UM0529
User manual

STUSB02E and STUSB03 low-speed evaluation boards: STEVAL-PCC004V1 and STEVAL-PCC003V1

Introduction

This user manual explains the details of both the STUSB02E and STUSB03 USB low-speed evaluation boards.

For evaluation purposes, the USB microcontroller used is the ST72F63B.

The STUSB02E or STUSB03 connected with a USB controller is ideal for use in mobile phones, digital cameras, printers, PDAs, etc.

The STUSB02E or STUSB03 USB low-speed evaluation board is designed for demonstration and evaluation purposes.

■ Reference:
  – STEVAL-PCC003V1: low-speed USB evaluation board based on the STUSB03 transceiver and ST72F63B
  – STEVAL-PCC004V1: low-speed USB evaluation board based on the STUSB02E transceiver and ST72F63B

Figure 1.   USB low-speed evaluation board - STEVAL-PCC003V1

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1 Getting started

1.1 Package contents

The STUSB02E and STUSB03 evaluation board kit package comprises the following:

1.1.1 Hardware

- STUSB02E / STUSB03 - low-speed evaluation board
- USB to mini-B cable

1.1.2 Software

- USB HID demonstration GUI

1.1.3 Documentation

- User manual
- Detailed presentation of applications and STUSB02EQR / STUSB03EQR features

1.2 Hardware installation

1.2.1 Powering on the board

Connect the evaluation board to the PC using the J7 connector via the USB to mini-B cable. The power status LED D2 lights up indicating successful power-up of the board.

1.3 Software installation

To work with the STUSB02E or STUSB03 low-speed evaluation board, install the USB HID demonstration GUI on the PC.

1.3.1 Drivers for evaluation board

The firmware programmed in the evaluation board is based on HID class of USB. Windows OS have built-in drivers for HID functionality

1.3.2 System requirements for USB HID demonstration GUI

For low-speed evaluation board communication with GUI, a recent version of Windows, such as Windows 2000 or Windows XP must be installed on the PC.

Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

Note: *The version of the Windows OS installed on your PC can be determined by clicking on the system icon in the control panel.*

After successful installation of USB HID demonstration GUI and board connection to PC, open the USB HID demonstration GUI. The low-speed evaluation board is enumerated in the GUI as shown in *Figure 2*.

Figure 2.   STUSB02E/STUSB03E- low-speed evaluation board enumeration in GUI
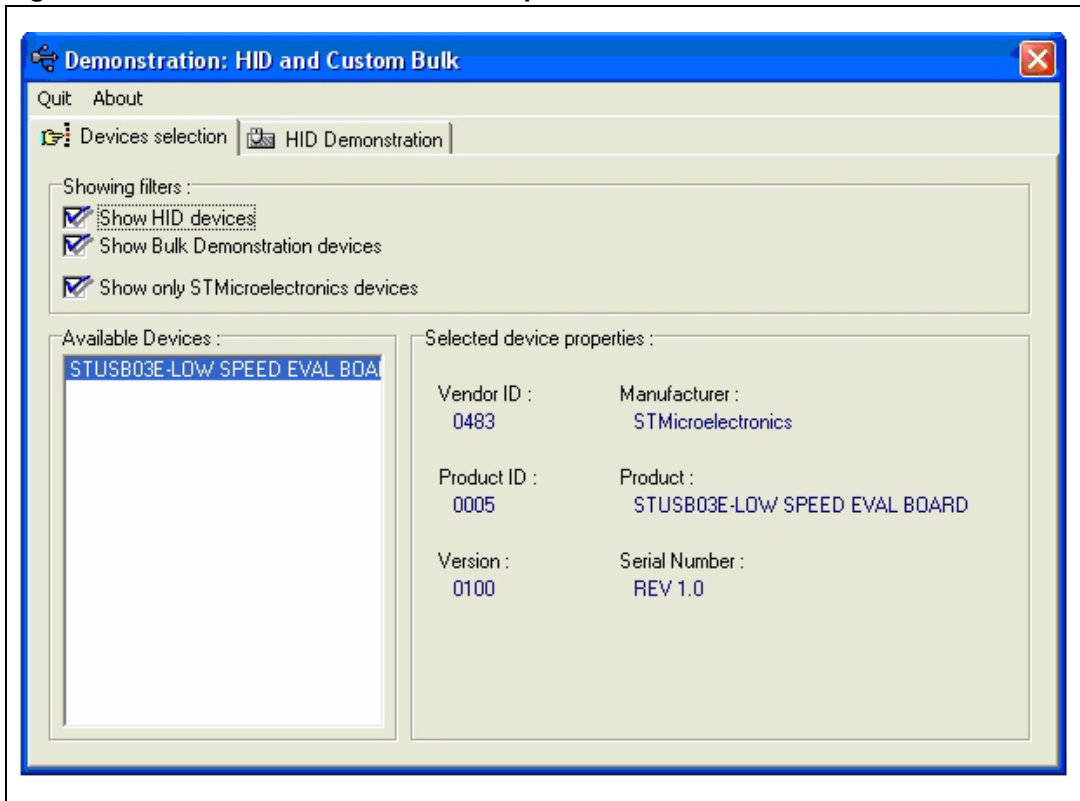
Now the evaluation board installation procedure is complete. For demonstration of the
board features refer to *Section 6.1: Communication with the application board on page 21*.

2 Evaluation board hardware

All the hardware components except the transceiver IC are the same for the STUSB02E and STUSB03 evaluation boards. The evaluation boards are comprised of one mini-B USB connector, one USB controller, one USB transceiver, two 2-to-4 demultiplexers and all required discrete components (pull-up resistors, series resistors and power supply capacitors). The device can be configured through a set of jumpers and the main signals can be accessed through test points.

The evaluation board is powered from a USB mini-B or optionally from an external supply. The transceiver STUSB02EQR/ STUSB03EQR is connected at the USB communication lines of the microcontroller. The USBVCC 3.3 V is obtained from the controller for providing the VIF to the transceiver and also the supply to 74LCX139. Since the ST72F63B is a USB low-speed microcontroller, therefore the pull-up resistor is connected to the D- pin of the transceiver. Hence, STUSB02E / STUSB03 acts as a low-speed transceiver. Also the SPD pin of the transceiver is connected to GND for low-speed selection.

The 74LCX139MTR is used to convert 5 V signals from the microcontroller to 3.3 V signals to STUSB02E/STUSB03E. This device is used because some signals need polarity conversion whereas other signals just need the level conversion. This is explained in *Section 3.3: 74LCX139MTR low voltage dual 2-to-4 decoder/demultiplexer U2,U3*.

Figure 3. STUSB02E/ STUSB03 evaluation board block diagram

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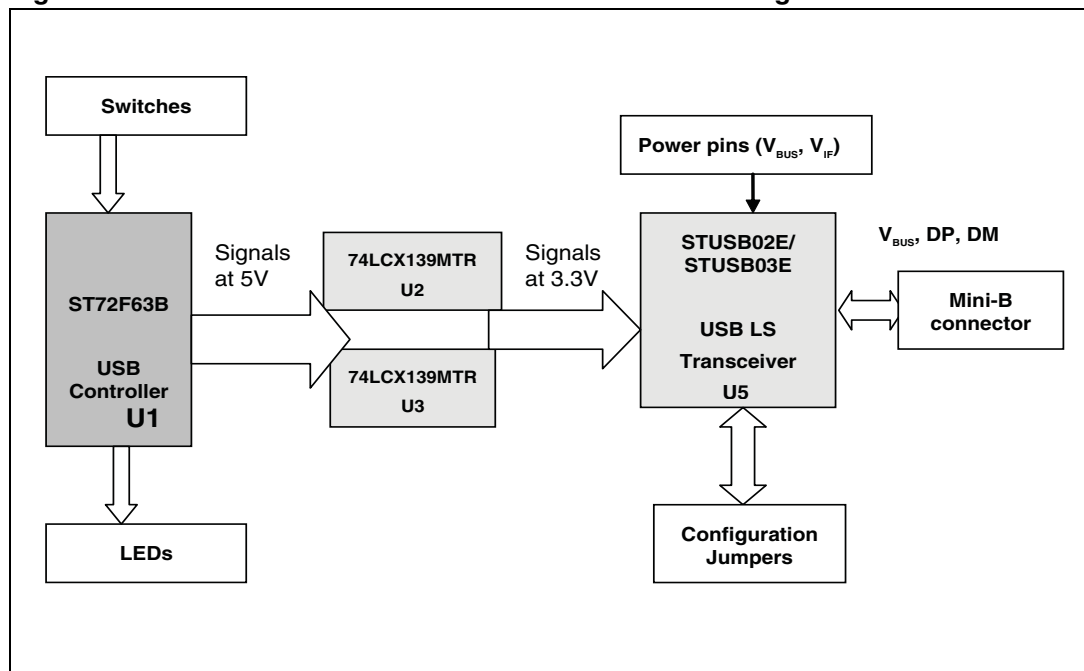
3 Evaluation board components

3.1 Microcontroller U1

The microcontroller used for the STUSB02E/STUSB03E transceiver evaluation board is ST72F63B. It is programmed with firmware to support the USB HID functionality for demonstration purposes.

Table 1. Microcontroller details

Feature	Description
Sales type	ST72F63BK4B1
Package	PSDIP32
Operating voltage	4.0 V to 5.5 V

3.1.1 Oscillator

A 12 MHz crystal is used for providing the necessary clock to the microcontroller. C3 and C4 capacitors are used along with a quartz crystal.

3.2 STUSB02E/STUSB03E transceiver U5

The STUSB02E and STUSB03 are single chip USB transceivers that support both USB full-speed and USB low-speed operations. Both have an integrated 5 V to 3.3 V regulator which allows direct powering from the VBUS. The transceivers also support sharing mode when VBUS is not present which allows the D+/D- lines to be shared with other serial protocols. They are also designed to operate down to 1.6 V so that they are compatible with lower system voltages of most portable systems, which include PDAs, MP3 players and cell phones.

3.3 74LCX139MTR low voltage dual 2-to-4 decoder/demultiplexer U2,U3

The 74LCX139MTR is a low-voltage CMOS dual 2-to-4 line decoder/ demultiplexer. It is ideal for low-power and high-speed 3.3 V applications. It can be interfaced to 5 V signal environment for inputs. The active low enable input can be used for gating or as a data input for demultiplexing applications. While the enable input is held high, all four outputs are high independently of the other inputs.

It has the same speed performance at 3.3 V as well as the 5 V, combined with lower power consumption. All inputs and outputs are equipped with protection circuits against static discharge, giving them 2 KV ESD immunity and transient excess voltage.

As explained above this device is used for interfacing between the microcontroller and STUSB02/STUSB03E for 5 V to 3.3 V signals. The 74LVX139MTR device can also be used as it also has 5 V tolerant inputs.

Note: *The 74LCX139MTR is used for interfacing the ST72F63B microcontroller with an operating voltage ranging from 4 V to 5.5 V in the evaluation board to transceiver. In the final*

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application involving the USB02E/USB03E, such a voltage converter is not needed as the USB microcontroller will have the V_{IF} ranging from 1.6 V to 3.3 V as required for the transceiver. Also, we need signal inversion for the USBOE and SUS signals of transceiver. This task is also performed by the 74LCX139MTR in this board. Hence, 74LCX139MTR usage is basically microcontroller specific.

3.4 LD2985BM33R voltage regulator U4

The LD2985BM33R is a 150 mA fixed output voltage regulator. The ultra-low drop voltage and the low quiescent current make them particularly suitable for low-noise, low-power applications and in battery-powered systems. In sleep mode, quiescent current is less than 1 µA when the INHIBIT pin is pulled low. Shutdown logic control function is available on pin 3 (TTL compatible).

Note: *LD2985BM33R usage is optional in the board. By configuring jumpers J9,J13,J11, the external voltage regulator can be switched off. In this case, the internal voltage regulator of the microcontroller is used to power 74LCX139MTR and STUSB02E/ STUSB03 V_{IF}*

When external voltage regulator LD2985BM33R is used for powering 74LCX139MTR and STUSB02E/ STUSB03 V_{IF} , overall current consumption of the board increases.

4 Power requirements

The recommended supply voltages for the STUSB02E/STUSB03E USB transceivers are the following:

1. V_{IF} = 1.6 - 3.6 V (typical value: V_{IF} = 1.8 V)
2. V_{BUS} = 4.0 - 5.5 V (typical value: V_{BUS} = 5 V)

The V_{IF} for the USB transceiver can be obtained from the onboard voltage regulator as well as the built-in voltage regulator of the ST72F63B.

Both evaluation boards are designed for two power supply configurations. It can be bus powered from the mini-B connector. There is another option available for powering the board using the J3 connector. J3 can be used for powering the board from an external supply. There is a three-pin jumper J4 on the board which selects the power supply configuration.

5 Pin assignments

5.1 Jumpers details

Table 2, *3*, and *4* show jumper assignments of the demonstration board. All the jumper settings are same for both the STUSB02E and STUSB03 evaluation boards except for jumper J10 and J12.

Table 2.   General jumper assignments

Jumper	Related pin(s)	Description	Default
JP1	PB7	**Open:** disconnects LED D1 from the microcontroller pin connected to it.	Closed
JP2	PB6	**Open:** disconnects LED D2 from the microcontroller pin connected to it.	Closed
JP3	PA7	**Open:** disconnects LED D3 from the microcontroller pin connected to it.	Closed
JP4	PA6	**Open:** disconnects LED D4 from the microcontroller pin connected to it.	Closed
J8	OSCIN	**Closed:** connects main clock input for external source.	Open

Table 3.   Voltage regulator U4 related jumper assignment

Jumper	Related pin(s)	Description	Default
J9	V_{IN}	**Open:** disconnects the external voltage regulator supply voltage **Closed:** connects the V_{CC} to IN pin of voltage regulator U4 when external regulator is to be used.	Open
J13	INH	**Pin 1 and 2 closed:** connects the INHIBIT of U4 to V_{CC} to switch on the external voltage regulator U4 **Pin 2 and 3 closed:** connects the INHIBIT pin of U4 to GND to switch off the external voltage regulator U4.	Pin 2 and 3 closed

Table 4.   **USB transceiver U5 related jumper assignment**

Jumper	Related pin(s)	Description	Default
JP5	USBVCC	**Closed:** connects USBVCC (=3.3V) to V_{IF} in USB02E/ USB03E transceiver. **Open:** disconnects USBVCC to V_{IF} in USB02E/ USB03E transceiver.	Closed
JP6	VBUS	**Closed:** connects USB02E/USB03E transceiver VBUS pin to V_{CC} supply.	Closed
J4(three pin connector)	VBUS	**Pin 2 and 3 closed:** connects the V_{BUS} supply to different components like microcontroller, decoder etc. **Pin 1 and 2 closed:** used for powering the board through an external supply.	Pin 2 and 3 closed
J10	VPU	**Pin 1 and 2 closed:** connects the 1.5 kΩ resistor between D- and VPU pin of USB transceiver for low-speed mode. **Pin 2 and 3 closed:** connects the 1.5 kΩ resistor between D- and VTRM pin of USB transceiver	Pin 2 and 3 closed for STUSB03 evaluation board. (STEVAL-PCC003V1) Pin 1 and 2 closed for STUSB02E evaluation board. (STEVAL-PCC004V1)
J11	3V3 SEL	**Pin 1 and 2 closed:** connects the U4 O/P to 3.3 V V_{CC} **Pin 2 and 3 closed:** connects USB V_{CC} to 3.3 V V_{CC}	Pin 2 and 3 closed
J12	RSL	**Pin 1 and 2 closed:** connects the RSL of U5 to GND **Pin 2 and 3 closed:** connects the RSL of U5 to VIF	Pin 1 and 2 closed for STUSB03 evaluation board (STEVAL-PCC003V1) Open for STUSB02E evaluation board (STEVAL-PCC004V1)

Note: *J12 is applicable only to the STUSB03 evaluation board. It is not applicable to the STUSB02E evaluation board since RSL is NC in the STUSB02E.*

CONFIG section jumpers are provided for future user requirements.

Table 5.   CONFIG section related jumper assignment

Jumper	Related pin(s)	Description	Default
J14	CFG1_PB5	**Pin 1 and 2 closed:** connects the CFG1_PB5 to GND **Pin 2 and 3 closed:** connects the CFG1_PB5 to VCC	Open
J15	CFG2_PB1	**Pin 1 and 2 closed:** connects the CFG2_PB1 to GND **Pin 2 and 3 closed:** connects the CFG2_PB1 to VCC	Open
J16	CFG3_PA0	**Pin 1 and 2 closed:** connects the CFG3_PA0 to GND **Pin 2 and 3 closed:** connects the CFG3_PA0 to VCC	Open
J17	CFG4_PC0	**Pin 1 and 2 closed:** connects the CFG4_PC0 to GND **Pin 2 and 3 closed:** connects the CFG4_PC0 to VCC	Open

5.2   Switch assignments

Table 6 shows switch assignments of the demonstration board.

Table 6.   Evaluation board switch assignments

Jumper	Related pin(s)	Description)
SW1	RESET	**When button is pressed**, the active low signal forces the initialization of the MCU.
SW2	PA3	**When button is pressed**, PA3 microcontroller pin is connected to ground. Not used at present.
SW3	PA4	**When button is pressed,** PA4 microcontroller pin is connected to ground. Not used at present.
SW4	PA5	**When button is pressed,** PA5 microcontroller pin is connected to ground. This is used to control the button state on the USB demonstrator software.

5.3   Connector assignments

Table 7 shows connector assignments of the evaluation board connectors.

Table 7.   Evaluation board connectors

Connector	Description
J7	USB mini-B connector
J3	External power supply(5 V), GND

5.4   USB pin assignments

Table 8 shows USB mini-B connector pin assignments.

Table 8.   USB mini-B pin assignments

Pin no.	Description
1	V_{BUS} – connect a 5 V supply voltage when powering V_{BUS} pin from mini-B connector.
2	D+ – data line
3	D- – data line
4	ID – not used
5	GND – ground reference

5.5   Decoder U2/U3 pin description

Table 9 shows the pin description of the decoder.

Table 9.   Decoder pin U2/ U3 description

Pin no	Symbol	Name and function
1, 15	n1G, n2G	Enable inputs
2, 3	1A, 1B	Address inputs
4, 5, 6, 7	n1Y0 to n1Y3	Outputs
12, 11, 10, 9	n2Y0 to n2Y3	Outputs
14, 13	2A, 2B	Address Inputs
8	GND	Ground (0 V)
16	VCC	Positive supply voltage

5.5.1 Decoder/demultiplexer U2

Table 10 shows the truth table for the first input of U2.

Table 10. Truth table for first input of U2

Inputs			Outputs			
Enable	Select					
n1G(1)	1B(3) = GND	1A(2)= USBOE	nY0(4) = NC	nY1 (5) = nUSBOE	nY2(6)= NC	nY3(7) = NC
H	X	X	H	H	H	H
L	L	L	L	H	H	H
L	L	H	H	L	H	H

Thus, it can be seen by comparing column 3 (input 1A) and column 5 (output Y1), that the USBOE signal is getting inverted.

Table 11 shows the truth table for the second input of U2.

Table 11. Truth table for second input of U2

Inputs			Outputs			
Enable	Select					
n2G(15)	2B(13)=GND	2A(14) = SUS_5	nY0(12) =SUS_33	nY1(11)= NC	nY2(10) = NC	nY3(9) = NC
H	x	X	H	H	H	H
L	L	L	L	H	H	H
L	L	H	H	L	H	H

Thus, it can be seen by comparing column 3 (input 2A) and column 4 (output Y0), that the SUS signal is getting buffered. Hence only the voltage level conversion from 5 V to 3.3 V is done.

5.5.2 Decoder/demultiplexer U3

The first input and other related input pins are not connected in this decoder. *Table 13* shows the truth table for second input of U3.

Table 12. Truth table for first input of U3

Inputs			Outputs			
Enable	Select					
N1G(1)	1B(3) = GND	1A(24) = CON-5V	nY0(4) =CON-3V3	nY1(5) = NC	nY2(6) = NC	nY3(7) = NC
H	x	X	H	H	H	H
L	L	L	L	H	H	H
L	L	H	H	L	H	H

Thus it can be seen by comparing column 3 (input 1A) and column 4 (output Y0), that the CON signal is getting buffered. Hence only the voltage level conversion from 5 V to 3.3 V is done.

Table 13.   **Truth table for second input of U3**

Inputs			Outputs			
Enable	Select					
n2G(15)=VCC	2B(13)=GND	2A(14) = GND	nY0(12) =NC	nY1(11)= NC	nY2(10) = NC	nY3(9) = NC
H	x	X	H	H	H	H
L	L	L	L	H	H	H
L	L	H	H	L	H	H

Note: *Second input of U3 is not used in the application. However, to save the current consumption, these inputs are not left floating and are tied to ground.*

5.6   STUSB02E and STUSB03 transceiver pin configuration

Table 14 shows the pin description of STUSB02E transceiver.

Table 14.   **Pin description for STUSB02E transceiver**

Pin no.	Symbol	I/O	Name and function
0	N.C		Not connected
1	SPD	I	Edge rate control. A logic HIGH operates at edge rates for "full-speed" operation. A logic LOW operates edge rates for "low-speed" operation.
2	RCV	O	Receive data. Output for USB differential data.
3	VP	I/O	If OE# = H, VP = receiver output (+) If OE# = L, VP = driver input (+)
4	VM	I/O	If OE# = H, VM = receiver output (-) If OE# = L, VM = driver input (-)
5	CON	I	CONNECT (input). Controls state of VPU. Refer to VPU pin description for details.
6	GND		Ground reference
7	SUS	I	Suspend (active-high). Turns off internal circuits to reduce supply current.
8	N.C.		Not connected
9	OE#	I	Output enable (active-low). Enables transceiver data transmission to the bus. When not active, the transceiver is in the receive mode.
10, 11	D-, D+	I/O	Differential data lines.
12	VTRM	O	3.3 V reference supply output. Requires a 1.0 µF decoupling capacitor for stability.

Table 14.   Pin description for STUSB02E transceiver (continued)

Pin no.	Symbol	I/O	Name and function
13	VPU	O	Pull-up supply voltage output. Used to connect 1.5 kΩ pull-up speed detect resistor. If CON = 0, VPU is high impedance. If CON = 1, VPU = 3.3 V ±10%.
14	VBUS	I	USB bus supply voltage (4 V to 5.5 V). Supplies power to the USB transceiver and internal circuitry.
15	VIF	I	System interface supply voltage (1.6 V To 3.6 V). Provides reference supply voltage for system I/O interface signals.
16	VBUSDET	O	VBUS indicator output. When VBUS > 2.9 V, VBUSDET = high and when < 2.2 V, VBUSDET = low.

Table 15 shows the pin description of the STUSB03 transceiver.

Table 15.   Pin description for STUSB03 transceiver

Pin no.	Symbol	I/O	Name and function
1	SPD	I	Edge rate control. A logic HIGH operates at edge rates for "full speed" operation. A logic LOW operates edge rates for "low speed" operation.
2	RCV	O	Receive data. Output for USB differential data.
3	VP	I/O	If OE# = H, VP = receiver output (+) If OE# = L, VP = driver input (+)
4	VM	I/O	If OE# = H, VM = receiver output (-) If OE# = L, VM = driver input (-)
5	CON	I	CONNECT (input). Controls state of VPU. Refer to VPU pin description for detail.
6	GND		Ground reference
7	SUS	I	Suspend (active-high). Turns off internal circuits to reduce supply current.
8	RSL	I	Full speed pull-up resistor selection input. If RSEL = 0 the internal pull-up resistor connected to D+ is disabled and an external resistor connected to VPU pin must be used.
9	OE#	I	Output enable (active-low). Enables transceiver data transmission onto the bus. When not active, the transceiver is in the receive mode.
10, 11	D-, D+	I/O	Differential data lines.
12	VTRM	O	3.3 V reference supply output. Requires a 1.0 µF decoupling capacitor for stability.
13	VPU	O	Pull-up supply voltage output. Used to connect 1.5 kΩ pull-up speed detect resistor. If CON = 0, VPU is high impedance. If CON = 1, VPU = 3.3 V ±10%.

Table 15.   Pin description for STUSB03 transceiver (continued)

Pin no.	Symbol	I/O	Name and function
14	VBUS	I	USB bus supply voltage (4 V to 5.5 V). Supplies power to the USB transceiver and internal circuitry.
15	VIF	I	System interface supply voltage (1.6 V To 3.6 V). Provides reference supply voltage for system I/O interface signals.
16	VBUSDET	O	VBUS indicator output. When VBUS > 2.9 V, VBUSDET = high and when < 2.2V , VBUSDET = low.
EXP	N.C.		Not Connected

Refer to the relevant datasheet of the device for a detailed description.

6 Firmware

The demo-application consists of an HID demonstrator GUI running on the PC and HID class demonstration firmware running on the board. The PC software and the firmware running on the USB microcontroller provide a clear example of data exchange between the PC and the board. The USB signals are routed through the STUSB02E/STUSB03E transceiver. The ST72F63B firmware is based on a USB core library that does all the hardware control of the USB interface. This application board incorporates basic input sources such as push-buttons, trimmers or output devices (LEDs) and a wrap area. Communications between the PC and the ST7 board are done through different USB pipes:

● control IN and OUT during the enumeration with the bi-directional endpoint 0
● interrupt IN from endpoint 1 for data transferred from ST7 to PC
● interrupt OUT to the endpoint 2 for the data transferred from PC to ST7

The evaluation board must first be connected to the PC with the USB cable. As a result, the evaluation board is enumerated as a HID device as shown in *Figure 4* and is ready to use.

Figure 4.   STUSB02E/STUSB03E evaluation board enumeration
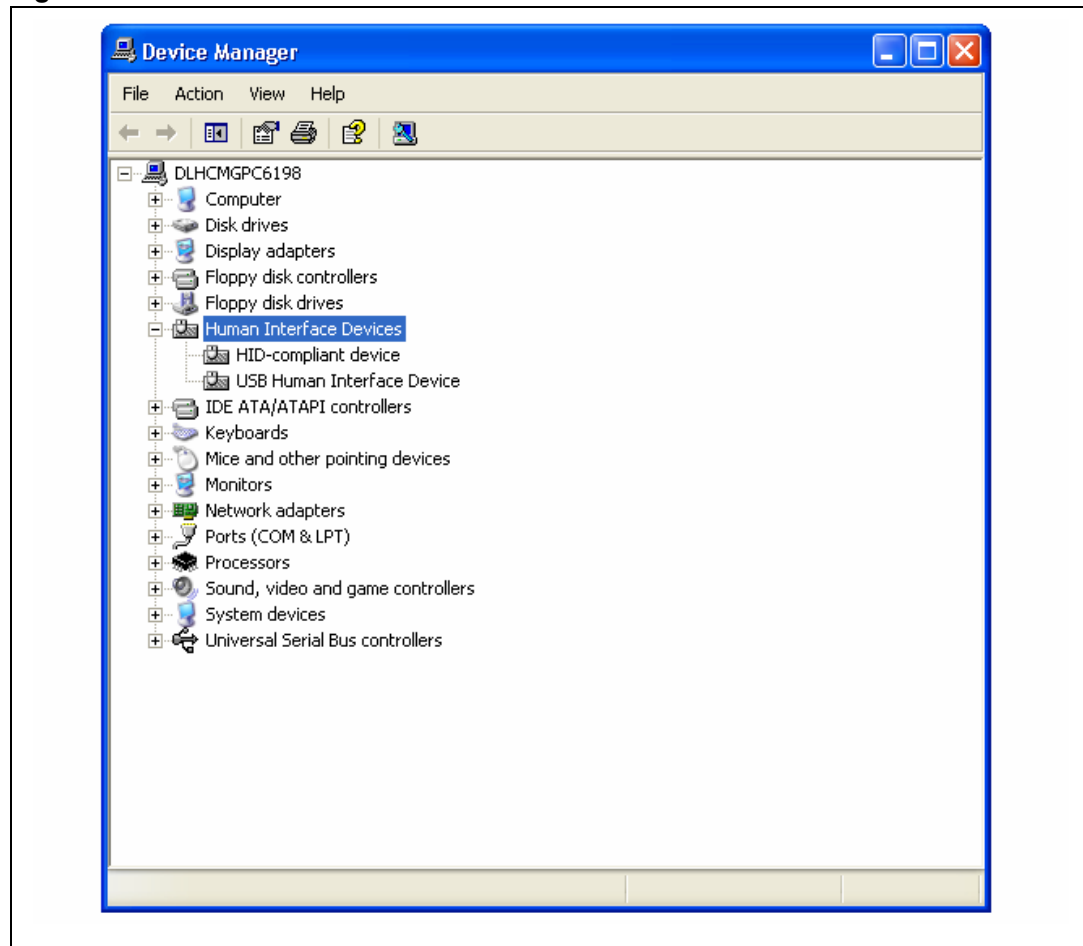
By starting the HID demonstrator on the PC, you get a graphical interface for controlling the application board. This PC software is used to demonstrate the enumeration process and

data transfer between the PC and the ST7 peripheral according to the USB HID class specifications.

Figure 5. STUSB02E/ STUSB03 evaluation board demonstration
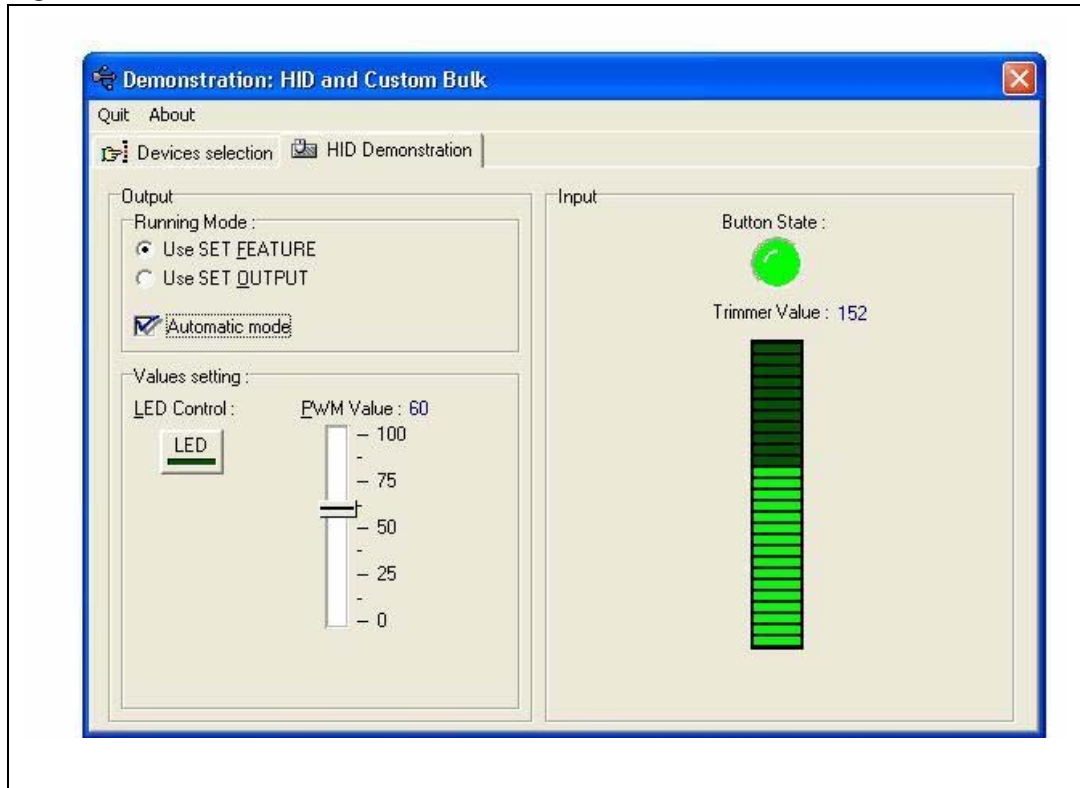
6.1 Communication with the application board

6.1.1 PC software control of the evaluation board

Click on the LED button in the application dialog box to switch ON the LED D3 on the board. Click again to switch it OFF. The slider bar controls the brightness of D4 on the board. Each slider bar value is converted to a pulse width modulation (PWM) by the microcontroller. The brightness of LED D4 changes according to the slider value.

6.1.2 Display of evaluation board state

● Button state: this green LED changes its state when push-button SW4 of the evaluation board is pressed.

● Trimmer value: this value is the result of the analog-to-digital conversion of the VR1 trimmer output. When the position of the trimmer mounted on the evaluation board is modified, the new ADC value is transmitted via the USB bus and displayed on the progress bar of the HID demonstrator.

6.2 USB suspend

The evaluation board enters the standby state when the PC is put in standby mode with the board connected to the PC. In this mode, the microcontroller enters the USB suspend mode. Power status LED D2 turns off indicating the standby state of the board. The board resumes its run state when the PC exits standby mode.

Current consumption of the evaluation board in the suspend state is according to USB specifications for low-power devices.

During suspend mode, the MCU is put in HALT mode to consume the minimum current. All I/Os of the microcontroller shall be configured for minimum current consumption. See *Appendix A: Port configuration* of detailed I/O configuration during run mode and suspend mode.

The transceiver is put in suspend mode by making the SUS pin high. Also the current flowing from the potentiometer is reduced by switching the transistor OFF.

7 Schematics

Figure 6.   STUSB02E/STUSB03E evaluation board schematic

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8 Bill of material

Table 16. BOM list

Index	Quantity	Ref.	Value / generic part number	Package	Manufacturer	Manufacturer's ord. code / ord. part number
Devices						
1	1	U1	Microcontroller	PSDIP32	STMicroelectronics	ST72F63BK4B1
2	2	U2, U3	Decoder/ demultiplexer	SO-16	STMicroelectronics	74LCX139MTR
3	1	U4	Voltage regulator	SOT-23-5L	STMicroelectronics	LD2985BM33R
4	1	U5	USB transceiver	QFN16	STMicroelectronics	STSB02EQR / STSB03EQR
5	1	Q1	PNP transistor	SOT-23	STMicroelectronics	2STR2215
LEDs						
1	4	D1, D2, D3, D4	LED	3 mm red, through hole	Any	
Crystals and oscillator						
1	1	XT1	Quartz crystal 12 MHz	SS4 (HC49/U4H) 11.35*4.6 mm	Jauch	
Connectors and jumpers						
1	1	CON1	HEADER 5X2	2.54*2.54 mm	Any	
2	2	J1,J2[(1)]	HEADER 1X16	2.54 mm pitch	Any	
3	1	J3	HEADER 1X4	2.54 mm pitch	Any	
4	8	J4, J11, J12, J13, J14, J15, J16, J17	HEADER 1X3	2.54 mm pitch	Any	
5	2	J5, J6[(1)]	HEADER 1X8	2.54 mm pitch	Any	
6	9	J8, JP1, JP2, JP3, JP4, JP5, JP6, JP9, JP10	2 pin HDR	2.54 mm pitch	Any	

Table 16.   BOM list (continued)

Index	Quantity	Ref.	Value / generic part number	Package	Manufacturer	Manufacturer's ord. code / ord. part number
7	1	J7	USB_MINI B	B-type mini	KYCON Inc. 30TR	
Passive components						
1	4	R1, R2, R3, R4	470 Ω	SMD0805	Any	
2	10	R5, R9, R10, R11, R12, R16, R18, R19, R20, R21	10 kΩ	SMD0805	Any	
3	2	R14, R13	20 Ω	SMD0805	Any	
4	1	R15	1.5 kΩ	SMD0805	Any	
5	1	R17	1 kΩ	SMD0805	Any	
6	1	R22	4.7 kΩ	SMD0805	Any	
7	3	R6, R7, R8	47 kΩ	SMD0805	Any	
8	1	(VR1) POT	10 kΩ	3/8" square, top adjust, triangular pattern pins	Bourns	
9	5	C1, C6, C8, C12, C13	100 nF	SMD0805	Any	
10	1	C2	4.7 µF / 25 V tantalum	EIA 3528-21 size B	Any	
11	2	C3, C4	22 pF or 33 pF	SMD0805	Any	
12	3	C7, C9, C10	1 µF tantalum	EIA 3216-18 size A	Any	
13	2	C5, C11	2.2 µF tantalum	EIA 3528-21 size B	Any	
Switches						
1	4	SW1, SW2, SW3, SW4	2 pin switch	TACT switch	Any	

1.   Not mounted

Note: For detailed datasheets of STMicroelectronics' products, please visit www.st.com

Appendix A Port configuration

Table 17. Port configuration

Port pin	Pin configuration				
	Connection status	Run state		Suspend state	
		Input/output	1/0	Input/output	1/0
Port A					
PA0	CFG3/MCO	Output	0	Output	0
PA1	ICC_DATA//SDA	Output	0	Output	0
PA2	ICC_CLK/SCL	Output	0	Output	0
PA3	SW2	Input	0	Input	0
PA4	SW3	Input	0	Input	0
PA5	SW4	Input	0	Input	0
PA6	D4 LED	Output	1	Output	1
PA7	D3 LED	Output	1	Output	1
Port B					
PB0	POT VR1 PIN No.3	Input	0	Input	0
PB1	CFG2	Output	0	Output	0
PB2	SUS_5V	Output	0	Output	1
PB3	Q1 On/off(0-To turn on Q1)	Output	0	Output	1
PB4	CON_5V	Output	1	Output	1
PB5	CFG1	Output	0	Output	0
PB6	D2 LED	Output	0	Output	1
PB7	D1 LED	Output	1	Output	1
Port C					
PC0	CFG4	Output	0	Output	0
PC1	REG_OFF	Output	1	Output	1
PC2	USBOE	Controlled by the microcontroller as per settings in MICSR of ST72F63B	-	-	-

Appendix B   Abbreviations

Table 18.   Abbreviations

Term	Description
ADC	Analog-to-digital converter
GUI	Graphical user interface
HID	Human interface devices
PC	Personal computer
USB	Universal serial bus
VBUS	USB bus supply voltage = 5 V
VIF	System interface supply voltage
VPU	Pull-up supply voltage

9 Revision history

Table 19.   Document revision history

Date	Revision	Changes
04-Jun-2008	1	Initial release

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