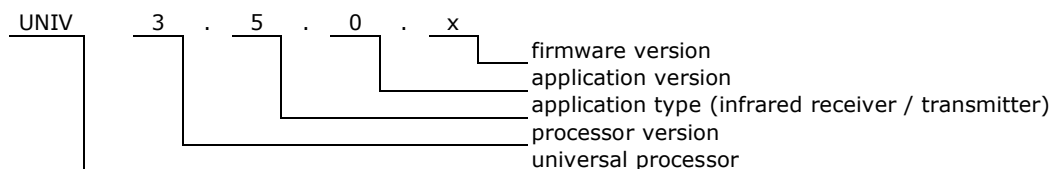**HAPCAN**

HOME AUTOMATION

1. Features

- The module to control AV devices
- Can emits IR signals with carrier frequency up to 500kHz
- Can learn IR codes from original remotes
- Operation voltage 10-24V
- Maximum current consumption 20mA
- 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  .  5  .  0  .  x
                           firmware version
                        application version
                     application type (infrared receiver / transmitter)
               processor version
            universal processor
```

3. Technical data

Bus side

Parameter	Symbol	Value	Unit
Power supply voltage	U_s	10-24V	V
Current consumption	I_s	12	mA
Maximum current consumption	I_{smax}	20	mA
Bus connector type	4 terminal blocks		

IR emitter and receiver side

Parameter	Unit
Connector type	4 terminal blocks
IR receiver	TSOP4838 Vishay
IR emitter	Any IR LED 940nm

4. Hardware

4.1. Wiring
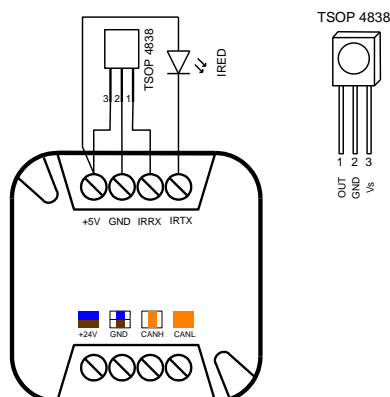
HAPCAN bus wiring
+24V - brown & blue
GND - white/brow & white/blue
CANH - white/orange
CANL - orange

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

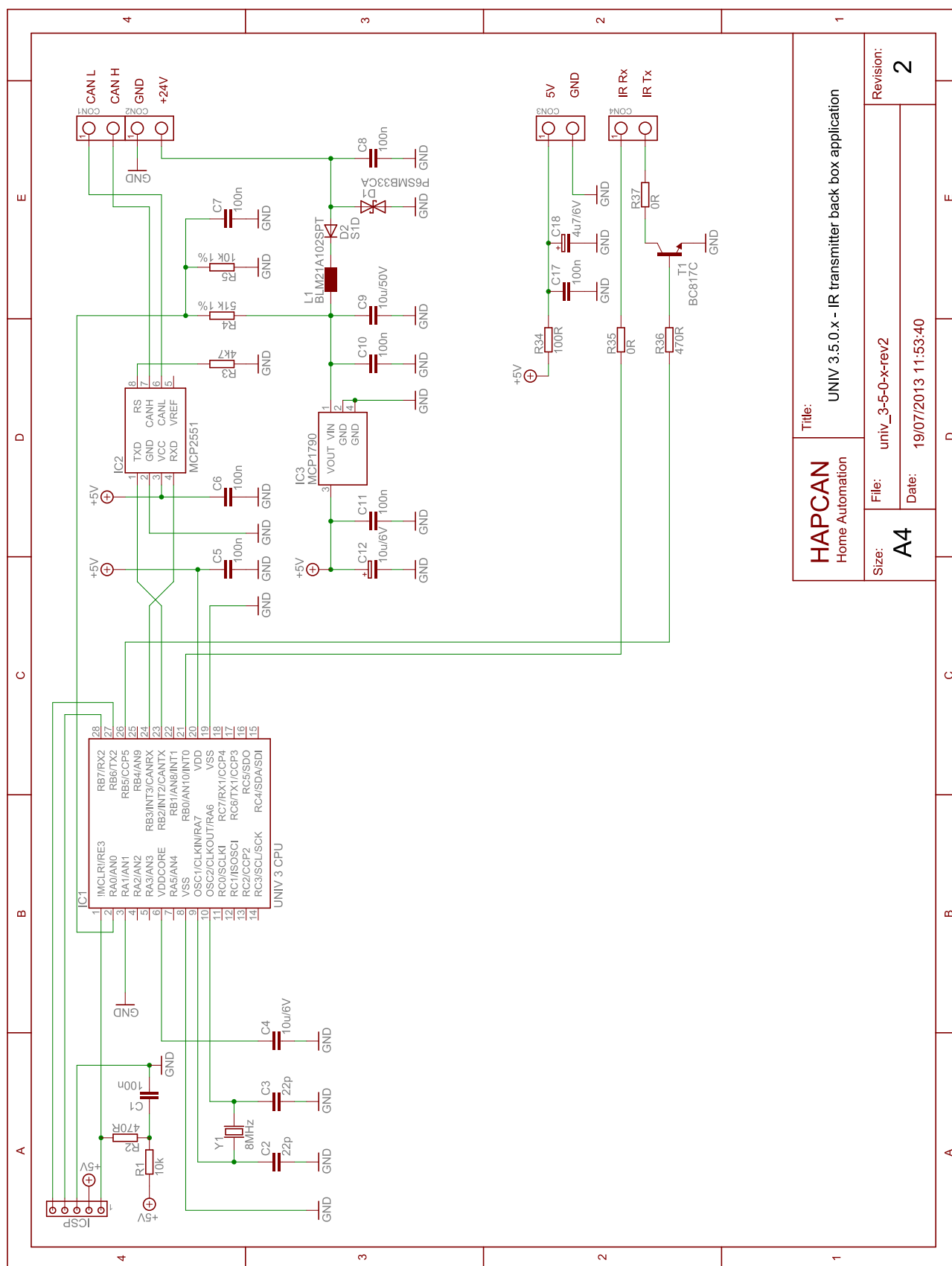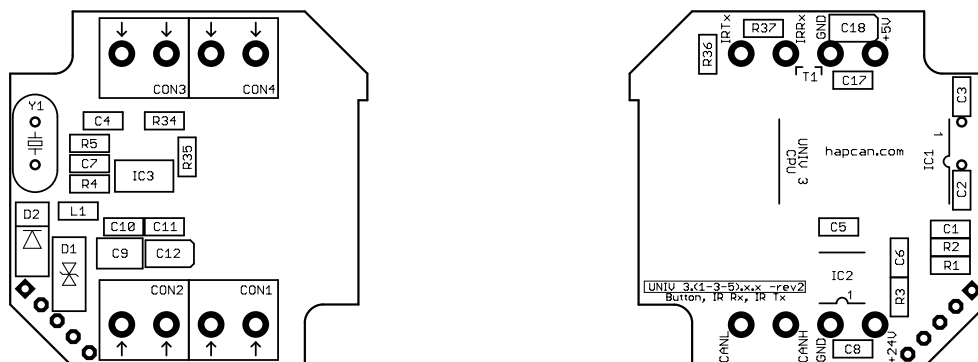Figure 1. Wiring diagram

4.2. Schematic

Figure 2. Schematic of UNIV 3.5.0.x module

4.3. Assembly schematic
- Printed circuit boards *PCB UNIV 3.(1-3-5).x.x –rev0* for UNIV 3.5.0.x module
- PCBs dimensions: 40mm x 40mm

4.4. Components

Designator	Type	Footprint	Description
C1, C5, C6, C7, C8, C10, C11, C17	100nF/50V	0805	Capacitor
C2, C3	22pF/50V	0805	Capacitor
C4	10uF/16V (X5R)	0805	Capacitor
C9	10uF/50V	1210	Capacitor
C12	10uF/16V	SMA, SMB	Tantalum capacitor
C18	4.7uF/16V	SMA, SMB	Tantalum capacitor
R1	10k	0805	Resistor
R2, R36	470 Ohm	0805	Resistor
R3	4k7	0805	Resistor
R4	51k 1%	0805	Resistor
R5	10k 1%	0805	Resistor
R34	100 Ohm	0805	Resistor
R35, R37	0 Ohm	0805	Resistor
L1	BLM21A102SPT	0805	Choke
Y1	8MHz	HC49-S	Quartz crystal
D1	P6SMB33CA	DO-214	Transil diode
D2	S1D	DO-214	Diode 50V 1A
IC1	UNIV 3 CPU	SOIC-28	HAPCAN universal processor
IC2	MCP2551-SN	SOIC-8	CAN Transceiver
IC3	MCP1790-5002EDB	SOT-223	Voltage regulator
T1	BC817C	SOT-23	NPN transistor
IRRX	TSOP4838	7x6x4mm	Infrared receiver
IRTX	LD271	ø5mm	IR LED
CON1, CON2, CON3, CON4	ARK2	L10xW9xH12 raster 5mm	Terminal block

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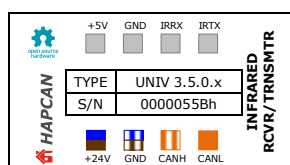- Dimensions: 43,8mm x 43,8mm x 25,1mm

4.6. Dimensions
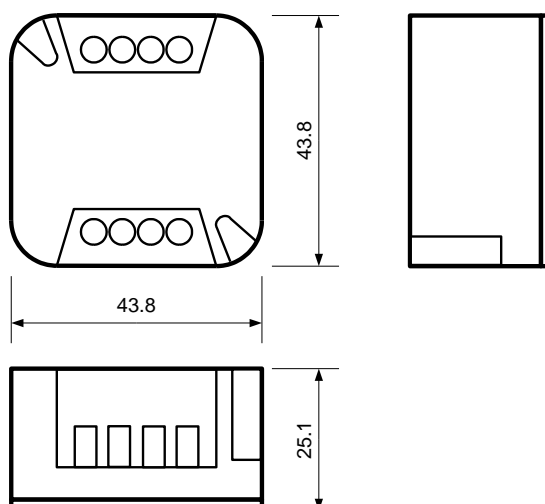
4.7. Labels
Editable labels version is available on hapcan.com site.

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.
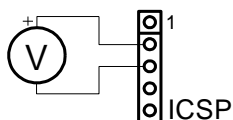

Figure 3. CPU voltage measurement

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.
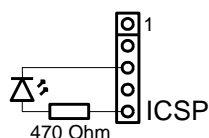

Figure 4. Checking the CPU clock

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

HAPCAN Home Automation Project hardware, Copyright (C) 2013 hapcan.com

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7. Document version

File	Description	Date
univ_3-5-0-x_a.pdf	Original version	July 2013
univ_3-5-0-x_b.pdf	Updated with PCB UNIV 3.(1-3-5).x.x –rev2	July 2013
univ_3-5-0-x_c.pdf	The module is IR receiver and transmitter	October 2013