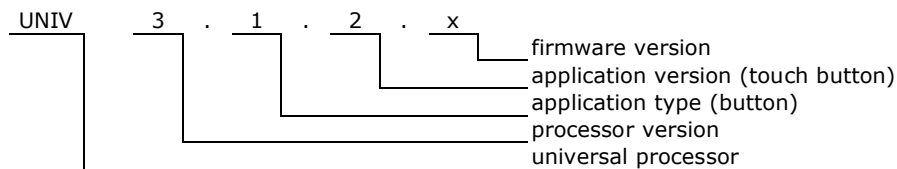


### 1. Features

- 6 channel touch button module. Up to 6 sensors can be connected to the module. There is no front panel with touch sensors included. Please see Microchip AN1492 and AN1334 notes to find out how to design sensors.
- Possibility to connect 6 LEDs to indicate status of other nodes
- Uses 1-wire digital sensors DS18B20, or DS1822.
- Measures temperatures from -55°C to +125°C.
- Accuracy ±0.5°C when used with DS18B20+, or ±2.0°C with DS1822.
- 12bits temperature resolution.
- Operation voltage 10-24V
- Current consumption 18mA with 6 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	$I_s$	8	mA
Maximum current consumption with 6 LEDs turned on	$I_{smax}$	18	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

**4. Hardware**

**4.1. Schematic**

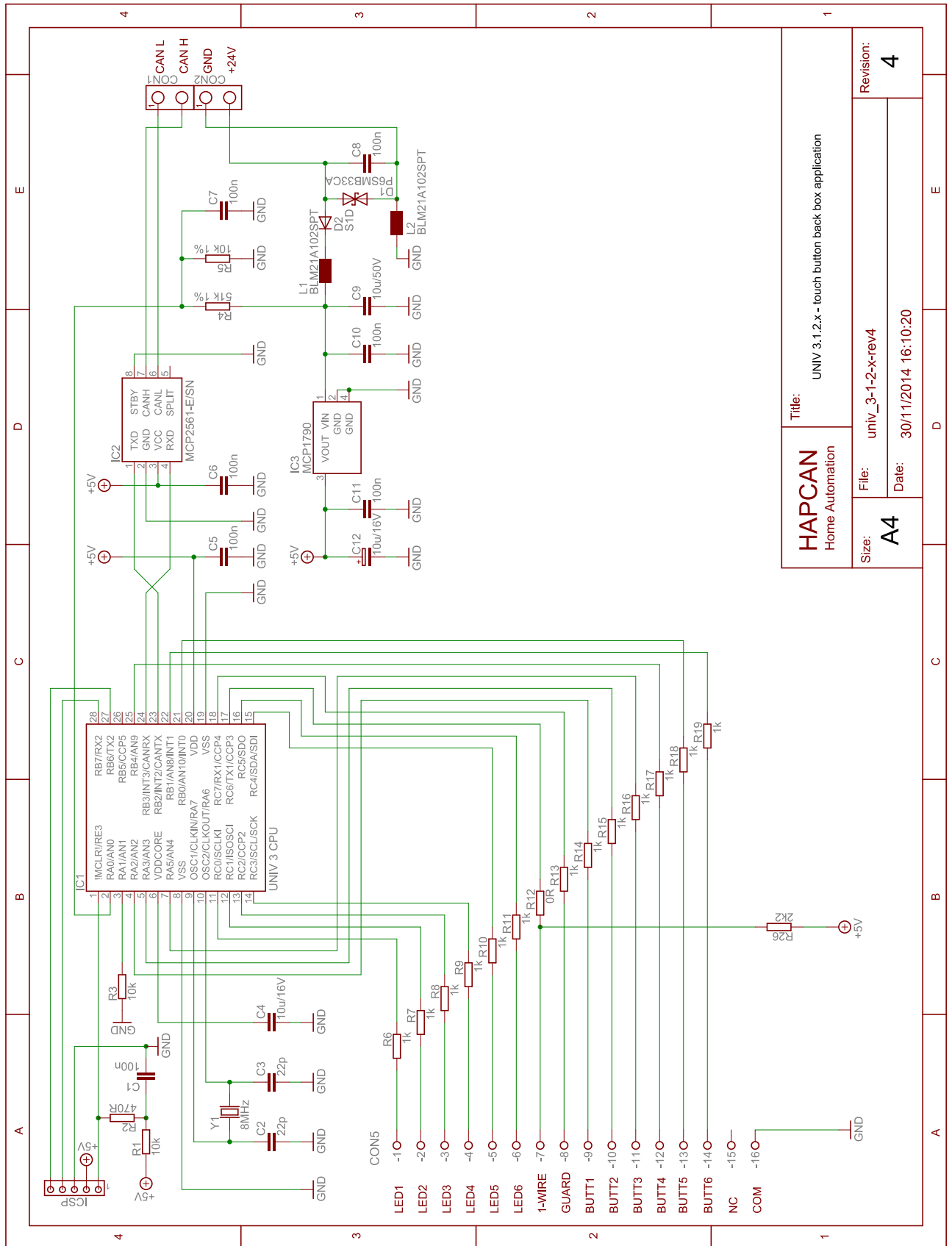
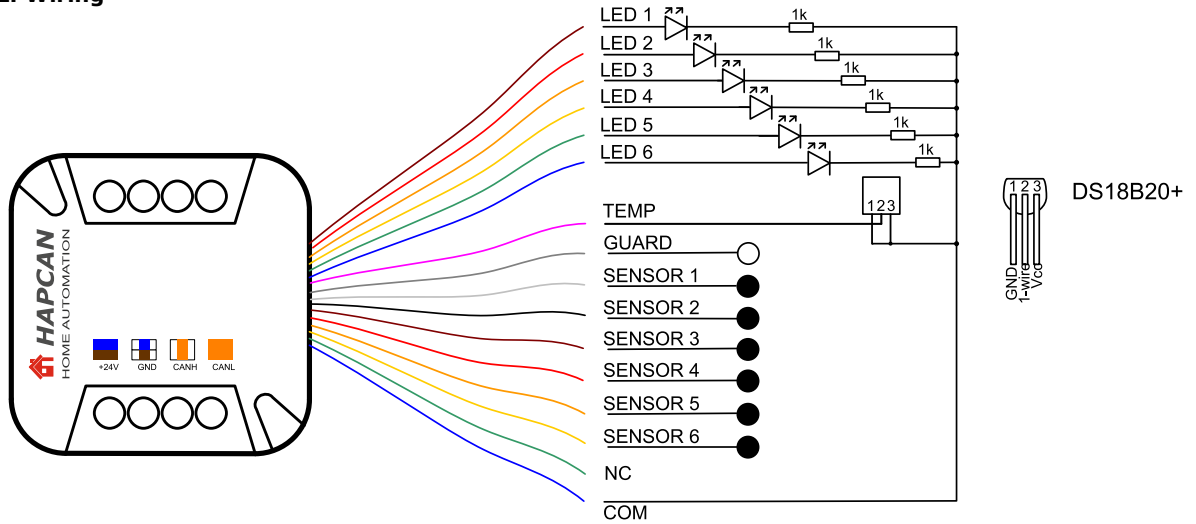


Figure 1. Schematic of UNIV 3.1.2.x module

**4.2. Wiring**



**HAPCAN bus wiring**

- +24V** - brown & blue
- GND** - white/brow & white/blue
- CANH** - white/orange
- CANL** - orange

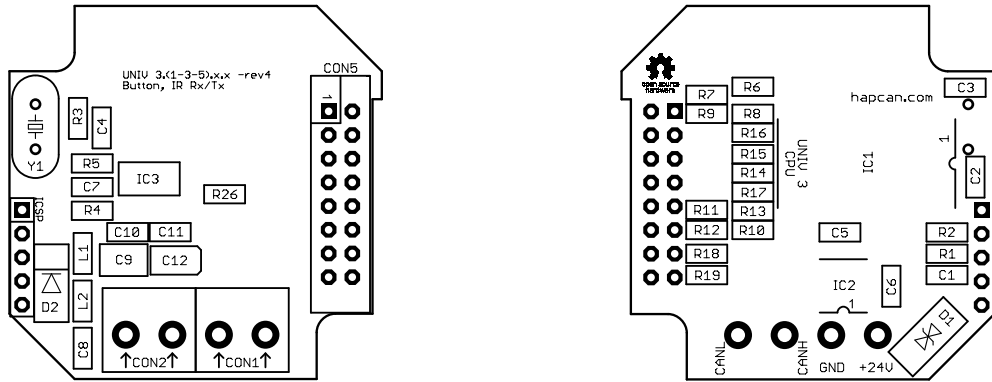
- LED1-LED6** - LED outputs
- TEMP** - DS18B20+ temperature sensor input
- GUARD** - active guard output for touch sensors
- SENSOR1-SENSOR6** - touch sensor input
- COM** - common wire

Note that if module is first or last on the bus, resistor 120ohm must be connected between pins CANH and CANL.

Figure 2. Wiring diagram

**4.3. Assembly schematic**

- Printed circuit boards *PCB UNIV 3.(1-3-5).x.x-rev4* for UNIV 3.1.2.x module
- PCBs dimensions: 40mm x 40mm



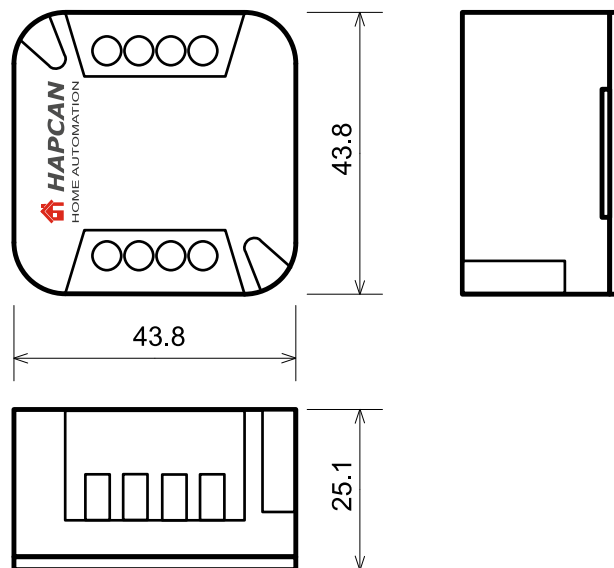
**4.4. Components**

Designator	Quantity	Type	Footprint	Description
C1, C5, C6, C7, C8, C10, C11	7	100nF/50V	0805	Capacitor
C2, C3	2	22pF/50V	0805	Capacitor
C4	1	10uF/16V (X5R)	0805	Capacitor
C9	1	10uF/50V	1210	Capacitor
C12	1	10uF/16V	SMA, SMB	Tantalum capacitor
R1, R3	2	10k	0805	Resistor
R2	1	470 Ohm	0805	Resistor
R4	1	51k 1%	0805	Resistor
R5	1	10k 1%	0805	Resistor
R6, R7, R8, R9, R10, R11, R13, R14, R15, R16, R17, R18, R19	13	1k	0805	Resistor
R12	1	0 Ohm	0805	Resistor

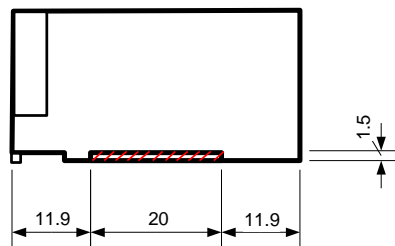
R26	1	2k2	0805	Resistor
L1, L2	2	BLM21A102SPT	0805	Choke
Y1	1	8MHz	HC49-S	Quartz crystal
D1	1	P6SMB33CA	DO-214	Transil diode
D2	1	S1D	DO-214	Rectifying diode
IC1	1	UNIV 3 CPU	SOIC-28	HAPCAN universal processor
IC2	1	MCP2561-E/SN	SOIC-8	Microchip CAN transceiver
IC3	1	MCP1790-5002EDB	SOT-223	Microchip voltage regulator
CON1, CON2	2	ARK2	L10xW9xH12 raster 5mm	Terminal block
CON5a	1	ZL202-16G	2x8pin, raster 2,54mm	PCB connector
CON5b	1	AWP-16	2x8pin, raster 2,54mm	IDC connector
Cable	1	16 wire	Raster 1,27mm	Ribbon cable
TEMP	1	DS18B20+	TO-92	Temperature sensor

#### 4.5. Enclosure

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



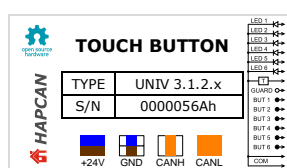
#### 4.6. Mechanical processing



Striped parts must be removed.

#### 4.7. Labels

Editable labels version is available on [hapcan.com](http://hapcan.com) site.



## 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.

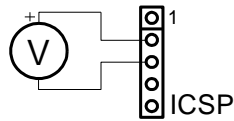


Figure 3. CPU voltage measurement

### 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.

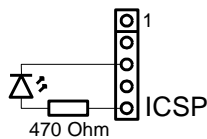


Figure 4. Checking the CPU clock

### 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	Hardware Revision	Description	Date
univ_3-1-2-x_a.pdf	rev2	Initial version	March 2014
univ_3-1-2-x_b.pdf	rev3	Updated to hardware revision 3	June 2014
univ_3-1-2-x_c.pdf	rev4	Updated to hardware revision 4	November 2014
univ_3-1-2-x_d.pdf	rev4	Changes in PCB	April 2017