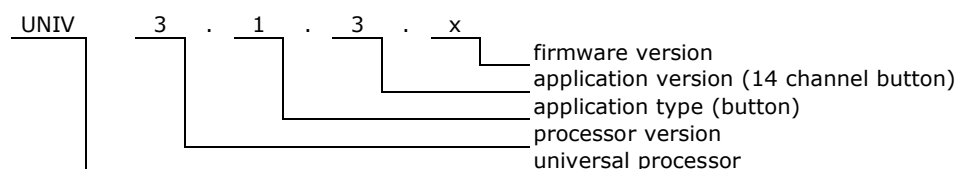


## 1. Features

- 14 channel button module. Up to 14 buttons with free voltage contacts can be connected to the module
- Possibility to connect 14 LEDs to indicate status of other nodes
- Uses 1-wire digital sensors DS18B20, or DS1822.
- Measures temperatures from -55°C to +125°C.
- Accuracy  $\pm 0.5^{\circ}\text{C}$  when used with DS18B20, or  $\pm 2.0^{\circ}\text{C}$  with DS1822.
- 12bits temperature resolution.
- Operation voltage 10-24V
- Current consumption 40mA with 14 LEDs turned on
- For deep back box mounting
- Dimensions 44x44x25 mm
- Operating of module depends on firmware uploaded into it.
- Schematic and PCB design can be downloaded from [hapcan.com](http://hapcan.com) site



## 2. Application version



## 3. Technical data

### Bus side

Parameter	Symbol	Value	Unit
Power supply voltage	$U_s$	10-24V	V
Current consumption without LEDs	$I_s$	14	mA
Maximum current consumption with 14 LEDs on	$I_{smax}$	40	mA
Bus connector type	4 terminal blocks 1.5mm <sup>2</sup>		

### Button input

Parameter	Symbol	Value	Unit
Connector type	Stranded ribbon cable		
Size of input wire	s	0.13 26	mm <sup>2</sup> AWG
Length of input wire	l	0.25	m

### Temperature sensor

Parameter	Symbol	Value	Unit
Operating temperature	T	-55 - +125	°C
Operating temperature resolution	$T_{RES}$	0.0625	°C
Temperature accuracy	$T_{ERR}$	DS18B20+: ±2 ±0.5 (-10°C - +85°C) DS1822: ±3 ±2 (-10°C - +85°C)	°C
Connector type	2 terminal blocks 1.5mm <sup>2</sup>		

## 4. Hardware

### 4.1. Schematic

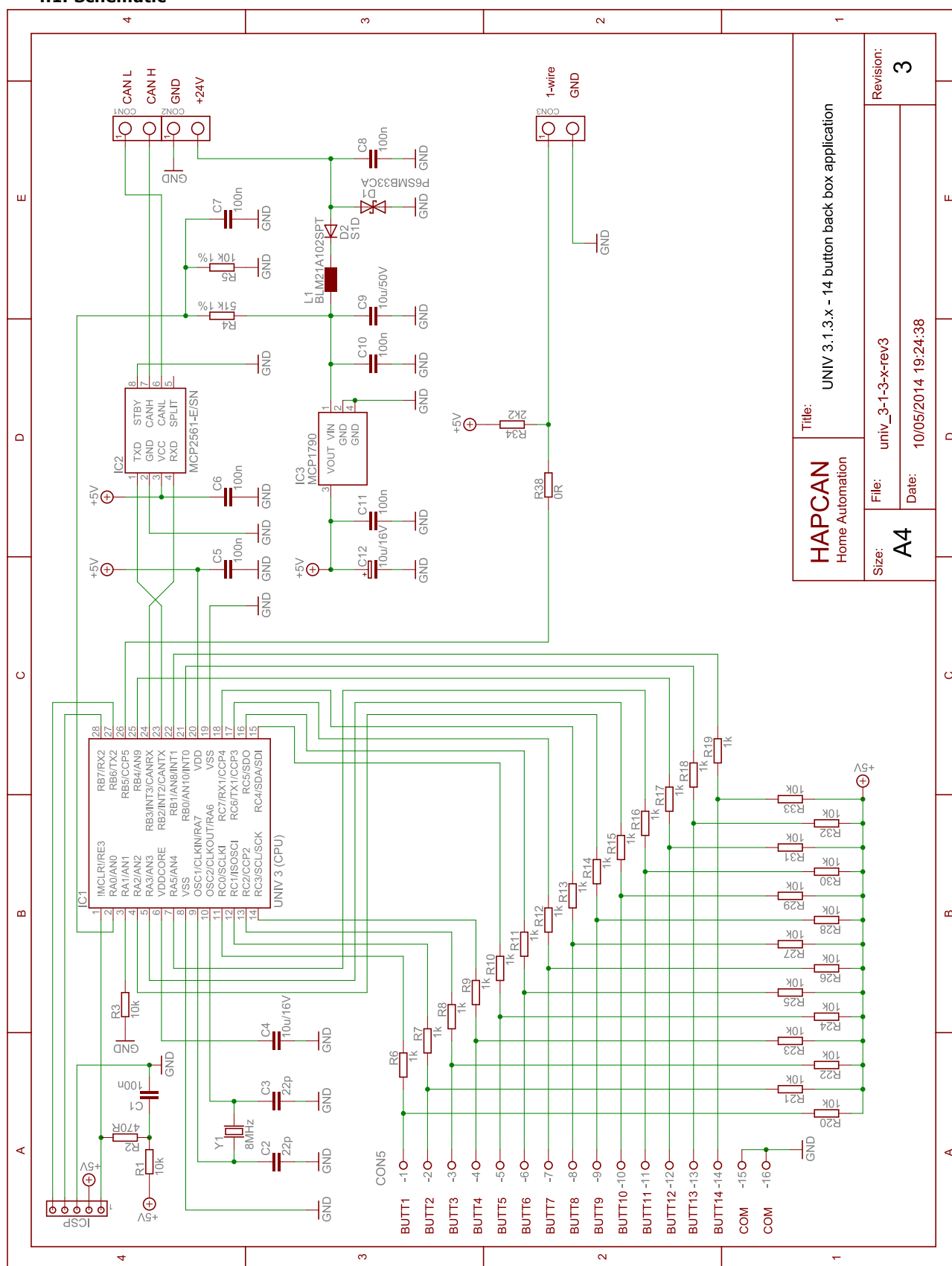


Figure 1. Schematic of UNIV 3.1.3.x module

## 4.2. Wiring

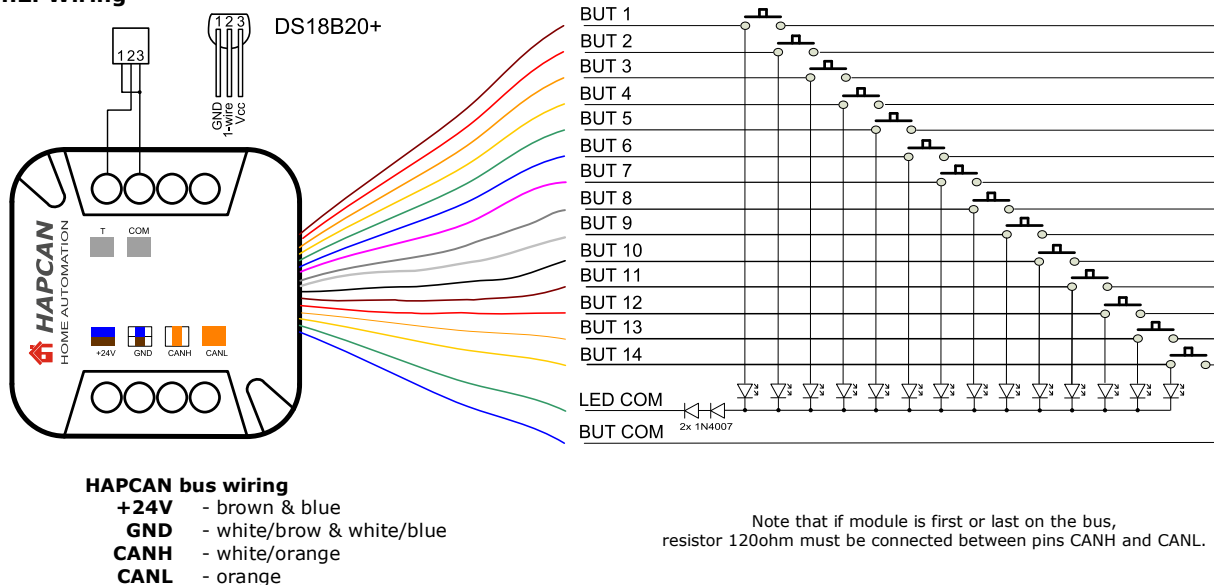
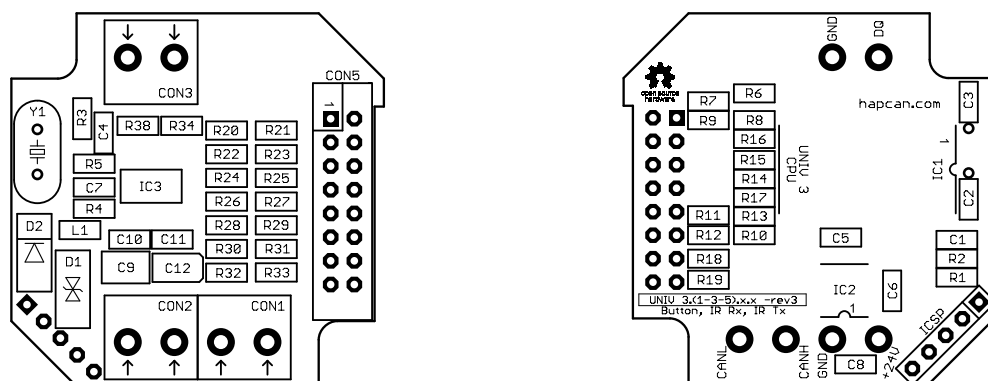


Figure 2. Wiring diagram

## 4.3. Assembly schematic

- Printed circuit boards *PCB UNIV 3.(1-3-5).x.x -rev3* for UNIV 3.1.3.x module
- PCBs dimensions: 40mm x 40mm



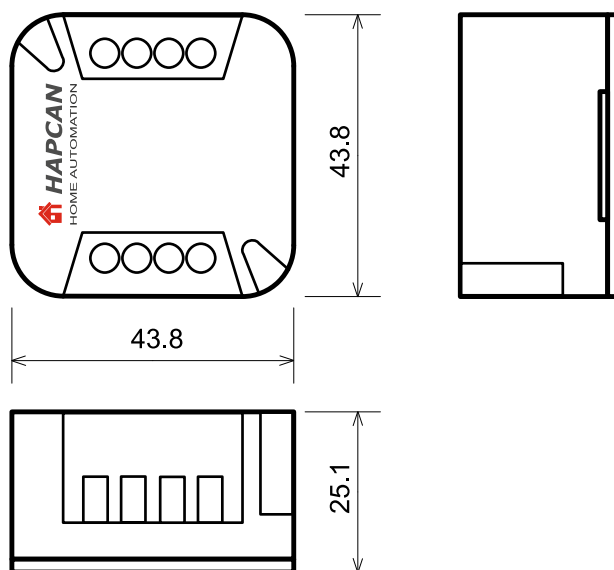
## 4.4. Components

Designator	Type	Footprint	Description
C1, C5, C6, C7, C8, C10, C11	100nF/50V	0805	Capacitor
C2, C3	22pF/50V	0805	Capacitor
C4	10uF/16V (X5R)	0805	Capacitor
C9	10uF/50V	1210	Capacitor
C12	10uF/16V	SMB	Tantalum capacitor
R1, R3, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33	10k	0805	Resistor
R2	470 Ohm	0805	Resistor
R4	51k 1%	0805	Resistor
R5	10k 1%	0805	Resistor
R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19	1k	0805	Resistor
R34	2k2	0805	Resistor
R38	0 Ohm	0805	Resistor
L1	BLM21A102SPT	0805	Choke
Y1	8MHz	HC49-S	Quartz crystal
D1	P6SMB33CA	DO-214	Transil diode
D2	S1D	DO-214	Rectifying diode

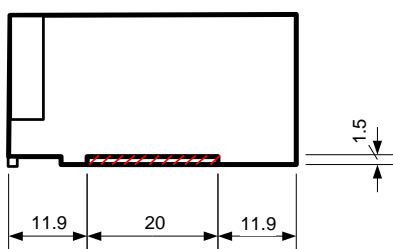
D3, D4	1N4007		Rectifying diode
IC1	UNIV 3 CPU	SOIC-28	HAPCAN universal processor
IC2	MCP2561-E/SN	SOIC-8	CAN transceiver
IC3	MCP1790-5002EDB	SOT-223	Voltage regulator
CON1, CON2, CON3	ARK2	L10xW9xH12 raster 5mm	Terminal block
CON5	AWLP16	Raster 2,54mm	IDC connector
Cable	16 wire	Raster 1,27mm	Ribbon cable
T	DS18B20+	TO-92	Temperature sensor

#### 4.5. Enclosure

- Italtronic C-BOX enclosure for deep back box mounting with diameter  $\varnothing 60\text{mm}$
- Dimensions: 43,8mm x 43,8mm x 25,1mm



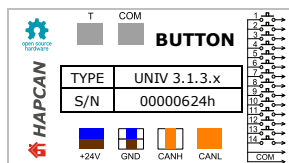
#### 4.6. Mechanical processing



Striped parts must be removed.

#### 4.7. Label

Editable label version is available at [hapcan.com](http://hapcan.com) website.



## 5. Commissioning

### 5.1. CPU voltage measurement

After verifying the correctness and quality of the soldering, the bus voltage should be connected while measuring the processor voltage. To do this, connect a voltmeter to pins 2 and 3 of the ICSP connector. Processor supply voltage should be about 5V.

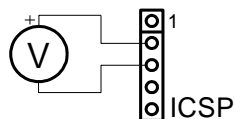


Figure 3. CPU voltage measurement

### 5.2. Checking the CPU clock

Proper operation of the CPU can be checked by temporarily connecting the LED to pins 3 and 5 of the ICSP connector. When device is powered, the LED should light up four times in the sequence 1 second on - 1 second off - 1 second on. The LED lights up only once for 50ms, if the processor is in programming mode.

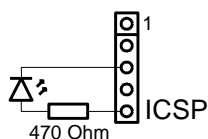


Figure 4. Checking the CPU clock

### 5.3. Firmware uploading

The device requires a firmware uploading for proper operation. It can be done with HAPCAN Programmer software. Both, firmware and HAPCAN Programmer can be downloaded from [hapcan.com](http://hapcan.com) website.

## 6. License



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## 7. Document version

File	Description	Date
univ_3-1-3-x_a.pdf	Original version	June 2014