



# UCAB232i

USB-RS232 Converter with  
Galvanic Isolation



**Reference Manual**

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# 1

## UCAB232i

Thank you for buying our product. If you have any question, please do not hesitate to contact our technical support.

### 1.1 Package Contents

- UCAB232i Converter
- CD-ROM with Drivers and User Guide
- Leaflet

### 1.2 Features

UCAB232i is a completely galvanically isolated USB to RS-232 converter suitable for connection vast majority of both industrial and commercial RS232 devices to PC using USB port.

- Full RS-232 implementation
- Inputs with improved immunity to interference suitable for industrial applications
- High communication speed
  - 250 kBaud guaranteed
  - more than 500 kBaud typically
- Unrivalled galvanic isolation
  - 5000 V DC / 1 sec.
  - 2600 V AC / 1 min.
  - 560 V RMS / no limit

- Enhanced ESD protection of all inputs
  - $\pm 15$  kV air discharge HBM
  - $\pm 8$  kV contact discharge HBM
- Extended temperature range -40 °C to +85 °C
- Enhanced durability to environmental influences
- USB 2.0 Full Speed (12 Mbps)
- LED indication for transmission and reception
- Drivers for Windows and Linux
  - for OEM application, proprietary ID can be used
- Small and compact enclosure

### 1.3 Quick Start

It is necessary to install drivers before first use.

#### 1.3.1 Windows

Please insert USB plug connector of your UCAB232i converter into PC USB port. The drivers are installed automatically from Microsoft update server.

#### 1.3.2 Linux

LINUX kernel 2.6.31 or newer includes required drivers and there is no need to install them.

### 1.4 How to use the UCAB232i converter

UCAB232i provides user with a galvanically isolated RS-232 port on PC equipped with a USB port.

The converter is designed for using with all ordinary devices with RS-232 port such as PC mouse, data modem, data terminal, Smart-Card reader, serial printer. With regard to top quality galvanic isolation, the UCAB232i

converter is dedicated for high demanding industry or automotive applications.

After installation the drivers a new COM port device will be ready to use by software applications in standard fashion (e.g. Win32 API function calls).

It is possible to set up the UCAB232i COM port number in the control panels.

## 1.4.1 RS-232 interface

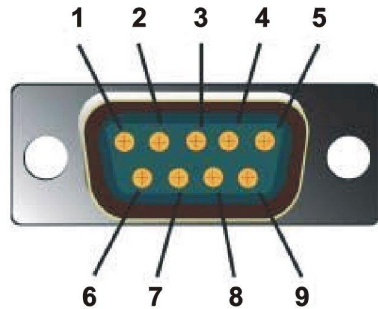


Fig.2: DB9, pins

UCAB232i provides all RS-232 signals.

The description of RS-232 signals is given below in the table:

Pin	Name	I/O	Description
1	DCD	IN	Data Carrier Detect
2	RD	IN	Receive Data
3	TD	OUT	Transmit Data
4	DTR	OUT	Data Terminal Ready
5	SG	PWR	Signal Ground
6	DSR	IN	Data Set Ready
7	RTS	OUT	Request to Send
8	CTS	IN	Clear to Send
9	RI	IN	Ring Indicator

Table 1: RS-232 signals description

## Data rate

The guaranteed data rate is within the range of 300 Baud to 250 kBaud.

With regard to very high speed optocouplers, the UCAB232i converter allows to communicate typically over 500 kBaud. However, this data rate is not guaranteed and could depend on temperature and an external signal quality.

## 1.4.2 LED indicators

UCAB232i is equipped with two LED indicators.

Red LED: data are being sent from PC to a RS-232 connected device

Green LED: data are being sent from a RS-232 connected device to PC

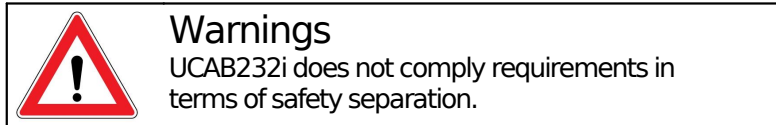
## 1.4.3 Standby

The UCAB232i converter fully supports PC standby mode (sleep).

## 1.4.4 Galvanic isolation

The UCAB232i converter provides unrivalled galvanic isolation which protects PC from an application voltage within of these limits

- 5000 V DC for period max. 1 sec.
- 2600 V AC for period max. 1 min.
- 560 V RMS without any time limits



Although, technically, the UCAB232i converter assures galvanic isolation within of limits listed above it does not comply requirements in terms of safety separation according to EN 60730-1 standard. ASIX s.r.o. is not liable for any damage caused due to any inappropriate use.

## 1.4.5 Resistance to external influences

UCAB232i is designed and produced with regard to maximum resistance to external influences. The operating temperature range is between -40 °C to +85 °C. Very low temperatures can cause a rigidity of the USB cable, in this case handle with care. For improving characteristics, special covering passivation has been applied to PCB of your UCAB232i converter.

The converter complies the IP50 specification.

## 1.4.6 Compact enclosure

Compact design of the UCAB232i converter enclosure with 1 meter cable is most suitable for connection to any RS-232 device.

UCAB232i is supplied without screw locks on DB9 connector because some applications do not support them. On special request it is possible to supply the UCAB232i converter with screw locks included.

# 1.5 Technical Specification

## 1.5.1 Absolute Maximum Ratings

Operating temperature	min. -40 °C	max. +85 °C
Storage temperature	min. -55 °C	max. +85 °C
Active USB current	max. 100 mA	
All input voltages to signal ground	±25 V	
All output voltages to signal ground	±13 V	
USB to RS-232 isolation	5 kV DC / 1 sec.	
	2.6 kV AC / 1 min.	
	560 V RMS / no limit	
ESD immunity	±8 kV contact HBM	
	±15 kV air HBM	
	±15 kV Human Body Model	
Electric Field Immunity	10 V / m	

Table 2: Absolute Maximum Ratings

## 1.5.2 Operating Specifications

Minimum data rate	300 Baud
Maximum data rate	250 kBaud guaranteed, 500 kBaud typically
Input Treshold Low RS-232	min. 0.8 V, typ. 1.5 V
Input Treshold High RS-232	max. 2.4 V, typ. 1.8 V

Output voltage Swing <sup>1</sup>	min. ±5 V, typ. ±5.4 V
Short-circuit tolerance	No limit
Short-circuit current	maximum ±60 mA
Operating system	Windows <sup>2</sup> 32/ 64-bit
	Linux 1.5.0 32/64-bit
	MAC OS 10 32/64-bit
	Windows CE <sup>3</sup>
RS-232	full implementation
RS-232 connector	DB9
USB 1.1 a 2.0 compatibility	yes, 12 Mbps (Full Speed)
USB connector	A type
Length of USB cable	1 m
Transmit indicator	red LED
Receive indicator	green LED

Table 3: Operating Range

<sup>1</sup> Outputs Loaded with 3 kΩ.

<sup>2</sup> Windows 8, Windows 7, Windows Server, Windows Server 2003, Windows Vista, Windows XP. Compatible with 32/64 bit. version.

<sup>3</sup> Windows Mobile 2003, Windows Mobile 2003 SE, Windows Mobile 5, Windows Mobile 6, Windows Mobile 6.1 ,Windows Mobile 6.5

## 1.5.3 Certificates

CE	EN 55022 ed.3:2011
	EN 55024 ed.3:2011
Immunity	EN61000-4-2, class B
	EN61000-4-3, class A   10 V/m
	EN61000-4-8, class A
	EN55024, class A

Table 4: List of certificates



No. of pages: 10  
No. of annexes/No. of an. pages: /  
Ref.: Pa

**ELECTROTECHNICAL TESTING INSTITUTE**  
Pod Liseňm 129  
171 02 Praha 8 - Troja

No. of the Test Report: 104880-01/01



Issued: 9.2.2012

### TEST REPORT

**Name of product:** USB - RS232 Converter  
**Type of product:** UCAB232i  
**Ratings:** Power over USB  
**Serial number:**  
**Manufacturer:** ASIX s.r.o. Staropramenná 397/4, 150 00 Praha 5, Czech Republic  
**Production site:** dtto  
**EZÚ product coding system:** 105001 - other services  
**Ordering firm:** ASIX s.r.o. Staropramenná 397/4, 150 00 Praha 5, Czech Republic  
**Number of tested samples:** 1  
**Samples submitted on:** 16.1.2012  
**Location of testing:** EZÚ  
**Tested from** 16. January **through** 6 February 2012  
**Other data:**  
**The product was tested according to:** EN 55022 ed.3 :2011  
 EN 55024ed.3:2011

The test results contained in this report refer to the tested items only. The values presented in this report were measured with the accuracy specified in the testing regulations. All measuring instruments used are properly traceable.

This Report shall not be reproduced except as a whole.

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Fig.3: CE certificate



# 2

## DRIVERS

In this chapter, we will discuss drivers installation, drivers updating and specific COM port setting requirements.

### 2.1 Drivers Installation

#### 2.1.1 Windows operation system

The driver installation runs automatically from Windows Update. In case the computer is not on the internet, it is possible to download the drivers from FTDI corp. ([www.ftdichip.com](http://www.ftdichip.com)) and install them manually in the device manager.

**Notes:**

It is possible to set up the converter COM port number in the control panels.

#### Windows 7 and newer

With Windows 7 operation system drivers are installed automatically from Microsoft update server every time the UCAB232i converter has been inserted into USB port. The successful installation is indicated by a message.

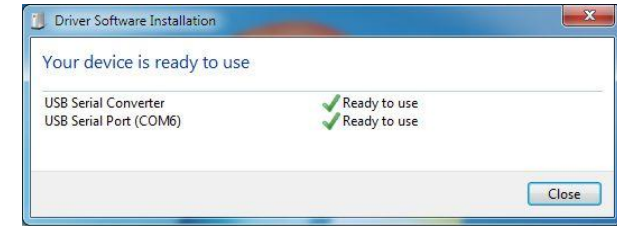


Fig.4: Drivers installation

#### Windows XP

When a new device has been detected by operating system it is necessary to agree searching the drivers on the Windows Update and continue with automatic installation. The installation continues then in two steps, first the converter driver and then the virtual COM port driver are being installed. After the installation the UCAB232i converter is ready for use.

#### 2.1.2 Linux operation system

LINUX kernel 2.6.31 or newer includes required drivers and there is no need to install them. If you use operation system based on that kernel, the UCAB232i converter will simply start to work when it has been inserted into USB port.

### 2.2 Drivers Update

UCAB232i is based on FTDI IC, FTDI Chip company [www.ftdichip.com](http://www.ftdichip.com) steadily updates drivers for their ICs. To keep your drivers updated follow this chapter.

#### 2.2.1 Windows 7

Signed drivers are automatically downloaded from Microsoft update server when the UCAB232i converter has been inserted into USB port. Every time operation

system is being updated, drivers are kept updated, too.

Another way how to update drivers in Windows 7 is very complicated or rather impossible.

## 2.2.2 Windows XP

Windows XP drivers are stable for a long time, thus there is usually no reason for update them with the exception that another software application using FTDI IC on the same PC requires it. In that case, drivers are available for download at [www.ftdichip.com](http://www.ftdichip.com)

## 2.3 Troubleshooting and Special Requirements

Some of applications have special requirements for RS-232 communication, which demand particular correct settings of the UCAB232i converter.

If there is any difficulty in communication between the RS-232 connected device and PC try options listed below.

Red LED indicates transmitting, it can serve as a check on that software application sends data to a correct PC port. In other case, please check the COM port number in software application and the assigned COM port number by operating system.

The COM port number can be found and/or changed in Control Panel/Device Manager/Ports.

If the RS-232 connected device does not reply (LED indicator does not blink) although software application sends data, it is possible that there is not correctly set „Baud rate“ (communication speed), „Data bits“, „Parity“, „Stop bits“ or „Flow control“. Please check that the settings meets specification of the RS-232 connected device.

## 2.3.1 High demands on time response

If the connected device replies (LED indicator blinks) but software application still does not receive data it is possible that the software application has high demands on time response.

The way of communication through USB is very different than communication through RS-232. USB uses packets of 64 B size. Furthermore, a RS-232 device can receive only on PC request. Hence it is almost impossible to assure time response lower than about 1 ms.

Time response settings can be done in Control Panel/Device Manager/Ports/.../Port Settings/ /Latency Timer. In case of troubles set this number to 1 ms.

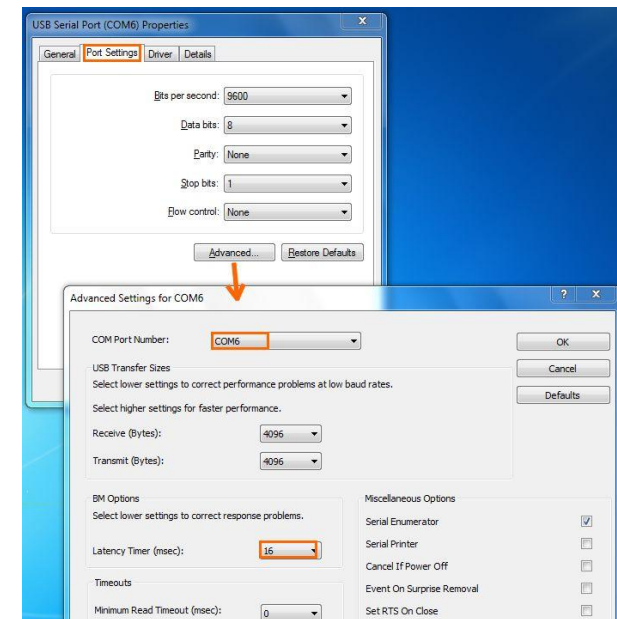


Fig.5: COM port Enhanced Settings

## 2.4 User OEM Application

The \$UCAB converter allows user to design an OEM application after which the converter is found and listed as a customer hardware.

For doing this, it is necessary to modify drivers, particularly, to change the UCAB232i converter VID and PID, which are originally set to 0403 / 6001, to customer numbers and write these numbers with the FT\_PROG utility to the converter EEPROM.

Before a modification of EEPROM it is advisable to create a backup of EEPROM in case there is any trouble with VID/PID identifiers.

For smooth installation of modified driver on Windows 7 a newer the digital sign of the driver will be requested. For more information about driver sign see the web pages of Microsoft corporation.

# 3

## Document history

Document revision	Modifications made
2014-05-29	Newly created document
2014-06-11	Drivers section updated