

Power Hub

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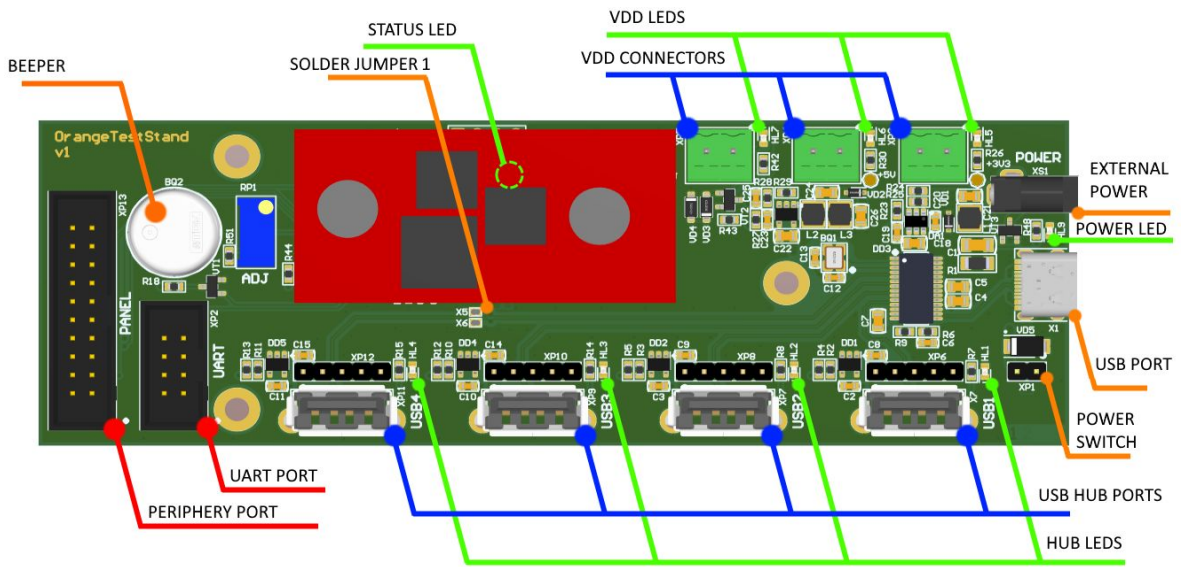
Layout and pinout



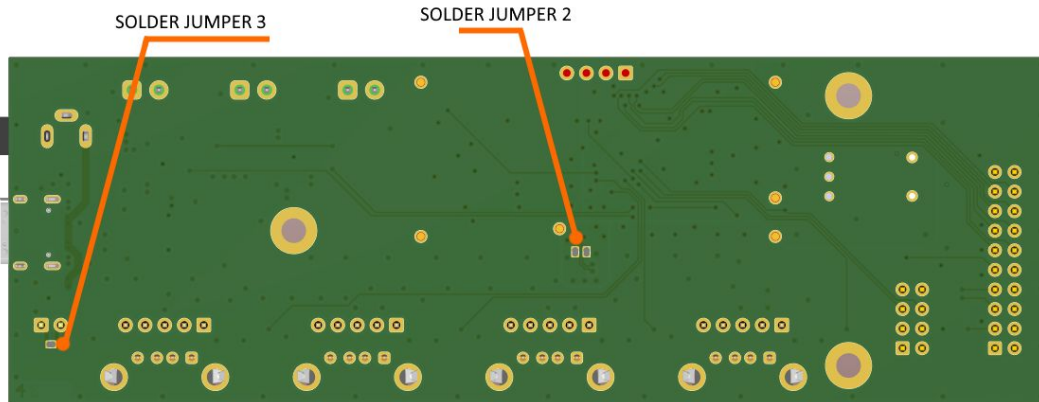
Be careful, when using external power. Make sure the polarity of the power supply is correct.

Do not connect Power Hub to two computers at the same time via USB port, UART port and External Power.

Layout

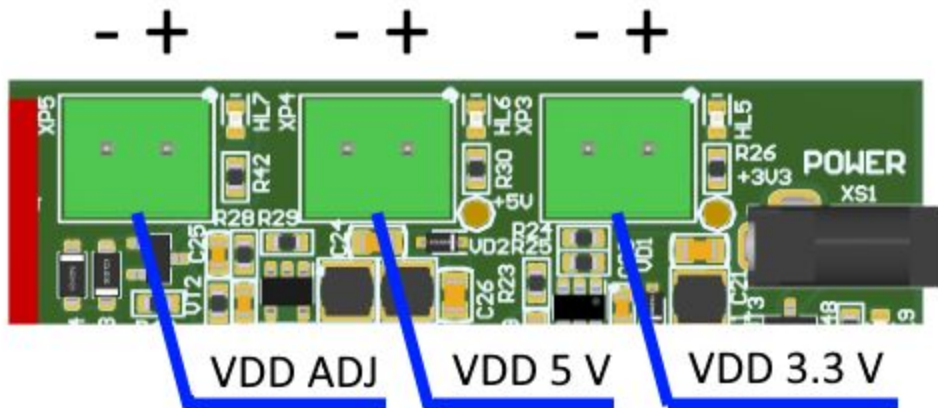
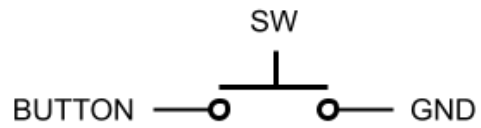
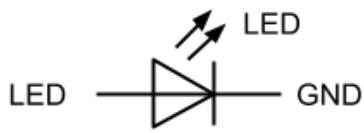
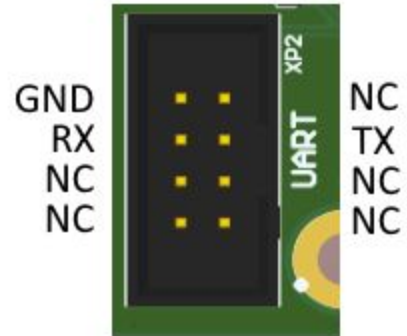
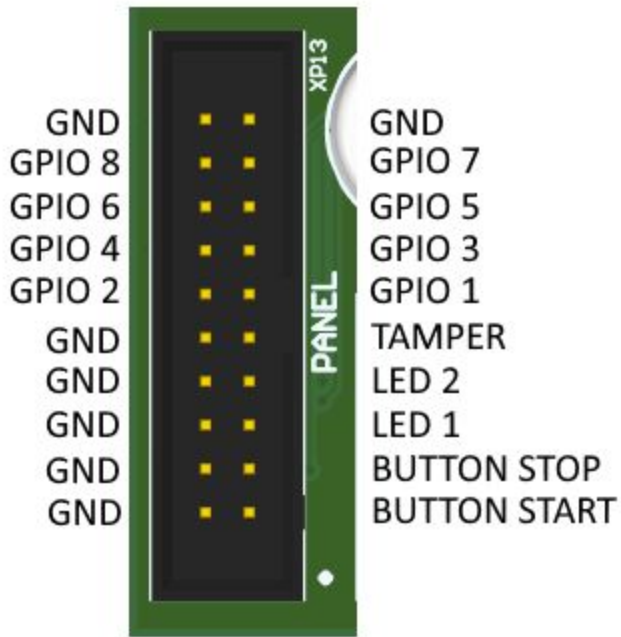


Front view



Back view

Ports pinout



Electrical characteristics

Typical self power consumption	40 mA (only Power Hub, without load)
Maximum self power consumption (4 USB ports in HighSpeed mode)	125 mA (only Power Hub, without load)
Input power supply voltage USB or External power	4.5 - 5.5 V
Maximum current for voltage source 3.3 V	500 mA *
Maximum current for voltage source 5 V	200 mA *
Voltage range of adjustable (ADJ) voltage source	1.35 V - 31.5 V
Maximum current of ADJ voltage source	1.35 V - 2.75 A *
	5 V - 1 A *
	31.5 V - 0.05 A *
Efficiency of ADJ voltage source	~65% @ 5 V
Maximum current consumption on USB hub port	500 mA *
Short circuit protection on USB hub port	2 A
BUTTON input pull-up voltage	3.3 V
BUTTON input pull-up resistance	1 kOhm
LED output internal supply voltage	3.3 V
LED output internal serial resistance	1 kOhm
TAMPER maximum externally supplied voltage	-0.3 ... 3.6 V **
TAMPER maximum source/sink current	20 mA **
GPIO maximum externally supplied voltage	-0.3 ... 3.6 V **
GPIO maximum source/sink current	20 mA **
Total GPIO maximum source/sink current (sum of all GPIO currents)	60 mA **

*** Total Power Hub power consumption should not exceed:**

- 500 mA at USB 2.0 power supply
- 900 mA at USB 3.0 power supply
- 2 A at external power supply

**** GPIO pins are directly connected to MCU pins.**

Power Hub does not limit any voltage or current. Exceeding recommended parameters may cause permanent damage to the device.

Functional description

Two control ports: USB-COM (when selected) and UART.
For controlling Power Hub AT-commands are used.

Periphery set:

- Two leds
- Two btns
- Beeper
- 8 GPIO pins
- TAMPER pin
- Two constant voltage sources 3.3 V and 5 V
- One adjustable voltage source in range 1.35 V - 31.5 V
- Four USB ports (port 4 is selectable)

Before using, make sure that jumper on Power Switch is installed or Solder Jumper 3 is soldered.

For using USB port 4 unsolder Solder Jumper 1 and solder Solder Jumper 2. In this case you can control device only via UART port, not USB-COM port.

Power Hub has mutable default values. Default values are stored in non-volatile memory. Default values are loaded in three cases:

- At device startup
- After pushing "STOP" button, if such option is configured
- After command SET_DEF

PC connection

USB-COM connection

When using USB-COM, set baud rate not more than 1000000 bits/s, Data bits 8, Stop bits 1, Parity none.

Using on Windows operating system.

Drivers for Windows® 98SE, 2000, XP, Vista®, 7 and 8.x you can get here:

<https://www.st.com/en/development-tools/stsw-stm32102.html>

Drivers for Windows® 10 are installed automatically.

Using on Linux operating system.

No need to install drivers.

UART connection

When using UART, set baudrate 115200 bit/s. Data bits 8, Stop bits 1, Parity none.

Protocol description

Power Hub API syntax

AT commands has next syntax

Write value	AT+<CommamdName>=<Value>
Read value	AT+<CommamdName>
Value change from Power Hub	+<CommamdName>

AT commands end with symbol LF or a new-line CR-LF.

When writing some value, you should receive an “OK” message.

Commands

Table fields description:

- Command - how to write a command
- Description - command description
- Input value - value that can be written
- Return value - value that is returned when reading

Hub ports

Command	Description	Input value	Return value
HUB#	Turn on/off USB hub port # (1..4)	0/1	0/1
HUB#_DEF	Set default value	0/1	0/1

Examples:

“AT+HUB1=1” - “OK” - USB hub number 1 turn on

“AT+HUB3” - “+HUB3:0 OK” - USB hub number 3 is off

LEDs

LEDs can work in three modes

1. Continuously lighting
2. Continuously periodic blinking
3. Several periodic blinking

Command	Description	Input value	Return value
LED#	Turn on/off led # (1..2)	0/1	0/1
LED#_PERIOD	Period of blinks in ms If period = 0 led light constant	[0-10000]	[0-10000]
LED#_CNT	Count of blinks If set 0, led blinks continuously	[0-10]	[0-10]
LED#_DEF	Set default value	0/1	0/1
LED#_PERIOD_DEF	Set default value	[0-10000]	[0-10000]
LED#_CNT_DEF	Set default value	[0-10]	[0-10]

Example 1:

“AT+LED1=1” - “OK” - Led 1 turn on

Example 2:

“AT+LED1_PERIOD=500” - “OK” - Led 1 set period 0.5 sec

“AT+LED1=1” - “OK” - Led 1 start blinking

Example 3:

“AT+LED1_PERIOD=500” - “OK” - Led 1 set period 0.5 sec

“AT+LED1_CNT=5” - “OK” - Led 1 set blinks 5 times

“AT+LED1=1” - “OK” - Led 1 start blinking and stop after 5 blinks

VDD

Command	Description	Input value	Return value
VDD_5V	Turn on/off VDD 5 V	0/1	0/1
VDD_3V3	Turn on/off VDD 3.3 V	0/1	0/1
VDD_ADJ	Turn on/off VDD ADJ and set it	[0, 1.35 - 31.50]	[0, 1.35 - 31.50]
VDD_5V_DEF	Set default value	0/1	0/1
VDD_3V3_DEF	Set default value	0/1	0/1
VDD_ADJ_DEF	Set default value	[0, 1.35 - 31.50]	[0, 1.35 - 31.50]

Example 1:

“AT+VDD_3V3=1” - “OK” - VDD 3.3 V turn on

“AT+VDD_3V3” - “+VDD_3V3:1 OK” - Read state of VDD 3.3 V

Example 2:

“AT+VDD_ADJ=25.1” - “OK” - VDD ADJ set to 25.1 Volts

“AT+VDD_ADJ” - “+VDD_ADJ:25.1 OK” - Read state of VDD ADJ

Beeper

Beeper can work in three modes

1. Continuous sound
2. Continuous periodic beeps
3. Several periodic beeps

Command	Description	Input value	Return value
SOUND	Turn on/off sound signal	0/1	0/1
SOUND_BEEP	Count of beeps will be sound. If set 0, Beeper beeps continuously	[0-10]	[0-10]
SOUND_BEEP_PERIOD	Period of beeps in ms. If set 0, Beeper sounds continuously	[0-10000]	[0-10000]

Example 1:

“AT+SOUND=1” - “OK” - Turn on sound signal

Example 2:

“AT+SOUND_BEEP_PERIOD=500” - “OK” - Set beep period to 0.5 sec

“AT+SOUND=1” - “OK”

Example 3:

“AT+SOUND_BEEP_PERIOD=500” - “OK” - Set beep period to 0.5 sec

“AT+SOUND_BEEP=3” - “OK” - set beeps 3 times

“AT+SOUND=1” - “OK” - Beeper start beeps and stop after 3 beeps

GPIO

Command	Description	Input value	Return value
GPIO#	Set GPIO # (1..8) to logical LOW/HIGH or get its state	0/1	0/1
GPIO#_DIR	Set GPIO # (1..8) direction Input or Output	0/1 IN/OUT	0/1 IN/OUT

Example 1:

“AT+GPIO1” - “+GPIO1:1 OK” - Read GPIO1 input state

Example 2:

“AT+GPIO1_DIR=OUT” - “OK” - Set GPIO1 to output

“AT+GPIO1=1” - “OK” - Set GPIO1 high level

“AT+GPIO1” - “+GPIO1:1 OK” - Read GPIO1 input state

Buttons

Buttons settings. Every time the button is pressed Power Hub will send a message "+BTN_STP" or "+BTN_ST".

Command	Description	Input value	Return value
BTN_ST	Turn on/off reading state of button “START”	0/1	0/1
BTN_STP	Turn on/off reading state of button “STOP”	0/1	0/1
BTN_STP_RESET_DEF	Reset to defaults when press “STOP” button	0/1	0/1

Example 1:

“AT+BTN_ST=1” - “OK” - Turn on reading state of button “START”

After pressing the “START” button for five times Power Hub has sent next messages:

“+BTN_ST”

“+BTN_ST”

“+BTN_ST”

“+BTN_ST”

“+BTN_ST”

Input supply voltage

Command	Description	Input value	Return value
VIN	Read device input supply voltage value	-	x.xx

Example:

“AT+VIN” - “+VIN:4.96 OK” - Input voltage is 4.96 Volts

Version of firmware, hardware and bootloader

Command	Description	Input value	Return value
VER	Return version of firmware, hardware and bootloader	-	FW x.xx; BL x.xx; HW x.xx

Example:

“AT+VER” - “+VER:FW 0.15; BL 1.1; HW 1.0 OK”

Set to default settings

Command	Description	Input value	Return value
SET_DEF	Set device to default settings	-	-

Example:

“SET_DEF” - “OK” - Values of Power Hub resets to default.

Local echo

Command	Description	Input value	Return value
ATE0	Disable local echo	-	-
ATE1	Enable local echo	-	-

Example:

“ATE0” - “OK” - Disable local echo

Updating firmware

For all operating systems

1. Python with pip must be installed on your Computer.
2. For the first time running powerhub_programmer run install.py to install dependencies.
3. Run powerhub_programmer.py

For Windows users only

1. Run powerhub_programmer.exe