



UCAB232i

USB-RS232 Converter with
Galvanic Isolation



Reference Manual

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UCAB232i

UCAB232i is a USB to RS232 converter with galvanic isolation. Using the UCAB232i converter it is possible to connect the most of RS232 devices to a USB port of a computer.

Thanks to the galvanic isolation the UCAB232i is suitable for industrial, automotive or commercial applications (e.g. mice, modems, data terminals, SmartCard readers, serial printers, measuring instruments with a serial port, industrial applications, etc.).

1.1 Package Contents

- UCAB232i Converter
- Leaflet

1.2 Features

- Galvanic isolation:
 - 5000 V DC / 1 sec.
 - 2600 V AC / 1 min.
 - 560 V RMS / no limit
- Enhanced ESD protection of all inputs
 - ±15 kV air discharge HBM
 - ±8 kV contact discharge HBM
- Extended temperature range: -40 °C to +85 °C
- Enhanced durability against environmental influences
- Full RS232 implementation
- Based on FT232R
- Communication speed:
 - 300 Baud - 250 kBaud, typ. to 500 kBaud
- Powered from USB
- Standard 9-pin SubD connector
- Receive buffer: 256 Byte
- Transmit buffer: 128 Byte
- Full hardware flow control using RTS/CTS, DTR/DSR, DCD, RI, hardware assisted XON/XOFF
- USB 1.1 and USB 2.0 compatible
- Possibility to customize VID, PID and its text ID for OEM products
- Drivers for Windows, Linux and Mac OS
- Low consumption mode support (USB suspend mode)
- Cable length: 1 m

1.3 Usage

After connection the UCAB232i to a computer and installing its drivers (see chapter Drivers) there will be added a new COM port to the operating system. The port can be accessed the standard way (e.g. using Win32 API functions).

It is possible to set the UCAB232i COM port number in the port properties in the Device manager.

1.3.1 RS232 interface

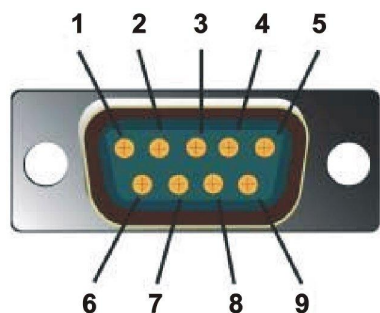


Fig. 2: DB9, pins

UCAB232i provides all RS232 signals.

The description of RS232 signals is given in the following 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: RS232 signals description

Data rate

The data rate is within the range of 300 Baud to 250 kBaud, the converter is typically able to communicate faster but this cannot be guaranteed. The usability for higher speeds can depend on temperature and signal quality of the connected device.

1.3.2 LED indicators

UCAB232i is equipped with two LED indicators.

Red LED: data are being sent from PC to a RS232 connected device

Green LED: data are being sent from a RS232 connected device to PC

1.3.3 Standby

The UCAB232i converter supports PC standby mode (sleep).

1.3.4 Galvanic isolation

The UCAB232i galvanically isolates both ports (USB, RS232) which protects the computer against the voltage of the device on the RS232 side with these limits:

- 5000 V DC maximally for 1 sec.
- 2600 V AC maximally for 1 min.
- 560 V RMS without any time limit

	Warnings UCAB232i does not comply with requirements in terms of safety separation.
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Although, technically the UCAB232i converter assures the galvanic isolation within the limits listed above it does not comply with 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.

1.3.5 Durability to external influences

UCAB232i is designed and produced with regard to maximum durability to external influences. The operating temperature range is between -40 °C and +85 °C. In very low temperatures the cable becomes rigid, in such a case it has to be handled very carefully.

To improve characteristics a special passivation coat has been applied to the PCB of the converter.

The converter has been designed to comply with the IP50 specification.

1.4 Technical Specification

1.4.1 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 RS232 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

1.4.2 Operating Specifications

Minimum data rate	300 Baud
Maximum data rate	250 kBaud guaranteed, 500 kBaud typically
Supply current	typ. 76 mA, in idle typ. 65 mA
Supply current in sleep	typ. 50 mA
Input Treshold Low RS232	min. 0.8 V, typ. 1.5 V
Input Treshold High RS232	max. 2.4 V, typ. 1.8 V

Output voltage Swing ¹	min. ±5 V, typ. ±5.4 V
Short-circuit tolerance	No limit
Short-circuit current	maximum ±60 mA
Operating system	Windows ² 32/ 64-bit
	Linux 1.5.0 32/64-bit
	MAC OS 10 32/64-bit
	Windows CE ³
RS232	full implementation
RS232 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
IP Code	IP50

Table 3: Operating Range

- ¹ Outputs Loaded with 3 kΩ.
- ² Windows 10, Windows 8, Windows 7, Windows Server, Windows Server 2003, Windows Vista, Windows XP. Compatible with 32/64 bit. version.
- ³ Windows Mobile 2003, Windows Mobile 2003 SE, Windows Mobile 5, Windows Mobile 6, Windows Mobile 6.1 ,Windows Mobile 6.5

1.4.3 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



ELECTROTECHNICAL TESTING INSTITUTE
Pod Lisem 129
171 02 Praha 8 - Troja

No. of pages: 10
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Ref.: Pa

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: ditto
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

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DRIVERS

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

2.1 Drivers Installation

2.1.1 Windows

Drivers installation runs automatically from Windows Update. In case the computer is not on the Internet the drivers have to be manually installed same as for older Windows versions.

Note:

It is possible to set the converter COM port number in the Device manager.

Windows 7 and newer

With Windows 7 and newer the drivers are automatically installed from Windows Update after the UCAB232i cable has been connected to USB port. A message shown after the installation reports that the cable is ready to use.

Windows 10 does not show this message.

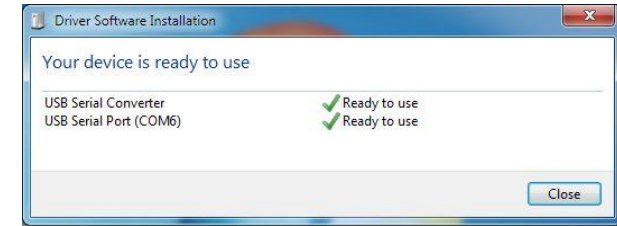


Fig. 4: Drivers installation

The drivers update automatically when the operating system updates.

Older Windows versions

In case of older Windows versions where the drivers do not install automatically they have to be downloaded from FTDI web (<https://www.ftdichip.com>).

Use VCP drivers (= Virtual COM Port).

The downloaded drivers have to be unpacked somewhere and when the system finds the cable as a new device the path to the unpacked drivers has to be provided to the installer. Or the drivers can be manually installed in the Device manager.

The installation is a two steps process, first it installs the converter driver then it installs the virtual COM port driver.

After the drivers are installed the cable is ready to use.

2.1.2 Linux

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

There is a `ftdi_sio` module. Most of GNU/Linux distributions is supplied with compiled `ftdi_sio` module. The module version has to be 1.6.0 or newer. In most distributions the `ftdi_sio` module is automatically loaded after the cable has been connected to a USB port.

2.2 Troubleshooting and Special Requirements

Some applications have special requirements for RS232 communication because of which the cable has to be particularly configured.

If there are difficulties in communication between the RS232 connected device and the PC there are several things to be checked.

Using the red LED it can be checked that the software application sends data on the correct PC port.

When the red LED is not blinking, no data are being transmitted by the software. This can happen when the application sends data to a different COM port number.

The COM port number can be checked and modified in the Ports section of the Device manager.

When the software sends some data but the connected device does not reply (green LED is not blinking), 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 connected device.

2.2.1 Short time response needed

If the connected device replies (green LED indicator blinks) but software application still does not receive data it is possible that the application needs shorter time response.

The USB communication works a different way than the RS232 communication. USB sends 64 B long packets. Furthermore, the device connected on the RS232 side can send its response only on the PC request. Because of this it is very difficult to achieve the response time under 1 ms.

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

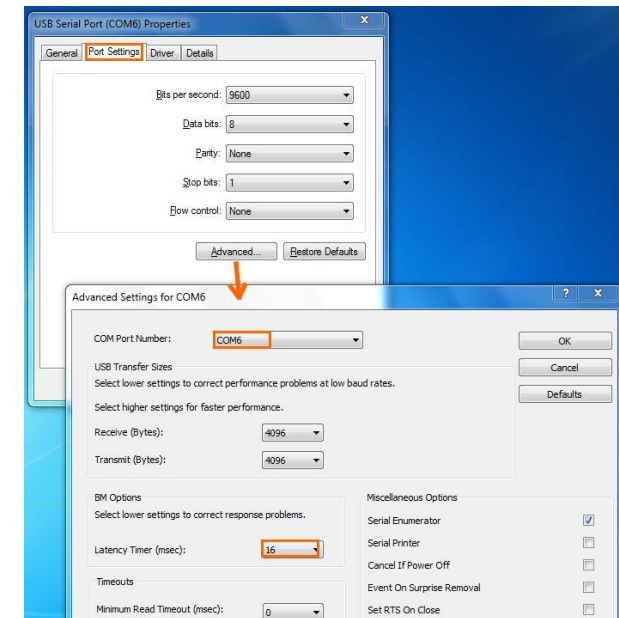


Fig. 5: COM port Enhanced Settings

2.3 User OEM Application

The UCAB232i converter enables user to make an OEM application, then the converter is reported as a customer hardware.

To do this the drivers have to be modified to change the converter VID and PID, which are originally set to 0403 / 6001, to customer numbers and using FT_PROG utility to write these numbers to the converter EEPROM.

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

For smooth installation of the modified driver on

Windows 7 and later the driver will have to be digitally signed. For more information on drivers signing see Microsoft web.

In Linux, the new VID and PID parameters have to be supplied to the ftdi_sio module when it is loaded.

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Document history

Document revision	Modifications made
2014-05-29	Newly created document.
2014-06-11	Drivers section updated.
2021-01-04	Manual updated, address updated.
	Drivers chapter was updated.