KAMAMI

Nettemp Pi Hat

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Źródło: https://wiki.kamamilabs.com/index.php/Nettemp_Pi_Hat

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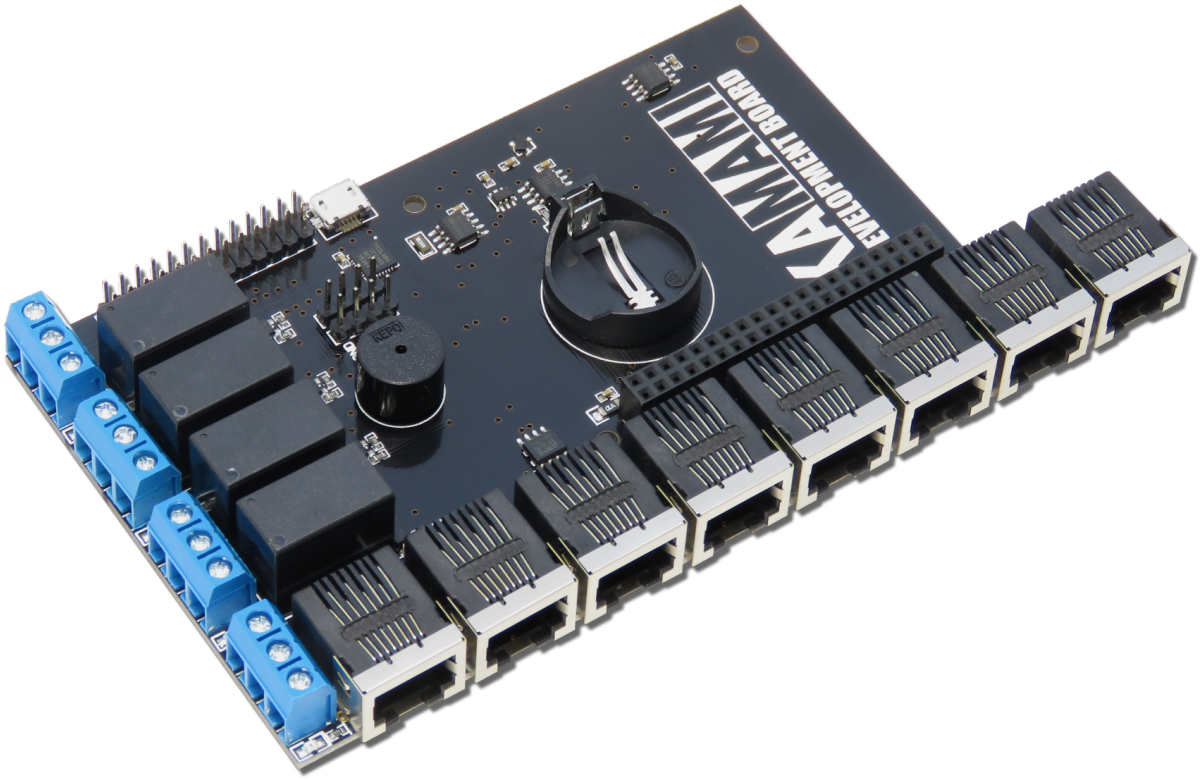
Description

Nettemp Pi Hat is a module that allows to connect eight trees of sensors with I2C/1-Wire interface and control of four relays outputs. Thanks to the extension board is possible to build in an easy way e.g. multipunkt temperature controller.



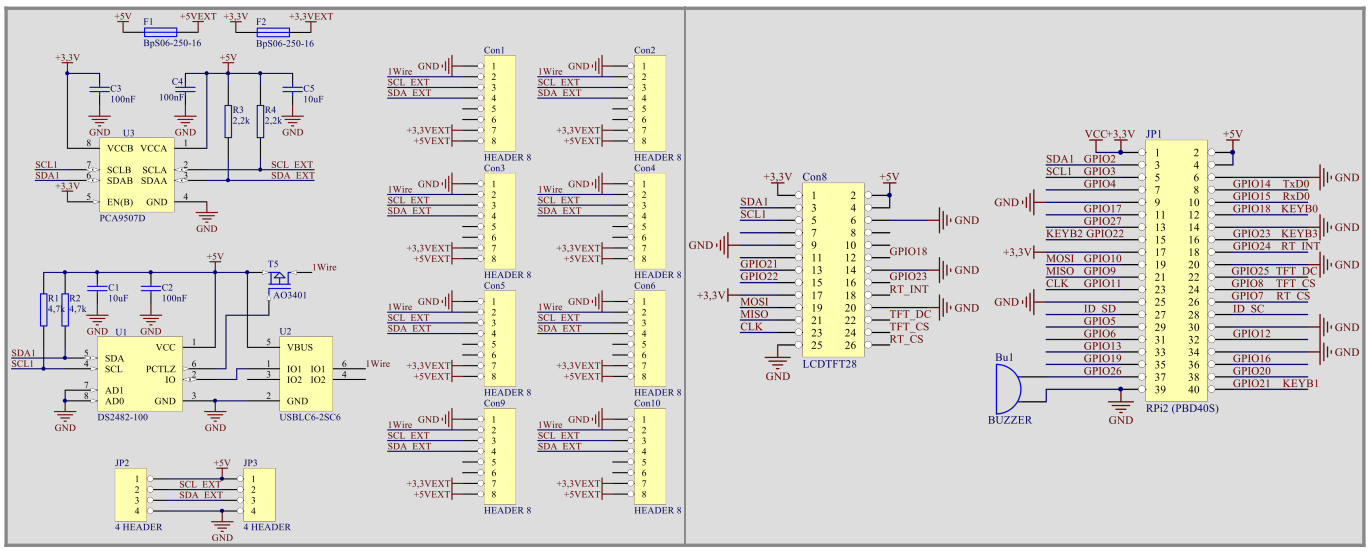
Basic features and parameters

- Compatibility with NETTEMP software
- Extension board for Raspberry PI (version 3/2B/B+)
- Possibility of connection eight separate trees of sensors with I2C/1-Wire interface
- Module is supplied with minicomputer
- Embedded UART-USB converter (based on chip CP2102 from Silicon Labs)
- Embedded four relays with NO/NC outputs
- Load is connected by screw terminals
- Maximum load of relay pins: 3A / 250VAC
- Embedded real-time clock (M41T00S chip from STMicroelectronics)
- Embedded battery holder for RTC support
- Embedded buzzer
- Embedded connector allows to add a minicomputer without any wires
- Embedded pin connector GPIO 28-pin allows e.g. to add TFT display
- Mounting holes for Raspberry PI fastening
- Module size: 146mm x 80mm x 20mm

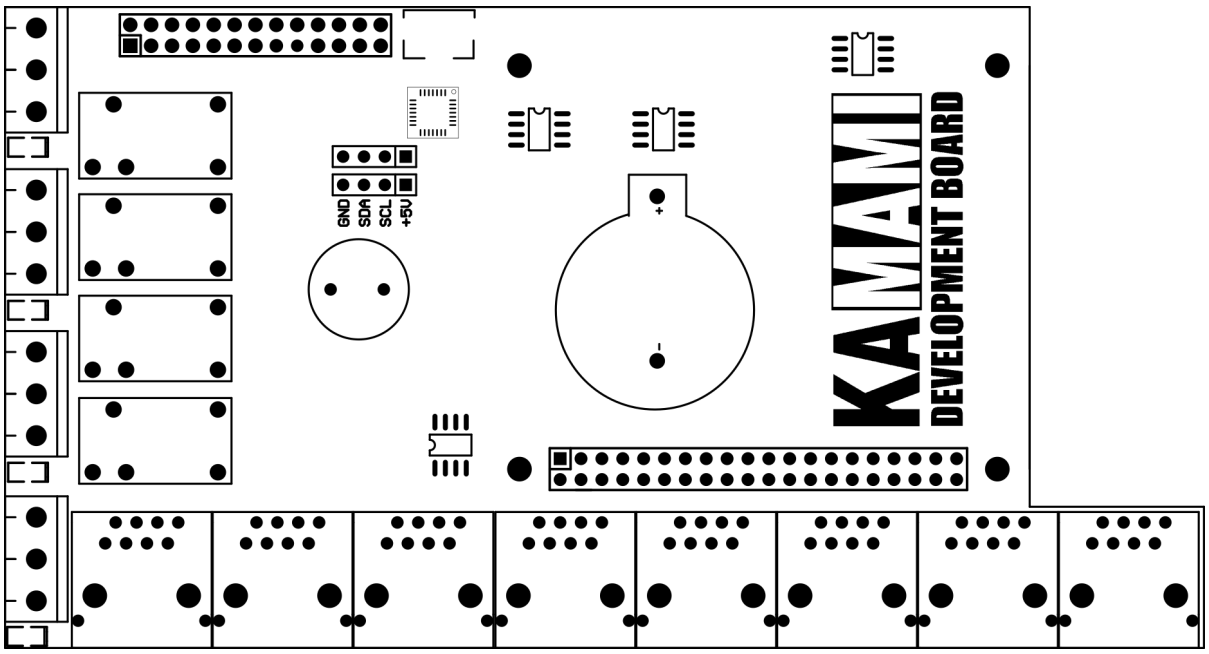
Standard equipment

Code	Description
Nettemp Pi Hat	• Assembled and launched module

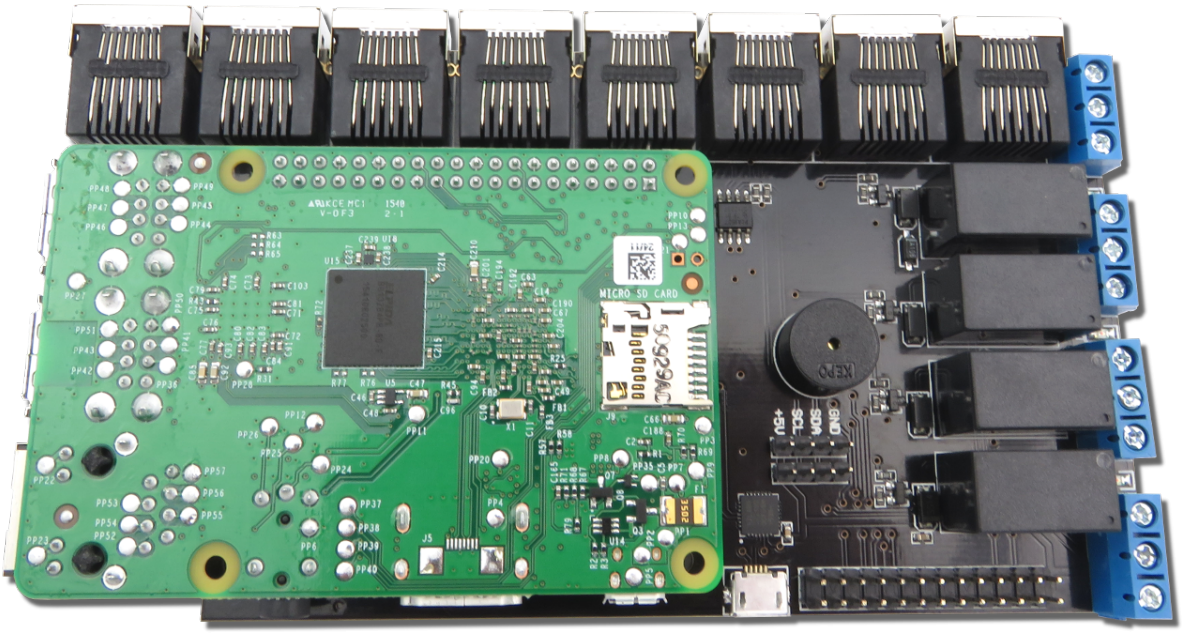
Electrical schematic



View of PCB

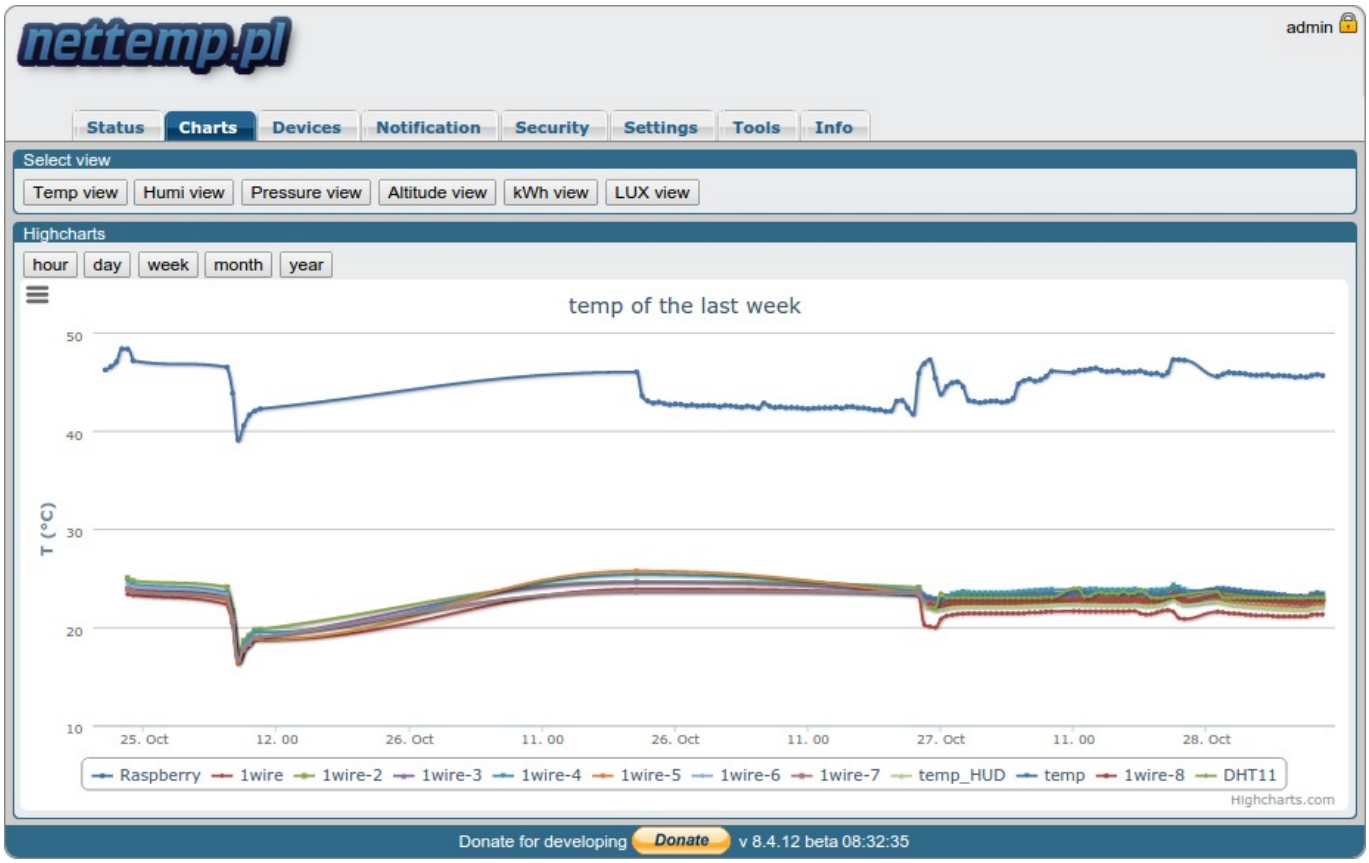


Nettemp Pi Hat and Raspberry Pi



Nettemp – system of temperature monitor

Nettemp project started for monitor of temperature in flats of author to make a optimalization of rooms heating. Description of project, news and idea of project development can be find on site: www.nettemp.pl. Project assumptions included to provide a ready to use solution for wireless sensors management of temperature, humidity and light measurement and relays controll. Software part of project based on simple installer and WWW interface.



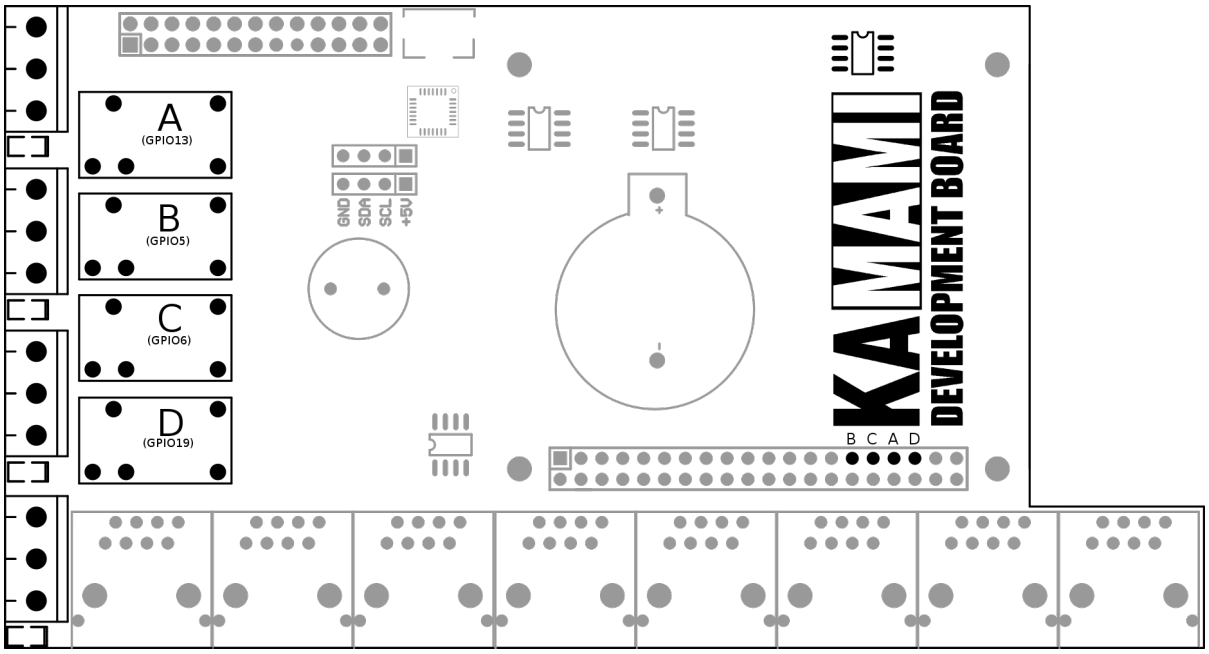
Simple use of Nettemp'a:

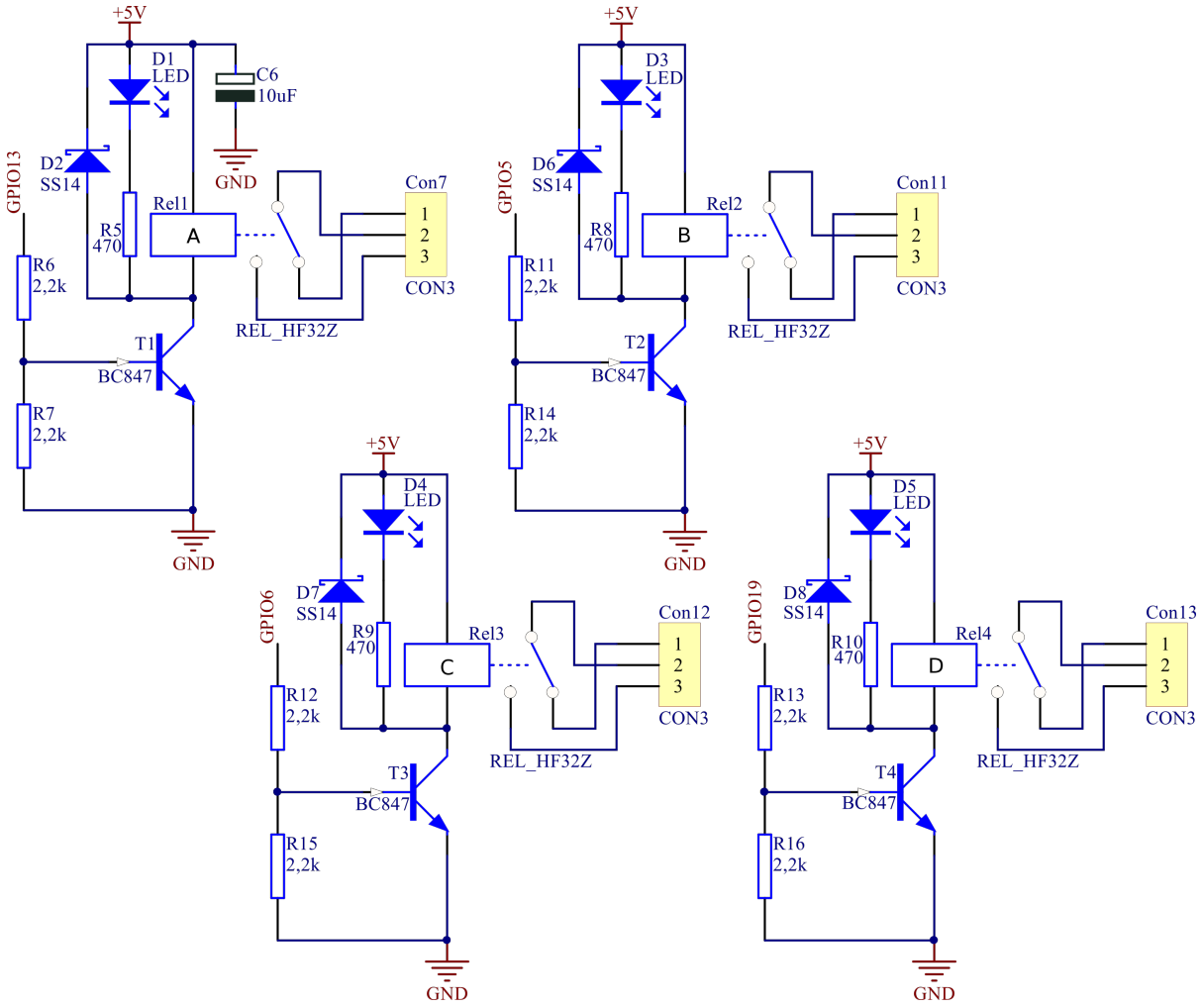
- Temperature, pressure and humidity measurement in server room
- Heat control at home
- Air conditioning control
- Sterowanie oświetleniem

On website www.nettemp.pl can you find a presentation film, fast installation script or list of compatibile sensors. Any problems or questions can you describe on forum on address: www.techfreak.pl/forum.

Relays outputs

Nettemp Pi Hat board has an embedded four relays with control coils and LED controls of enabling. Module can be controlled via GPIO lines of Raspberry Pi (5, 6, 13,1 9 pins). Relays outputs are extended on screw terminals and are available normal close (NC) as well as normal open (NO) pins.



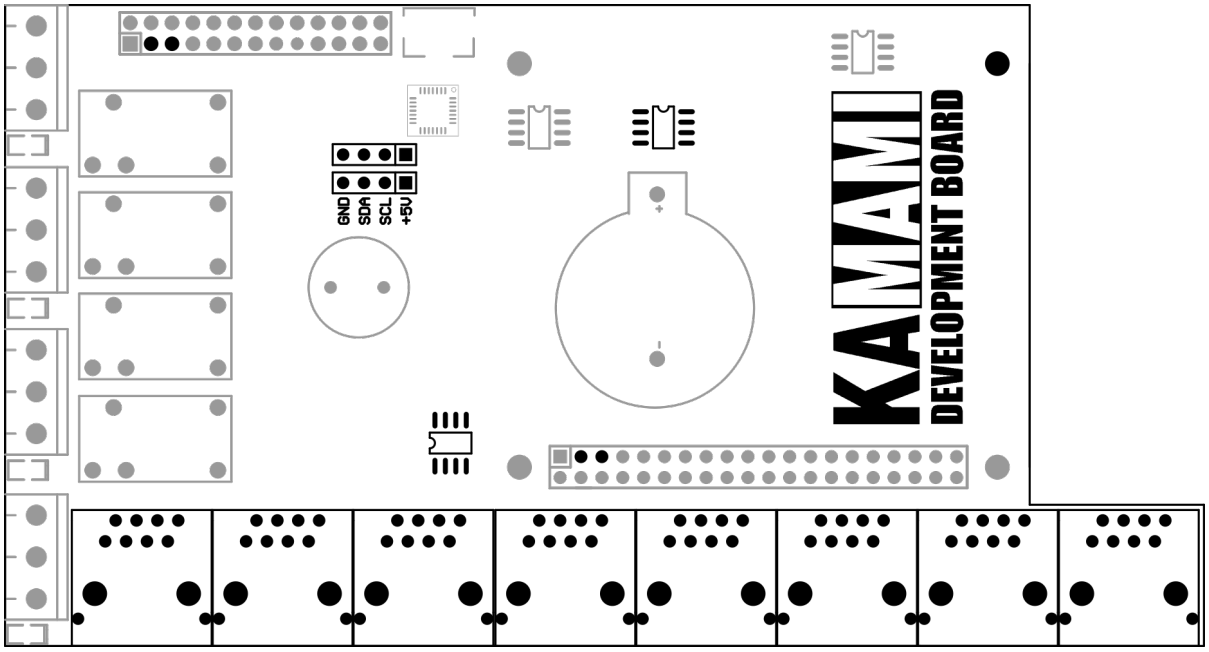

+5V
D1
LED
C6
10uF
GPIO13
D2
SS14
GND
R5
470
Rel1
A
Con7
1
2
3
CON3
R6
2,2k
REL_HF32Z
T1
BC847
R7
2,2k
GND
+5V
D3
LED
GPIO5
D6
SS14
R8
470
B
Rel2
Con11
1
2
3
CON3
R11
2,2k
REL_HF32Z
T2
BC847
R14
2,2k
GND
+5V
D4
LED
GPIO6
D7
SS14
R9
470
C
Rel3
Con12
1
2
3
CON3
R12
2,2k
REL_HF32Z
T3
BC847
R15
2,2k
GND
+5V
D5
LED
GPIO19
D8
SS14
R10
470
D
Rel4
Con13
1
2
3
CON3
R13
2,2k
REL_HF32Z
T4
BC847
R16
2,2k
GND

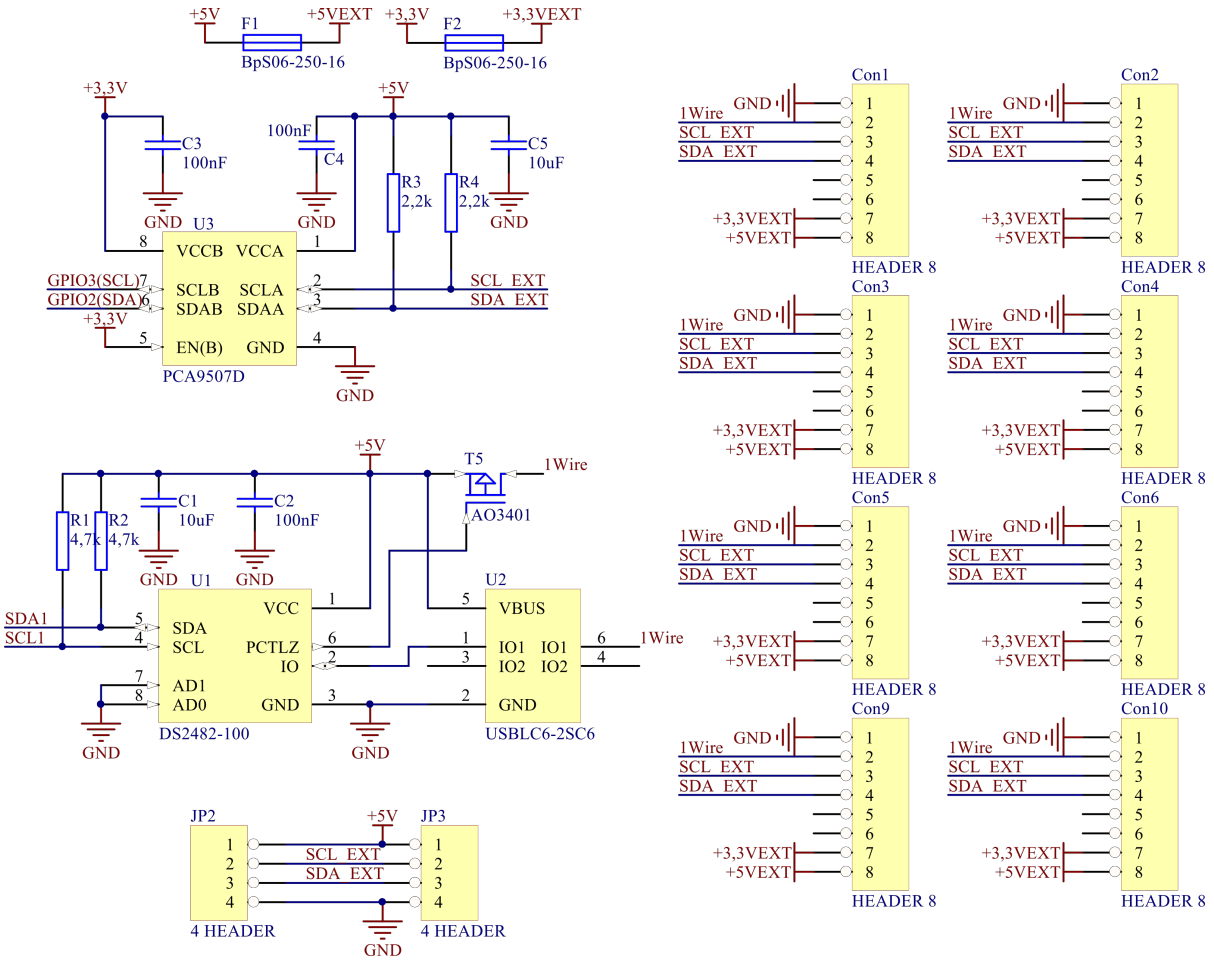
Sensors input with I2C / 1-Wire interface

Embedded RJ-45 socket allow to connect sensors via I2C and 1-Wire interface (supplied via data line). Thanks to the eight sockets is possible to connect a lot of sensors by using separate wires with greater reliability of device. In I2C communication is used PCA9507 expander. It allows to increase a maximum range of work (to 18m). 1-Wire signals are converting to I2C signals by using Dallas DS2482 chip. Separatation between chip and sensors (connected to 1-Wire ports) is USBLC6-2SC6 chip. Signals of common I2C interface are connecting to the GPIO ports of Raspberry Pi (SCL to GPIO3 lines, SDA to GPIO2 line). In each RJ-45 port are following signals: 1-Wire, SCL (I2C), SDA (I2C), ground, 3V3 and 5V (both of power supply line are protected with polimer fuses with value 500mA). Maximum current available on power supply lines depends on possibility of Raspberry PI minicomputer. On board are also available to pin headers, I2C interface lines and 5V power supply (without fuse protection).

Power supply lines of Raspberry Pi shouldn't be overload.

SDA and SCL lines of I2C interface are pulled-up to 5V line. Before connection additional device, check compatibility of the device with this system.

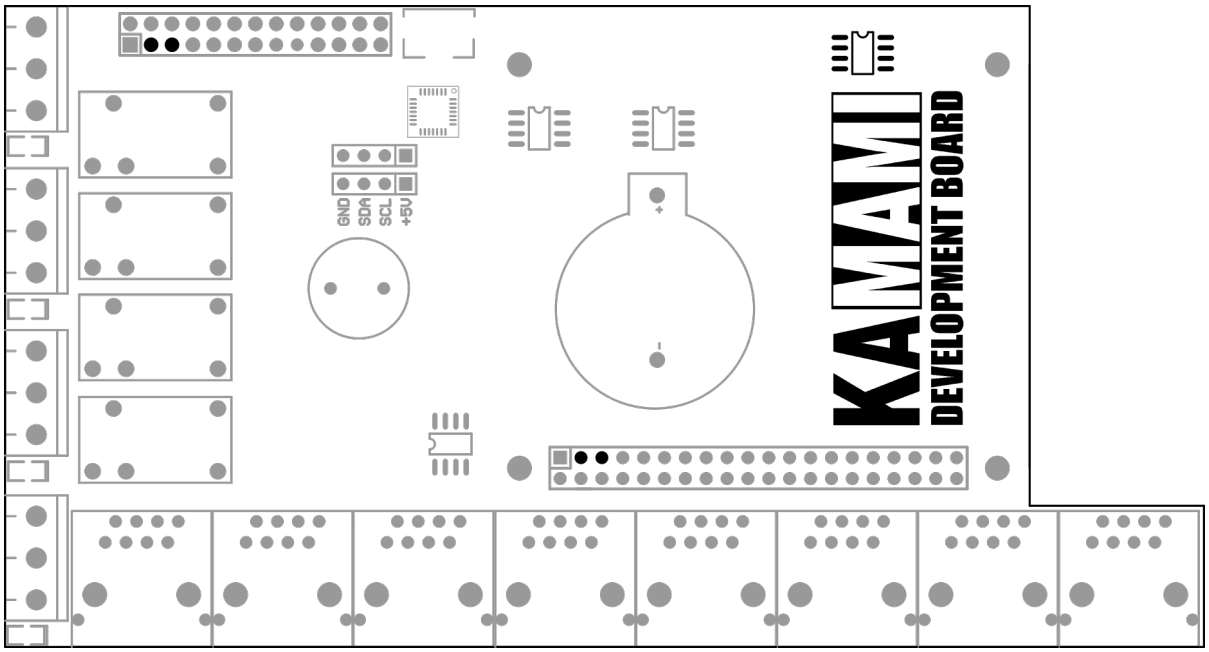


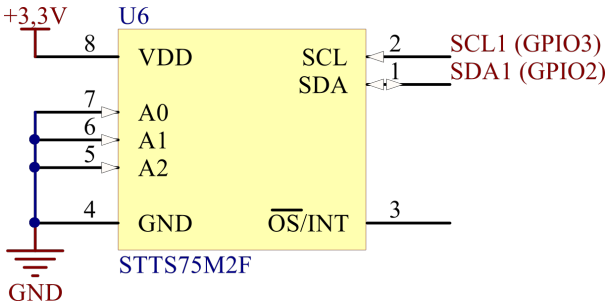


RJ45 port pin	Function
1	Ground
2	1-wire signal
3	SCL signal
4	SDA signal
5	NC
6	NC
7	Power supply +3,3 V
8	Power supply +5 V

Embedded temperature sensor

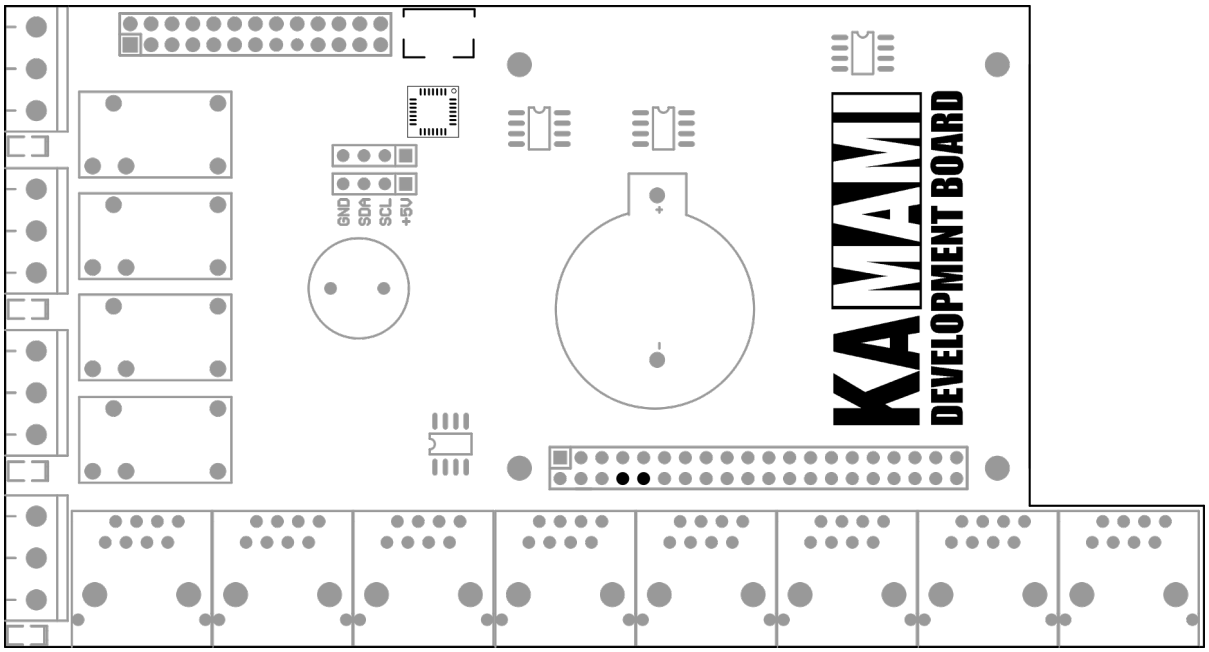
On board is placed a chip of temperature sensor STTS75M2F, connected with I2C interface to Raspberry Pi GPIO ports (SCL signal to GPIO3 line, SDA singal to GPIO2 line). Sensor allows to measure a temperature in range –55°C to +125°C.

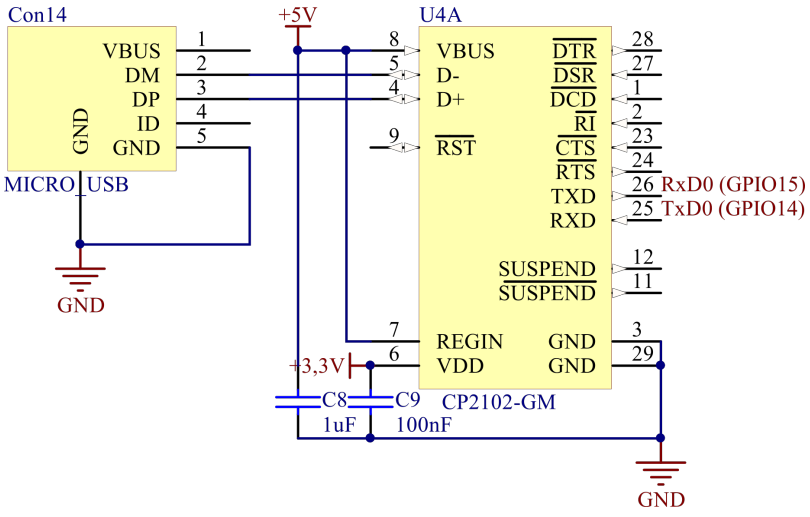




UART – USB converter

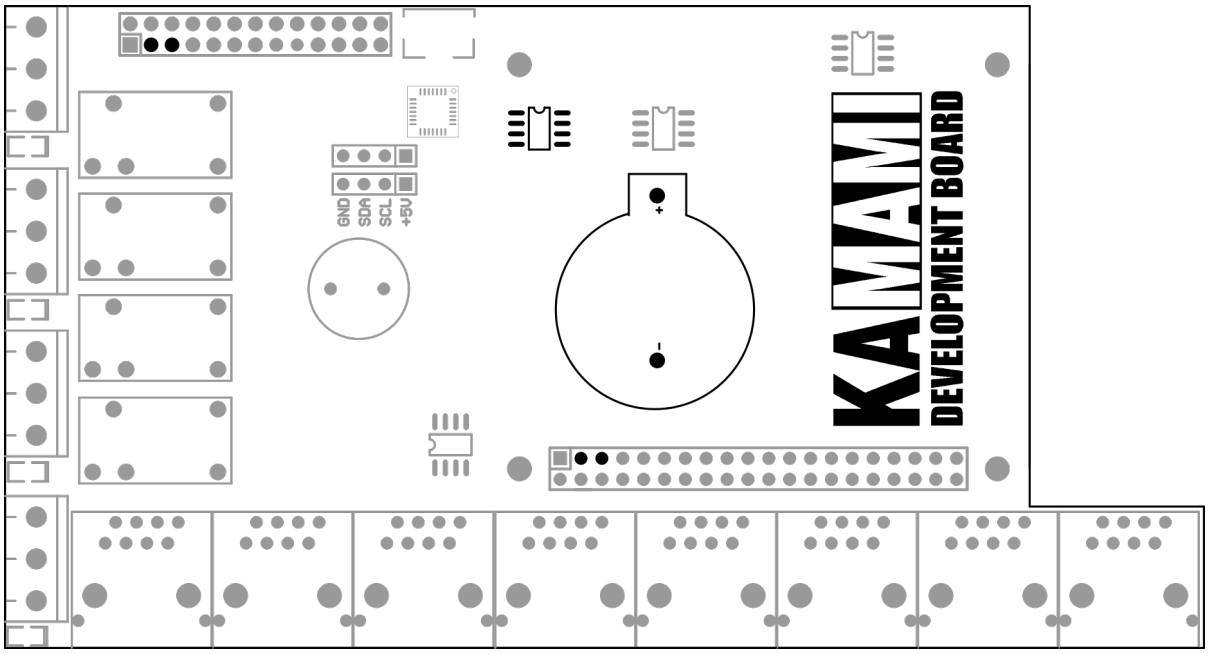
Embedded UART-USB converter allows to communicate of minicomputer with PC (e.g. via terminal). Converter uses a CP2102 chip and RxD and TxD line are connected to GPIO14 and GPIO15 line of Raspberry Pi (cross connection).

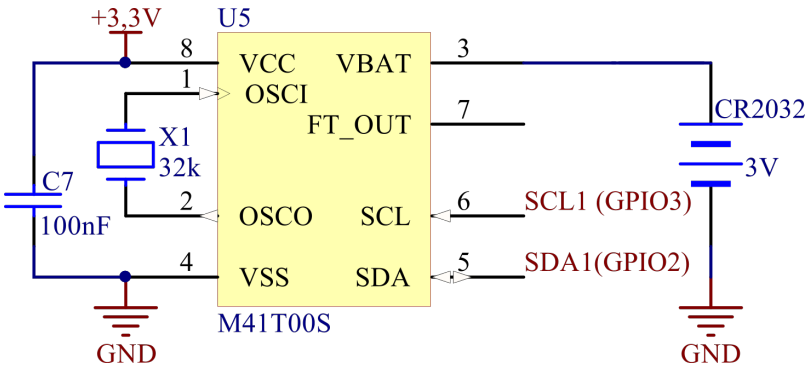




Real-time clock

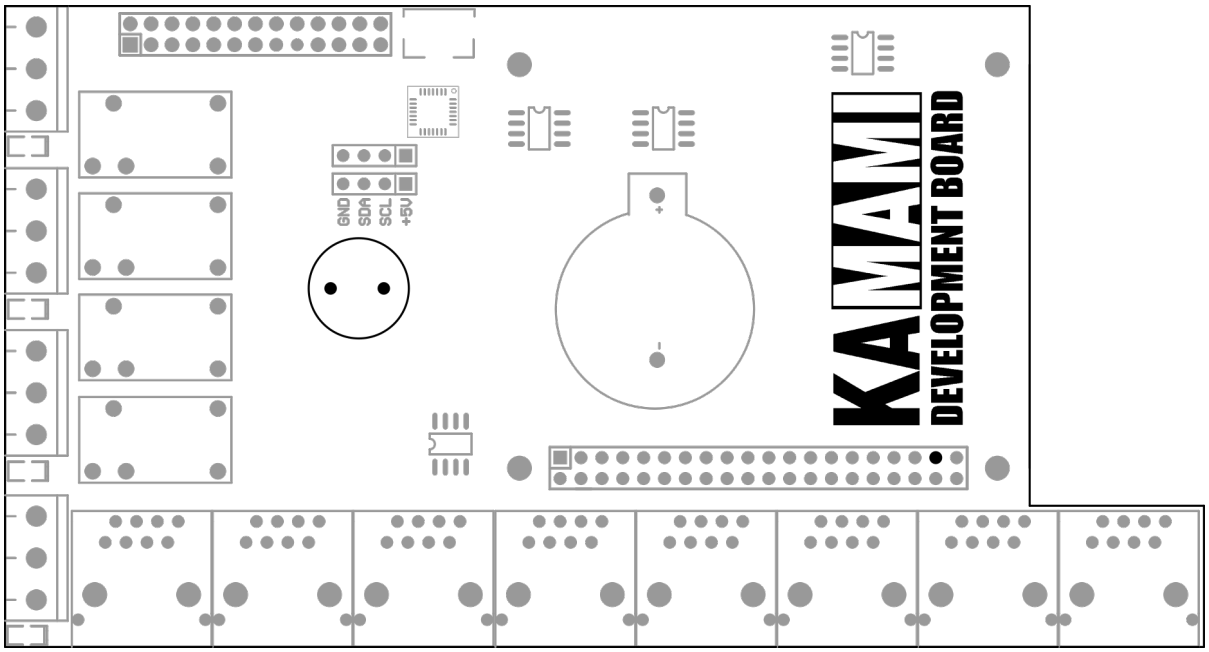
On Nettemp Pi Hat board is placed real-time clock (RTC) with battery holder for CR2032 battery (for support of RTC by losing of power supply). M41T00S chip has connected external oscillator with frequency 32.768kHz. Communication with chip is realized via I2C interface (SCL signal to GPIO3 line, SDA singal to GPIO2 line of Paspberry PI).

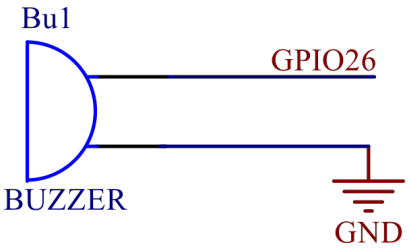




Buzzer

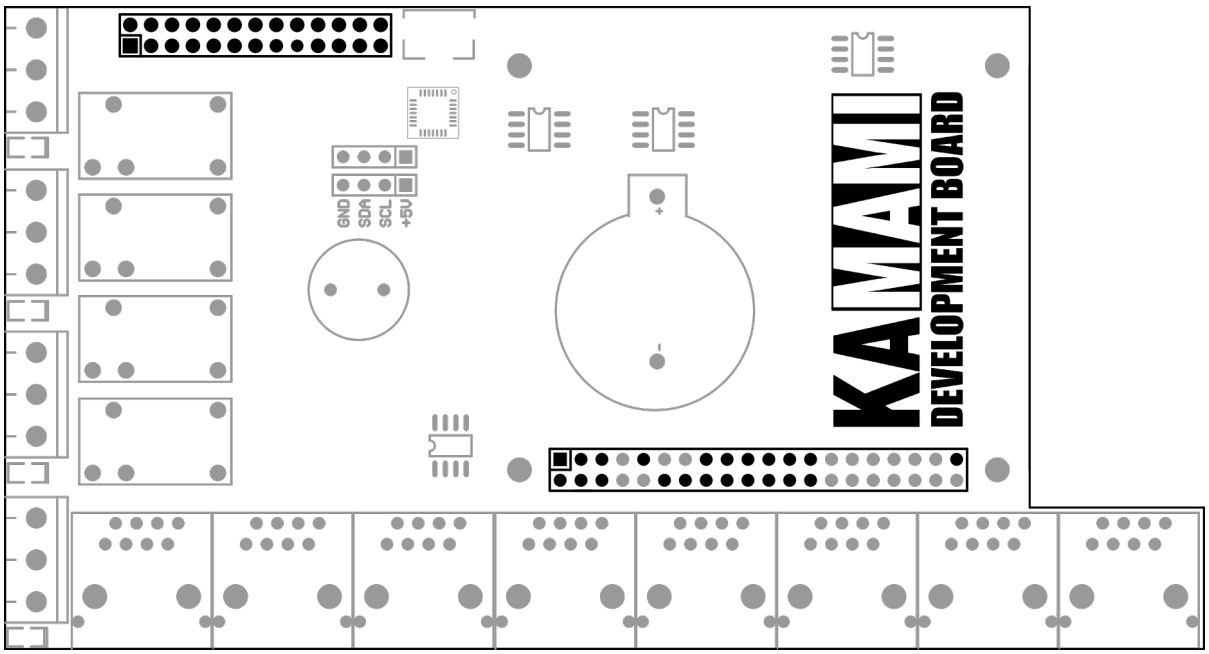
Embedded buzzer is conncted to GPIO26 line of Raspberry Pi. Converter hasn't embedded generator. Thanks to that user has unlimited possibilities for sounds generation (included voice synthetization).

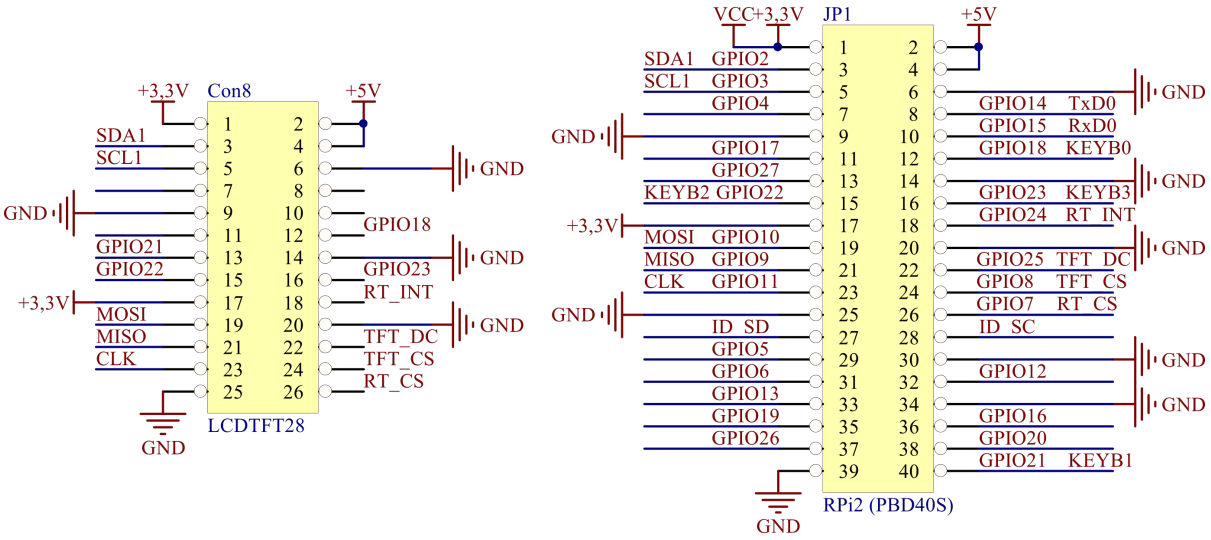




TFT display connector

Double pins connector on board Nattemp Pi Hat allows to connect touch color display 2.8” with ILI9341 controller for Raspberry Pi (modRPi TFT28).


GND
SDA
SCL
+5V
KAMAMI
DEVELOPMENT BOARD


+3,3V
Con8
+5V
SDA1
SCL1
GND
GPIO18
GPIO21
GPIO22
GPIO23
RT_INT
+3,3V
MOSI
MISO
CLK
TFT_DC
TFT_CS
RT_CS
GND
LCDTFT28
VCC+3,3V
JP1
+5V
SDA1 GPIO2
SCL1 GPIO3
GPIO4
GPIO14 TxD0
GPIO15 RxD0
GPIO17
GPIO18 KEYB0
GPIO27
KEYB2 GPIO22
GPIO23 KEYB3
GPIO24 RT_INT
MOSI GPIO10
MISO GPIO9
GPIO25 TFT_DC
CLK GPIO11
GPIO8 TFT_CS
GPIO7 RT_CS
ID_SD
ID_SC
GPIO5
GPIO12
GPIO6
GPIO13
GPIO19
GPIO16
GPIO26
GPIO20
GPIO21 KEYB1
RPi2 (PBD40S)

External links

- Nettemp project website
- Nettemp project forum
- Article 'Nettemp Pi Hat nowy moduł dla Raspberry Pi'

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