

Virtual Instrument - User Manual

Version 1100

Martin Cejp

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1 Introduction

This virtual instrument enables measurement of signal frequency, period, duty cycle, as well as the ratio of two frequencies and the phase shift between two signals.

The complete solution was developed at Laboratory of Videometry, Department of Measurement, Faculty of Electrical Engineering, Czech Technical University in Prague under the supervision of doc. Ing. Jan Fischer, CSc.

2 Installation

The application is provided in source and binary (Windows 32-bit) packages. When using the binary build, the application itself doesn't require any installation. However, depending on the operating system used, it may be necessary to install a hardware driver. The supported operating systems are summarized in table 1.

Operating system version	Binary build provided	Driver installation necessary
Windows XP	yes	yes(2.1)
Windows Vista/7/8/8.1	yes	maybe(2.2)
Windows 10 or later	yes	none
macOS 10.12 or later	no	none
Linux 3.0 or later	no	permissions, see (2.3)

Table 1: Supported operating systems

2.1 Installation on Windows XP

Windows XP doesn't ship with a USB CDC driver. It is recommended to use the software package provided at <http://www.st.com/en/development-tools/stsw-stm32102.html>. After installing this package, the device should be recognized automatically.

2.2 Installation on Windows Vista/7/8/8.1

Windows Vista should automatically install the required driver provided by STMicroelectronics through Windows Update.

2.3 Installation on Linux

No driver is required on Linux-based systems, however it may be necessary to add a Udev rule to make the device accessible to non-root users.

The location of Udev configuration varies with distribution. For example, on Fedora 25 a file can be created at `/etc/udev/rules.d/99-universalcounter.rules` with the following contents:

```
SUBSYSTEMS=="usb", ATTRS{idVendor}=="0483", ATTRS{idProduct}=="5740", \
    ENV{ID_MM_DEVICE_IGNORE}="1", \
    MODE:="0666"
```

This ensures that the operating system will not attempt to use the device as a data modem and that the device will be available to all users.

3 Usage

3.1 Pin configuration - F042 Nucleo-32

The pins on the board are designated as follows:

Pin	MCU port	Type	Meaning
D2		I/O	USB D+
D10		I/O	USB D-
A3	PA4	Output	PWM A
A6	PA7	Output	PWM B
D7		Clock	Crystal - optional
D8		Clock	Crystal - optional
GND		Power	USB ground

Additionally, depending on the selected measurement mode, additional signals need to be connected:

Pin	MCU port	Counting mode	Reciprocal mode	Interval mode	Frequency ratio mode
A0	PA0	Measured signal	Measured signal	Channel A	Signal A
A1	PA1	–	Measured signal	Channel B	–
A5	PA6	–	–	–	Signal B

3.2 Pin configuration - F042 TSSOP20

The pins on the board are designated as follows:

Pin number	Type	MCU port	Meaning
1	Input		Boot mode selection - tie to GND
10	Output	PA4	PWM A
13	Output	PA7	PWM B
15	Power		GND, USB ground
16	Power		3.3v
17	I/O		USB D-
18	I/O		USB D+
	OSC		

Additionally, depending on the selected measurement mode, additional signals need to be connected:

Pin number	MCU port	Counting mode	Reciprocal mode	Interval mode	Frequency ratio mode
6	PA0	Measured signal	Measured signal	Channel A	Signal A
7	PA1	-	Measured signal	Channel B	-
12	PA6	-	-	-	Signal B