

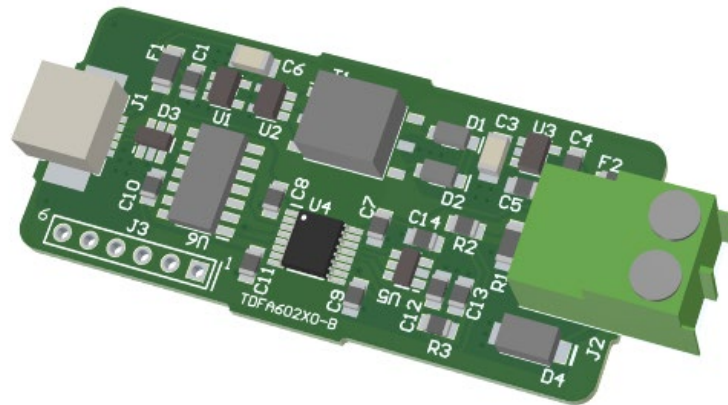


**TOKYO DEVICES**

# TDFA60250

USB Isolated Digital Input Board, 7 positions, Current Sink/Source

Revision 1.1



TDFA60250 is a USB voltage meter designed for reading analog voltage signals in the range of 0-5V or 1-5V. It can acquire voltage data in real-time at a speed of up to 1,000 samples per second with a resolution of 12 bits (4,096 levels). It's important to note that the circuits on the USB side and the measurement side are electrically isolated for safety. Additionally, it operates on bus power, eliminating the need for an external power source.

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## 1. Specifications

項目	値	説明
Measurement Range	0~5V	
Resolution	12 bits	*0~4,095
Maximum Rated Voltage	5.5V	
Input Resistance	47K $\Omega$	
Sampling Speed	1,000 sps	
Isolation Performance	1KV	*Design Value
Compatible Wire	0.2~2.5 mm <sup>2</sup> 26~14 AWG	*Screw Terminal Block
Communication Standard	USB 2.0 Full Speed	
Connector	USB Type B Mini	
Power Consumption	12 mA typ.	
Power Source	USB Bus Powered	
Operating Temperature Range	0~55°C	
Board Dimensions	W:60 D:25 H:18 mm	

## 2. Board Layout and Pin Assignment

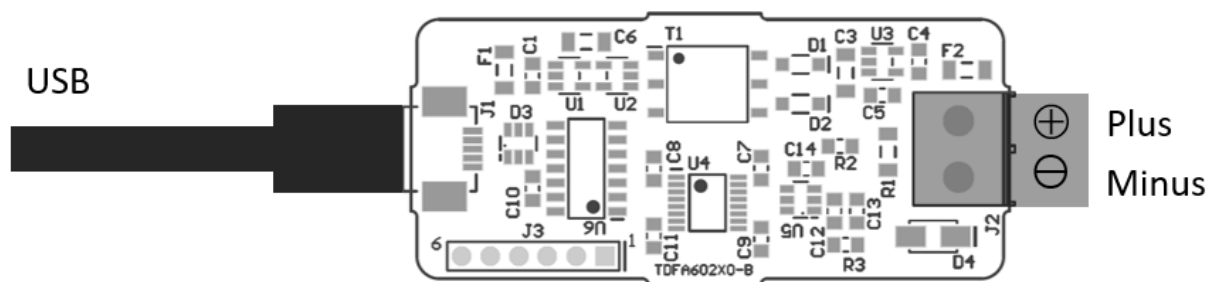


Figure 1 Board Layout

**Table 1 Pin Assignment**

名前	説明
⊕	Connect the positive pole of the signal
⊖	Connect the negative pole of the signal.
J1	Connect the USB cable.

### 3. Quick Usage

- Search for "TDFA60250" in the Tokyo Devices website's search box and download/install "TD-AppKit" from the product page.
- Connect the computer's USB port to the board's USB connector.
- Connect the voltage output sensor to TDFA60250.
- Launch TD-AppKit and select Device -> Open from the menu. Choose TDFA60250 from the "Product Model" list and select the serial number from the "Detected devices" list, then click the Open button.
- The measured values will be displayed in real-time on the graph.

### 4. Controlling TDFA60250

TDFA60250 is controlled using the "TD-USB" command. "TD-USB" is a command-line program that can be executed on Windows or Linux. To obtain TD-USB, please search for the keyword "TDFA60250" on the Tokyo Devices website or download it from the GitHub repository:

Tokyo Devices Web: <https://en.tokyodevices.com/>

TD-USB GitHub Repository: <https://github.com/tokyodevices/td-usb/>

#### 4.1. Basic Usage of the TD-USB Command

The options for the TD-USB command are as follows:

```
> td-usb tdfa60250 (operation) [options]
```

The first argument `tdfa60250` is a fixed string representing the target product model. The second argument `(operation)` is a fixed string representing a specific operation. Specify `options` as needed.

#### 4.2. Obtaining Measurement Values

```
> td-usb tdfa60250 get  
4.3149
```

The `get` operation is used to read values from the device. Upon successful value retrieval, a single line containing a numerical value in volts (V) is returned to the standard output.

You can obtain values repeatedly by specifying the `--loop=N` option, where N is a numerical value representing the retrieval interval in milliseconds. The following example outputs current values to the standard output every 3 seconds:

```
> td-usb tdfa60250 get --loop=3000
3.14159
3.14159
3.64822
```

The `get` operation may experience delays due to the communication status of the USB bus (typically ranging from tens of milliseconds to seconds in the case of Windows). If you require the fastest data retrieval, consider using the `listen` operation described below.

### 4.3. Real-Time Current Value Retrieval

By specifying the `listen` operation, data is written to the standard output at the highest speed (1,000 samples per second). In one `listen` operation, 30 data points are obtained. If you wish to continuously retrieve data, use the `--loop` option. The following example displays data indefinitely. To stop it from the command line, press the Ctrl and C keys.

```
> td-usb tdfa60250 listen --loop
3.14159
3.14159
3.14159
...
```

The following commands will write all the data to a text file, which can be imported into Excel or other software for analysis.

```
> td-usb tdfa60250 listen --loop > output.txt
```

### 4.4. Identifying Multiple TDFA60250 Units

You can connect multiple TDFA60250 units to a single PC. Each TDFA60250 is assigned a unique serial number at the time of shipment. By specifying the serial number in the TD-USB command, you can specify which unit to operate.

```
> td-usb tdfa60250 list
XXXXXXXXXXXXXXXX,YYYYYYYYYYYYYY
> td-usb tdfa60250:XXXXXXXXXXXX get
3.14159
```

The `list` operation of the TD-USB command allows you to retrieve the serial numbers of multiple units connected to a single computer. Serial numbers are output with commas as separators for each recognized unit. If no devices are discovered, a blank line is output. To specify the unit you want to operate on, you should use the fixed string `tdfa60250` followed by a colon and the serial number. Serial numbers are case-sensitive.

## 4.5. Calibration

TDFA60250 can be calibrated (single-point calibration). The calibration process is as follows:

1. Prepare a precise DC power supply that can output exactly 4V and connect it to the TDFA60250.
2. Use the `get` operation with the `--format=raw` option to obtain the calibration value.
3. Set the calibration value using the `set` operation.
4. Write the calibration value to the non-volatile memory of the device using the `save` operation.

Here is the command example for the calibration process:

```
> td-usb tdfa60250 get --format=raw
3277
> td-usb tdfa60250 set CALIBRATION=3277
> td-usb tdfa60250 save
```

The `--format=raw` option is a fixed string used to obtain the calibration value. It is case-sensitive. In the example above, the calibration value of 3277 is obtained. The option `CALIBRATION=3277` in the `set` operation is the string used to set the calibration value. It is also case-sensitive. Please note that if you don't perform the `save` operation, the calibration value will not be applied the next time the power is turned on.

You can integrate TDFA60250 into your custom applications by invoking the TD-USB commands as external processes or external programs. The method for integrating with external processes is documented in the TD-USB README, as well as in the reference manuals and developer guides for various programming languages. Please refer to these resources for more information on how to integrate TDFA60250 into your custom applications.

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