HAPCAN
HOME AUTOMATION

BACK BOX BUTTON
UNIV 3.1.1.x

1. Features

- 13 channel button module. Up to 13 buttons with free voltage contacts can be connected to the module
- Possibility to connect 13 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 40mA with 13 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 site

2. Application version

UNIV 3 . 1 . 1 . x

- x — firmware version
- 1 — application version
- 1 — application type (button)
- 3 — processor version
- UNIV — universal processor

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 13 LEDs on	I_{smax}	40	mA
Bus connector type	4 terminal blocks 1.5mm^2		

Button input

Parameter	Symbol	Value	Unit
Connector type	Stranded ribbon cable		
Size of input wire	s	0.13 26	mm^2 AWG
Length of input wire	l	0.25	m
Maximum resistance of input loop	R_{max}	500	Ohm

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

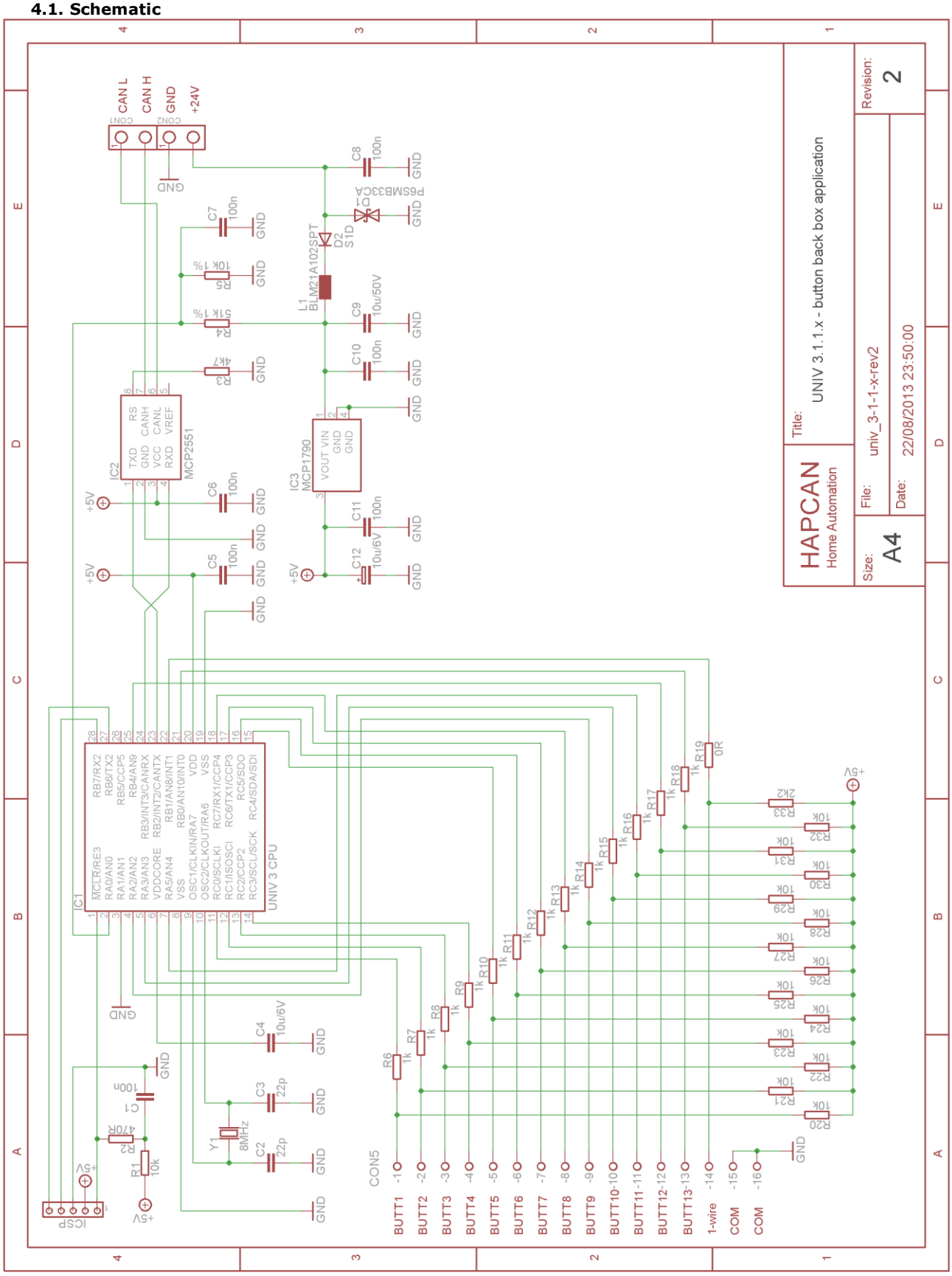
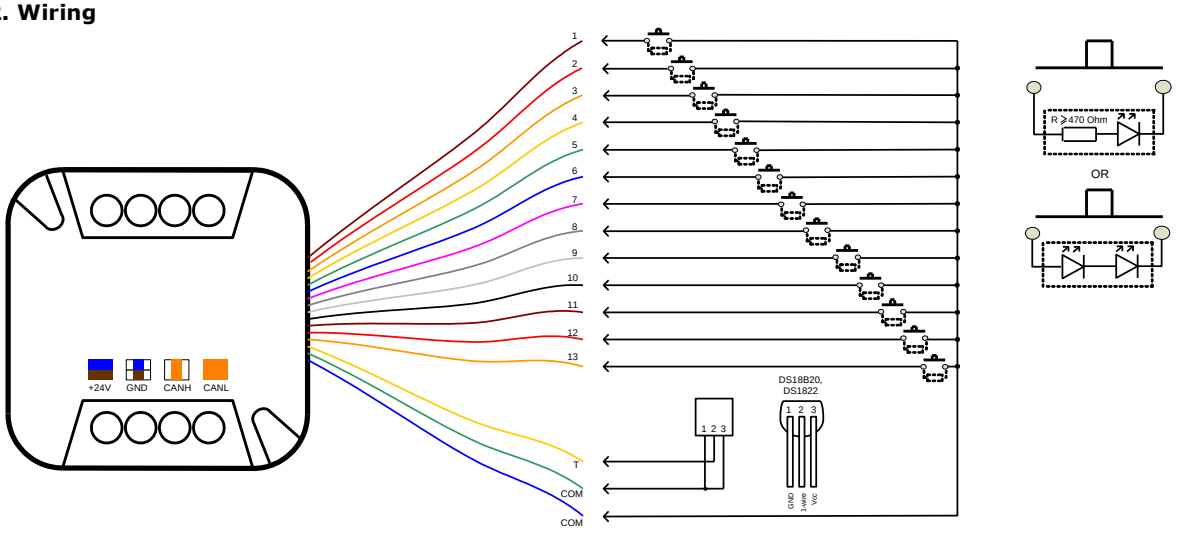


Figure 2. Schematic of UNIV 3.1.1.x module

4.2. Wiring



HAPCAN bus wiring

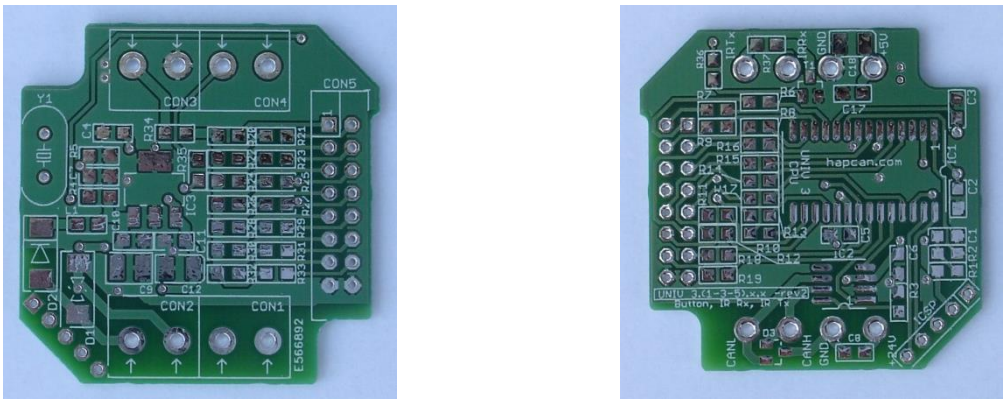
+24V	- brown & blue
GND	- white/brow & white/blue
CANH	- white/orange
CANL	- orange

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

Figure 1. Wiring diagram

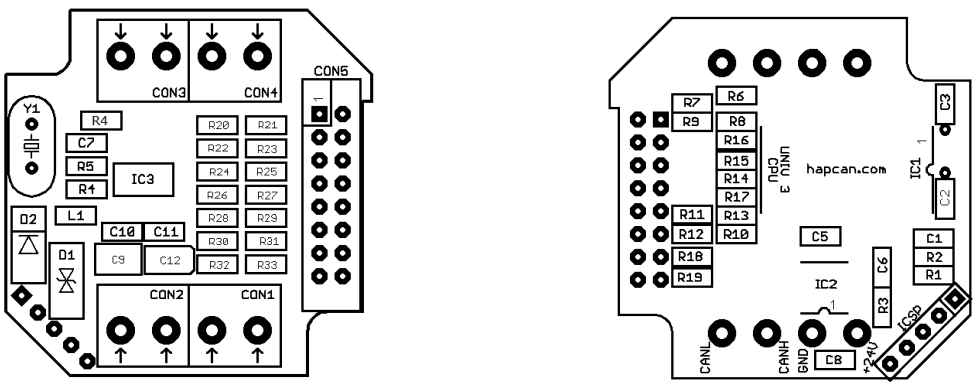
4.3. Printed Circuit Board

- Printed circuit boards *PCB UNIV 3.(1-3-5).x.x –rev0* for UNIV 3.1.1.x module
- PCBs dimensions: 40mm x 40mm



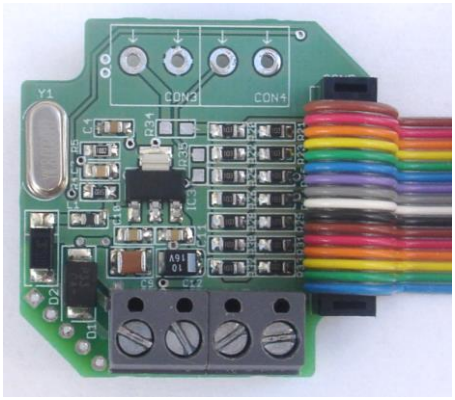
PCB UNIV 3.(1-3-5).x.x –rev2

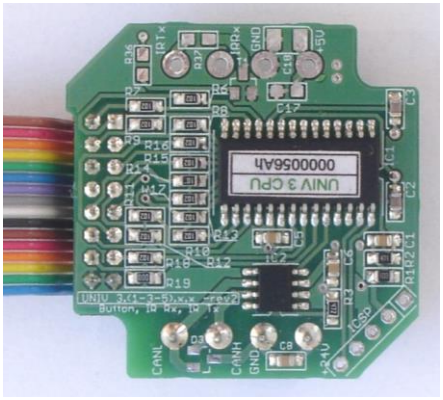
4.4. Assembly schematic



PCB UNIV 3.(1-3-5).x.x –rev2

4.5. Assembled PCB





PCB UNIV 3.(1-3-5).x.x –rev2

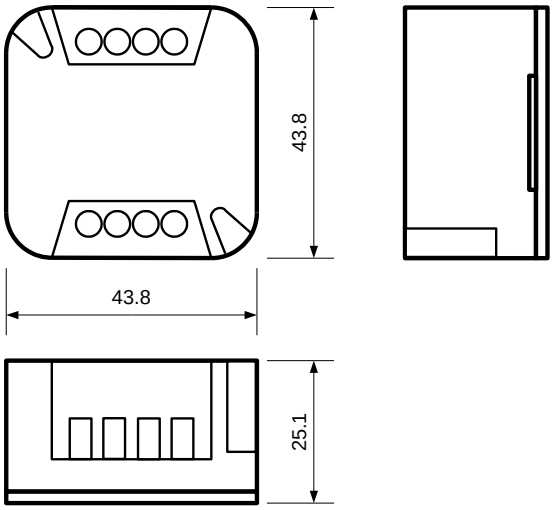
4.6. Components

Designator	Type	Footprint	Description
C1, C5, C6, C7, C8, C10, C11	100nF	0805	Capacitor
C2, C3	22pF	0805	Capacitor
C4	10uF/6V	0805	Capacitor
C9	10uF/50V	1210	Capacitor
C12	10uF/6V	SMB	Tantalum capacitor
R1, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32	10k	0805	Resistor
R2	470 Ohm	0805	Resistor
R3	4k7	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	1k	0805	Resistor
R19	0 Ohm	0805	Resistor
R33	2k2	0805	Resistor
L1	BLM21A102SPT	0805	Choke
Y1	8MHz	HC49-S	Quartz crystal
D1	P6SMB33CA	DO-214	Transil diode
D2	S1D	DO-214	Rectifying diode
IC1	UNIV 3 CPU	SOIC-28	HAPCAN universal processor
IC2	MCP2551-SN	SOIC-8	CAN transceiver
IC3	MCP1790-5002EDB	SOT-223	Voltage regulator
CON1, CON2	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

4.7. Enclosure

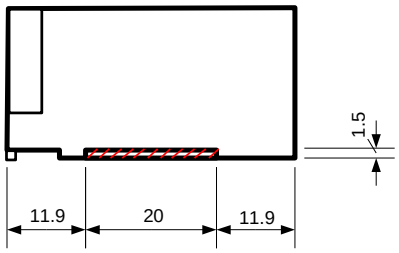
- Italtronic C-BOX enclosure for deep back box mounting with diameter ø60mm
- Dimensions: 43,8mm x 43,8mm x 25,1mm

4.8. Dimensions



4.9. Mechanical processing

4.9.1. Base



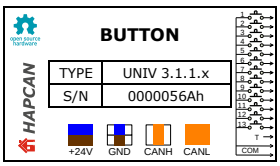
Striped parts must be removed.

4.9.2. Lid

Does not need processing.

4.10. Labels

Editable labels version is available on 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.

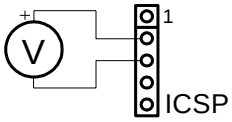


Figure 3. CPU voltage measurement

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.

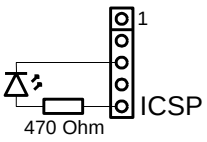


Figure 4. Checking the CPU clock

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 website.

6. License

7. Document version

File	Description	Date
univ_3-1-1-x_a.pdf	Original version	August 2013