slave Select Pin		0	5
VIH	Input High Voltage		2.31V	5.5V
VIL	Input Low Voltage		-0.5V	0.99V
VOH	Output High Voltage	IOUT= 4.0mA	2.9V	
VOL	Output Low Voltage	IOUT= -4.0mA		0.4V

USB-GPIO (General Purpose Input / Output) Interface

The DLN-2 adapter has **32 GPIO pins** which can be configured as digital inputs or outputs.

Every GPIO pin is equipped with an **embedded pull-up resistor**. These pull-up resistors are turned on by default to ensure that DLN-2 input pins get the predefined value when no external device is connected.

The DLN-2 adapter stands out against competitive products by its support of **event driven interface**. With other adapters you would need to continuously poll the GPIO pin for changes, wasting the resources of your PC and USB bandwidth. You can preconfigure the DLN-2 adapter to

Symbol	Parameter	Condition	Min	Max
VIH	Input High Voltage		2.31V	5.5V
VIL	Input Low Voltage		-0.5V	0.99V
VOH	Output High Voltage	IOUT= 4.0mA	2.9V	
VOL	Output Low Voltage	IOUT= -4.0mA		0.4V
IL	Input Leakage Current I/O Pin			0.001mA
IDC	DC Current per I/O Pin	3.0V<VDDIO<3.6V; VOH=2.8V		8mA

Absolute Maximum Ratings

Parameter	Min	Max
Storage Temperature	-66°C	+150°C
Ambient Temperature Under Bias	-40°C	+85°C
DC Input Voltage to Any Pin	-0.5V	+5.5V
DC Input Voltage to Pins in ADC mode	0V	+3.6V

Operating Conditions

Parameter	Min	Max
Ta (Ambient Temperature Under Bias)	0°C	+70°C
DC Current VCC and GND Pins		50mA