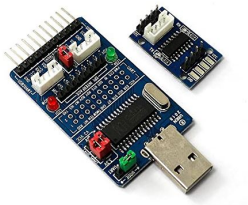

COPTONIX RS232 I2C Adapter User Manual

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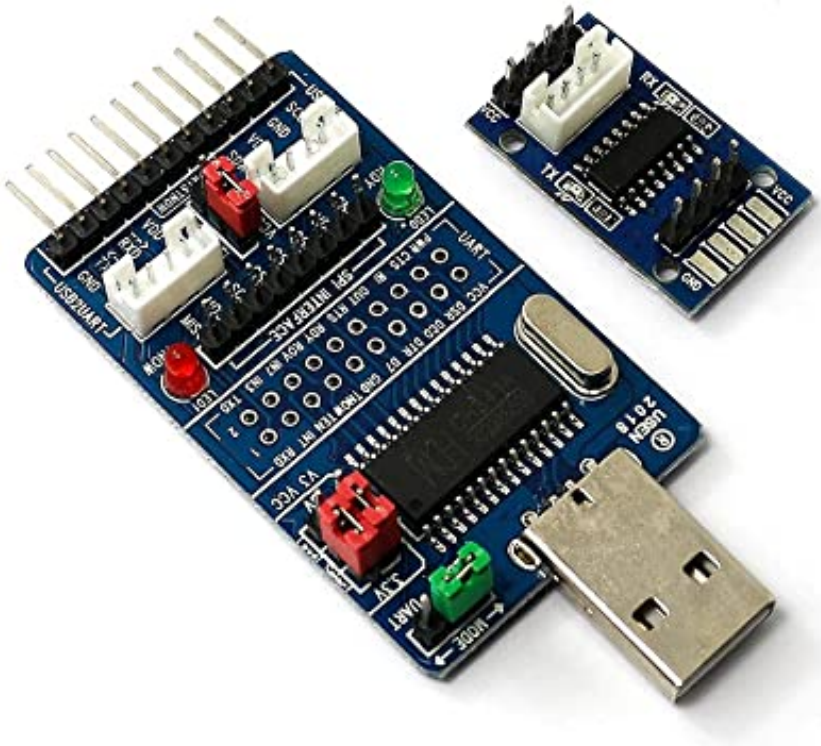


Introduction

The RS232 I2C Adapter is a universal applicable I2C-tool with 128 bytes of buffer and an SCL frequency up to 400 kHz. With the RS232 I2C Adapter as master, numerous bus participants can be addressed such as IOExpander, sensors, LCDs, 7-segment display, stepping motors, AD/DA converters, and real-time clocks, tone generators, RAM, EEPROMs, etc. The Tool is ideally for the developer, who would like to develop and/or test-own I2C circuits. The SCL frequency can be adjusted between 15 – 400 kHz. The frequency depends on the Adapter's type.

- 200kHz: SCL-frequency adjustable between 8 and 200kHz. Needs an external power supply of 5V.
- 400kHz: SCL-frequency adjustable between 12 and 400kHz. Needs an external power supply of 5V.
- LowPower: SCL-frequency adjustable between 1 and 100kHz. No separate power packs for voltage supply are needed. The power supply is provided from the RS232- Interface (DTR & RTS). Typical power consumption of about 5mA.

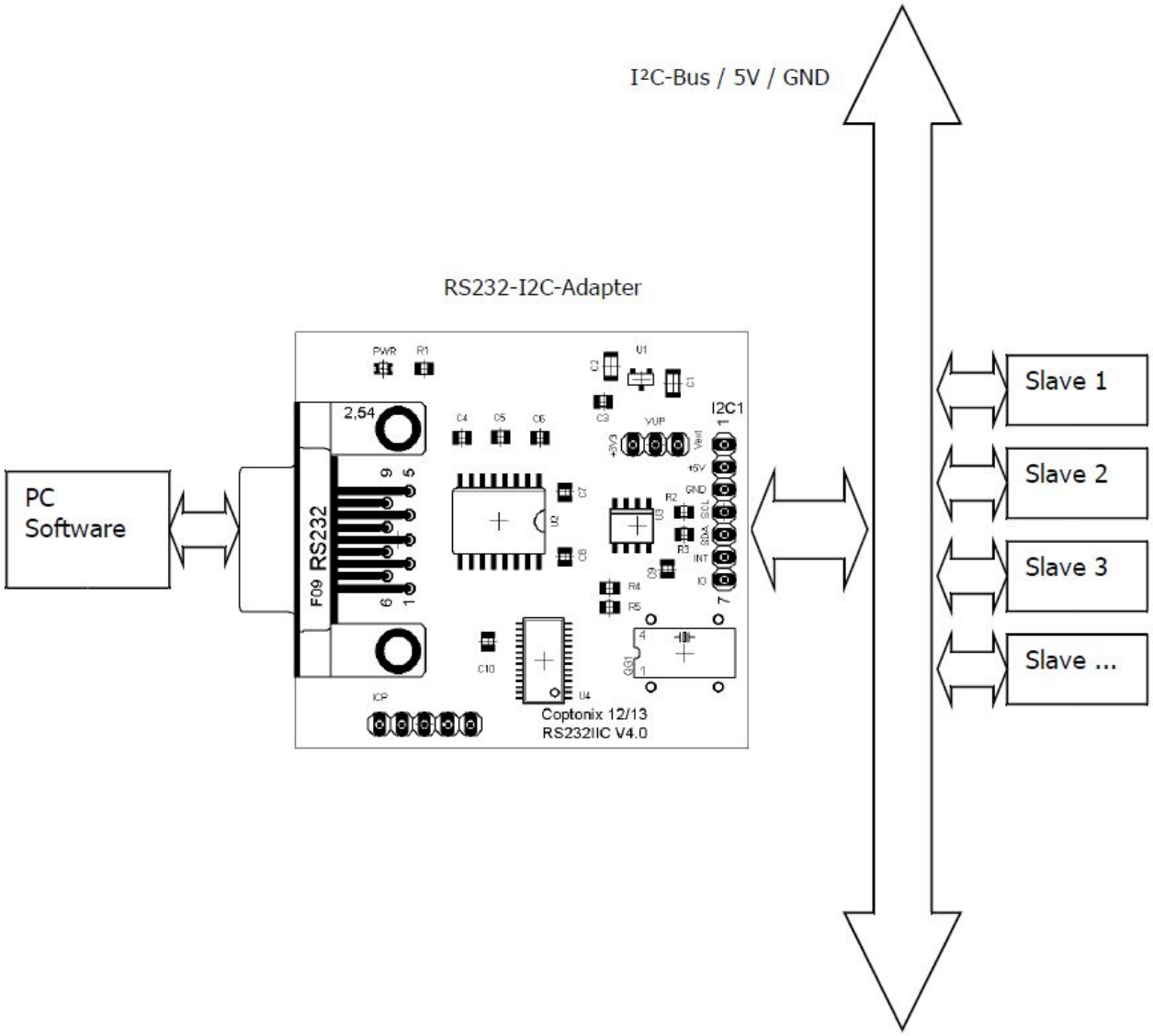
The adapter (only 200 & 400 types) contains an I2C level shifter on board. Thus, it is possible to connect the adapter to an I2C bus having different voltage levels between 2V and 15V. The software interface allows communication without drivers or other software. It is possible to communicate with the adapter using Windows API functions such as CreateFile(), WriteFile() and ReadFile(). A simple software interface (ASCII commands) is available. Some of the software Tools are for the developer very helpfully. Thus it is possible to test immediately I2C devices. The software "IIC Control" supports EEPROMS of 1kbit (128 bytes) to 1Mbit (128k byte).

Features

- RS232 Sub-D
- Configurable I2C frequency 8Hz – 400kHz
- adjustable duty cycle (SCL-frequency)
- Onboard I2C level shifter, I2C levels from 2V to 15V
- supports multi-master

- Master transmit & receive
- supports clock streching
- 7bit addressing

  Interrupt input for external events
- Simple software interface / ASCII commands
- Labview VIs



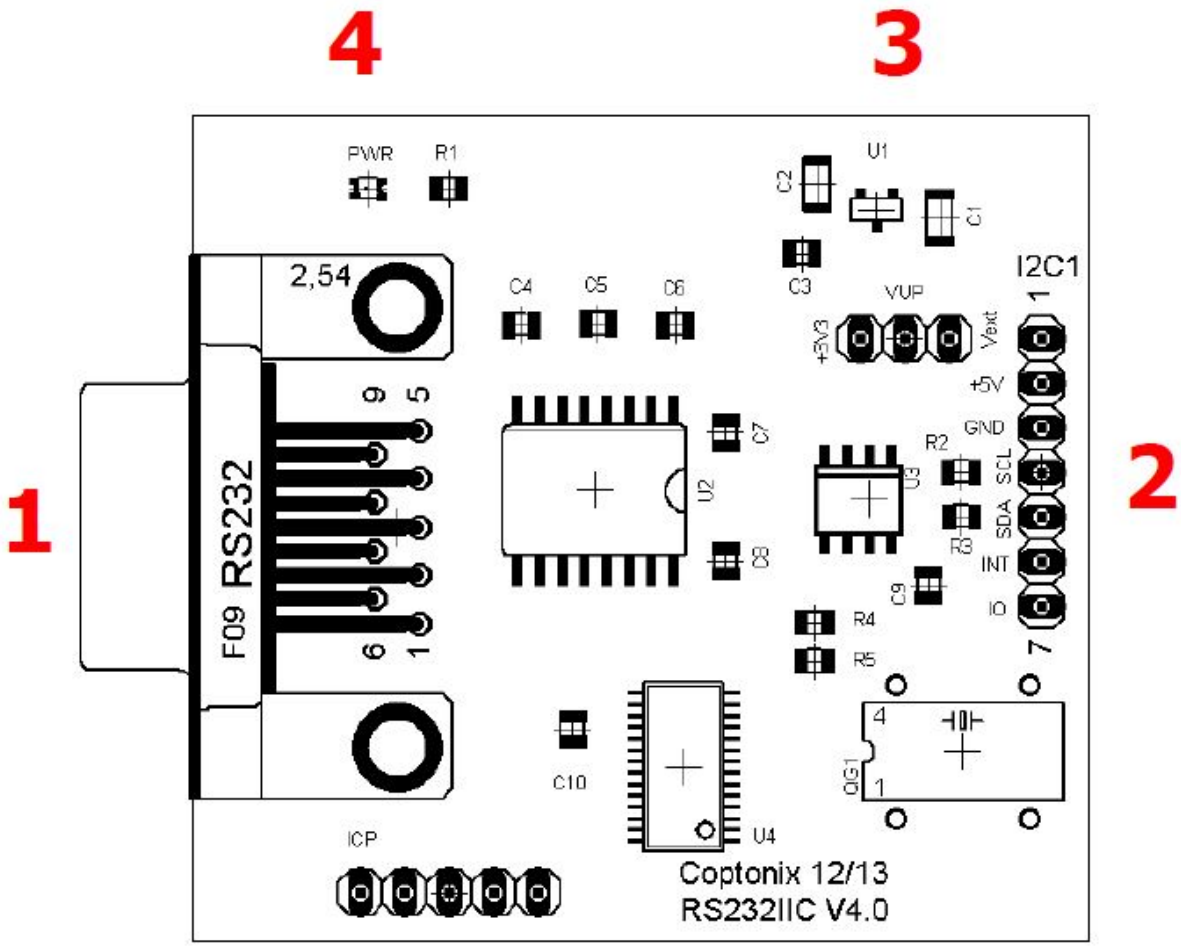
Interface

(200kHz und 400kHz Adapter)

- 1 RS232 port for communication with a PC (RxD, TxD, GND)
- 2 I²C-Interface
  - Pin 1: External pull-up voltage Vext (2V – 15V)
  - Pin 2: Supply voltage +5V
  - Pin 3: Ground
  - Pin 4: I2C – SCL
  - Pin 5: I2C – SDA
  - Pin 6: Interrupt – Input 1
  - Pin 7: Not used

- Header strip / 2.54 pitch

- 3 Jumper VUP – Vpull-up Pull-up voltage
  - Pin 1: +3.3V
  - Pin 2: Vpull-up ; connected to pull-up resistors (4K7)
  - Pin 3: External pull-up voltage
  - Position 1-2: connects pull-up voltage to internal +3.3V Position 3-2: connects pull-up voltage to external pull-up voltage.
- 4 LED Power-ON



(LowPower Adapter)

- 1 D-SUB 9 female RS232-Interface
  - Pin 1: Not connected
  - Pin 2: TxD
  - Pin 3: RxD
  - Pin 4: DTR (power supply) Pin 5: GND
  - Pin 6: Not connected
  - Pin 7: RTS (power supply) Pin 8: Not connected
  - Pin 9: Not connected
- 2 D-SUB 9 male
  - I²C-Interface
  - Pin 1: GND

- Pin 2: I2C – Clock (SCL)
- Pin 3: I2C – Data (SDA)
- Pin 4: Interrupt-Input Pin 5: Not connected
- Pin 6: Not connected
- Pin 7: Not connected
- Pin 8: Not connected
- Pin 9: Not connected

Characteristics

(200kHz und 400kHz Adapter)

	Min.	**Typ**	**Max.**	**Unit**
Power-Supply				
Supply Voltage	5.0			V
Supply Current		12	15	mA
I2C-Bus pins (SCL, SDA)				
Vext External Pull-up Voltage	2	–	15	V
VIH High-State Input Voltage	0.58Vpull-up	–	–	V
VIL Low-State Input Voltage	–	–	0.42Vpull-up	V
Limiting values				
Interrupt pins				
Input Voltage	0	–	5.5	V
Output Voltage	0	–	VDD(3,3V)	V
Power-Supply				
Supply Voltage	4.0	5.0	6.0	V
Temperature				
operating temperature	0	–	+70	°C

(LowPower Adapter)

	Min.	Typ	Max.	Unit
Power-Supply				
Supply Voltage	RS232-powered			V
Supply Current		4	5	mA
I2C-Bus pins (5V tolerant I/O pins)				
VIH High-State Input Voltage	0.7VDD(3,3V)	–	–	V
VIL Low-State Input Voltage	–	–	0.3VDD(3,3V)	V
Limiting values				
I/O pins (SCL, SDA, Interrupt)				
Input Voltage	0	–	5.5	V
Output Voltage	0	–	VDD(3,3V)	V
Power-Supply				
Supply Voltage	4.5	–	24.0	V
Temperature				
operating temperature	0	–	+70	°C

Software interface

Function	Code			Description		
	Hex	Char	Parameter	CMD + Data (->RS232)	answer (<- RS232)	
Write I2C	0x77	w	SlvAddr, data (d1 .. d128), CheckSum	**'w'**+**SA**+**' XXYY..'**+**CS**+<CR>	**'77'**+**'01'+SA+CS+**<CR>	successfully written
					'77'+**'00'+SA+CS+**<CR>	read error
Read I2C [1]	0x72	r	SlvAddr, Cnt (Number of bytes to read) , CheckSum	**'r'**+**SA**+**Cnt**+**CS**+<CR>	**'72'**+**'01'**+**SA**+**CS**+<CR> **'64'**+**SA**+**'XXYY….'**+**Cnt**+**CS**+<CR>	successfully read data packet
					'72'+**'00'**+**SA**+**CS**+<CR>	read error
Read I2C [2]	0x52	R	SlvAddr, Cnt (Number of bytes to read) , CheckSum	**'R'**+**SA**+**Cnt**+**CS**+<CR>	**'52'**+**'01'**+**SA**+**'XXYY….'+Cnt+CS**+<CR>	successfully read
					'52'+**'00'+SA+CS+**<CR>	read error
Write Read I2C [2] (Repeated Start)	0x57	W	SlvAddr, Cnt (Number of bytes to read), data (d1 .. d128) , CheckSum	**'W'**+**SA+Cnt+'XXYY..'+CS**+<CR>	**'57'**+**'01'**+**SA**+**'XXYY….'+Cnt+CS**+<CR>	write/read Ok
					'57'+**'10'+SA+CS+**<CR>	write error
					'57'+**'20'+SA+CS+**<CR>	read error
					'57'+**'30'+SA+CS+**<CR>	unkown error

Check SlvAdr	0x 63	c	SlvAddr, CheckSum	**'c'**+**SA**+**CS**<CR>	**'63'**+**SA**+**'01'**+**CS**+<CR>	slave connected
					'63'+**SA**+**'00'**+**CS**+<CR>	slave not connected
SetSCLFreq **1**	0x 65	e	SCLH, SCLL, CheckSum	**'e'**+**IH**+**IL**+**CS**+<CR>	**'65'**+**IH**+**IL**+**CS**+<CR>	set frequency
GetSCLFreq **1**	0x 69	i	CheckSum	**'i'**+**CS**+<CR>	**'69'**+**IH**+**IL**+**CS**+<CR>	read frequency
SetSCLFreq **2**	0x 45	E	32Bit SCL Freq. (low byte first), CheckSum	**'E'**+**LL**+**LH+HL+HH**+**CS**+<CR> Low…….. High	**'45'**+**LL**+**LH+HL+HH**+**CS**+<CR> Low……. High	set frequency
GetSCLFreq **2**	0x 49	I	CheckSum	**'I'**+**CS**+<CR>	**'49'**+**LL**+**LH+HL+HH**+**CS**+<CR> Low……. High	read frequency
ReSetIRQ	0x 71	q	Interrupt state (active)	**'q01'**+**CS**+<CR>	**'71'**+**'01'**+**CS**+<CR>	interrupt active
			Interrupt state (deactive)	**'q00'**+**CS**+<CR>	**'71'**+**'00'**+**CS**+<CR>	interrupt deactive

1. Deprecated commands
2. Commands available from firmware version 6V0 and later.

IRQ	**'70'**+**'01'**+**CS**+<CR>	interrupt detected
ChkSumERROR	**'73'**+**'01'**+**CS**+<CR>	CheckSum Error
UnCMD	**'FF'**+**'00'**+**CS**+<CR>	unknown command

SA: Slave Address.

CS: CheckSum CS = 0x0100 – (Sum MOD 0x0100); Sum is the sum of all bytes without CS and CR.

Cnt: Count of bytes to read

SCL Frequency (LL LH HL HH):

Example:
Set SCL frequency of 100kHz (100000 = 0x000186A0). The frequency is transmitted low byte first:
'45A0860100'+CS+<CR> XXYY…: data to be send / read. <CR> : CarriageReturn (0x0D). Commands and data

are always terminated with a CarriageReturn.

XXYY… data to be send. At least 1 byte and maximally 128 bytes may be transferred
Example: the 5 bytes 0xA1, 0x1F, 0x22, 0x5C, 0xB0 are to be sent to the address 0xC4. Then the following string (terminated with a carriage return) is sent via the serial interface: 'wC4A11F225CB0DB'+<CR> 'w' 0x77; Command / WRITE 'C4' 0xC4; Slave Address 'A11F225CB0' Data: 0xA1, 0x1F, 0x22, 0x5C, 0xB0 'DB' 0xDB; Checksum for 'wC4A11F225CB0' Sum = 0x77 + 0x43 + 0x34 + 0x41 + 0x31 + 0x31 + 0x46 + 0x32 + 0x32 + 0x35 + 0x43 + 0x42 + 0x30 = 0x0325 (w) (C) (4) (A) (1) (1) (F) (2) (2) (5) (C) (B) (0) CS = 0x0100 – (Sum MOD 0x0100) = 0x0100 – (0x0325 MOD 0x0100) = 0x0100 – 0x25 = 0xDB <CR> 0x0D; CarriageReturn The feedback from the adapter can be the following: '7701C4BA'+<CR> or '7700C4BB'+<CR> '77' 0x77; Command '01' 0x01; Slave address found, data written successfully. 'C4' 0xC4; Slave address 'BA' 0xBA; Checksum calculated for '7701C4' <CR> 0x0D; CarriageReturn '77' 0x77; Command '00' 0x01; Slave address not found. Communication aborted. 'C4' 0xC4; Slave address 'BB' 0xBB; Checksum calculated for '7700C4' <CR> 0x0D; CarriageReturn
RS232 – Settings:

Baud: 19200 (ask for another baud rate)

DataBits: 8

StopBits: 1

Parity: None

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Documents / Resources

	**COPTONIX RS232 I2C Adapter** [pdf] User Manual RS232, I2C Adapter, RS232 I2C Adapter

References

- **Zeilenkameras und Busschnittstellen | Coptonix**