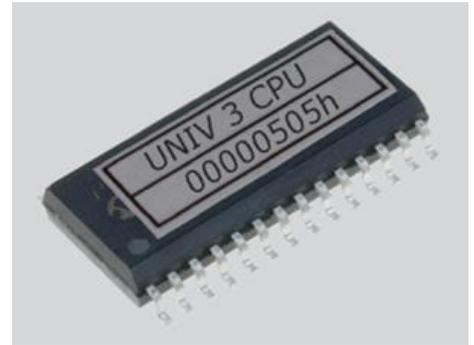
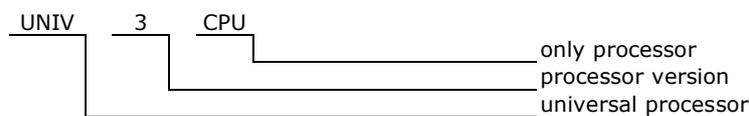


1. Features

- The base to build sensor or actuator of HAPCAN home automation system.
 - PIC18F26K80 microcontroller
 - Package SOIC 28 pin
 - HAPCAN UART/CAN bootloader programmed which enables module firmware uploading
 - Implements XLP (extreme low power)
 - Operating voltage 5V
 - Clock speed 8MHz or 32MHz with PLL
 - Conforms to CAN 2.0B
 - 125kbps bus speed
 - Up to 112 modules can be connected on the same bus
 - High noise immunity due to differential bus implementation
 - An unpowered node will not disturb the CAN bus
- Non-volatile program and data memories
 - 64 kB FLASH (endurance 10,000 Write/Erase Cycles)
 - 1024 B EEPROM (endurance 100,000 Write/Erase Cycles)
 - 3.6 kB SRAM
- Peripherals
 - 18 general purpose inputs/outputs
 - 5 PWM output
 - 2 USART
 - Supporting SPI, I²C
 - 6 available channels of 12-bit A/D converter



2. Processor symbol



3. Overview

This is a microcontroller of HAPCAN system. The processor comes with programmed HAPCAN UART/CAN bootloader, which allows firmware to be loaded through the serial port or CAN bus. It can be used to build one of the system nodes. It needs a few external components to create sensor, actuator or interface of HAPCAN system. Functionality of device built with UNIV 3 CPU depends on firmware uploaded into it. All schematics, firmware and Windows software can be found at hapcan.com.

4. Hardware

4.1. Processor outputs

The PIC18F26K80 by Microchip is used as UNIV 3 CPU processor. Detailed information about microcontroller is at microchip.com

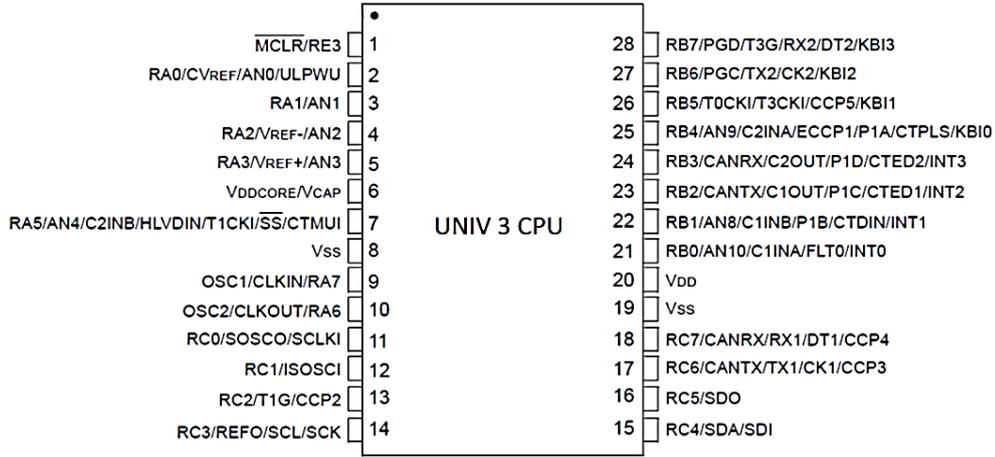


Figure 1. UNIV 3 CPU pinout

4.2. Basic working circuit

The basic UNIV 3 CPU working circuit is shown below (Figure 2). Processor pin 3 connected to the negative power switches bootloader to CAN mode, while connected to positive power switches to UART/CAN mode and increases the clock from 8MHz to 32MHz. The C5 capacitor is required only in UART/CAN (32MHz) bootloader mode.

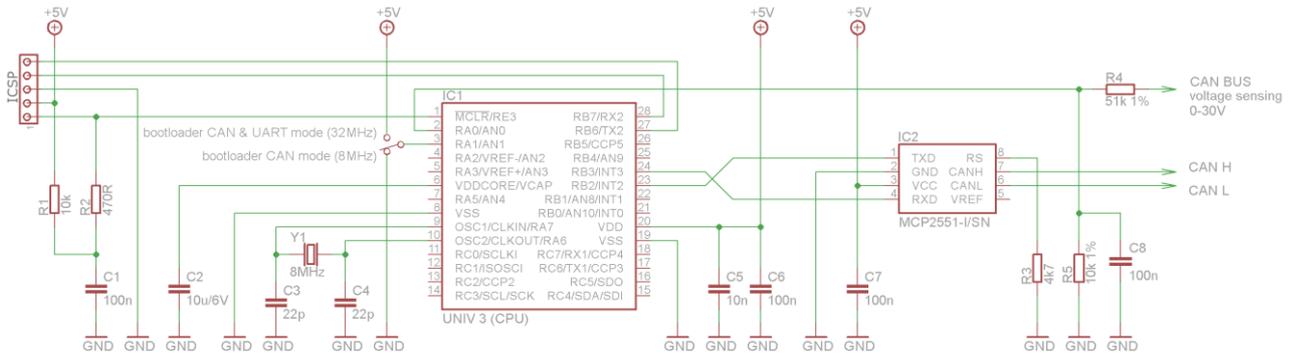


Figure 2. Basic working mode for UNIV 3 CPU

4.3. 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 (processor pin 27 and GND). When device is powered, the LED should light up in one of the sequences shown in table below.

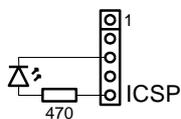


Figure 3. Checking the CPU clock

| | |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <p>Bootloader in UART/CAN mode (32 MHz) – processor can be accessed through serial port UART (RS232C) or HAPCAN bus. The processor clock is 32 MHz.</p> |
| | <p>Bootloader in CAN mode (8 MHz) – processor can be accessed only through HAPCAN bus. The processor clock is 8 MHz.</p> |
| | <p>Bootloader is in the programming mode</p> |
| | <p>Bootloader error mode</p> |

Table 1. Indication of processor working mode.

4.4. Dimensions

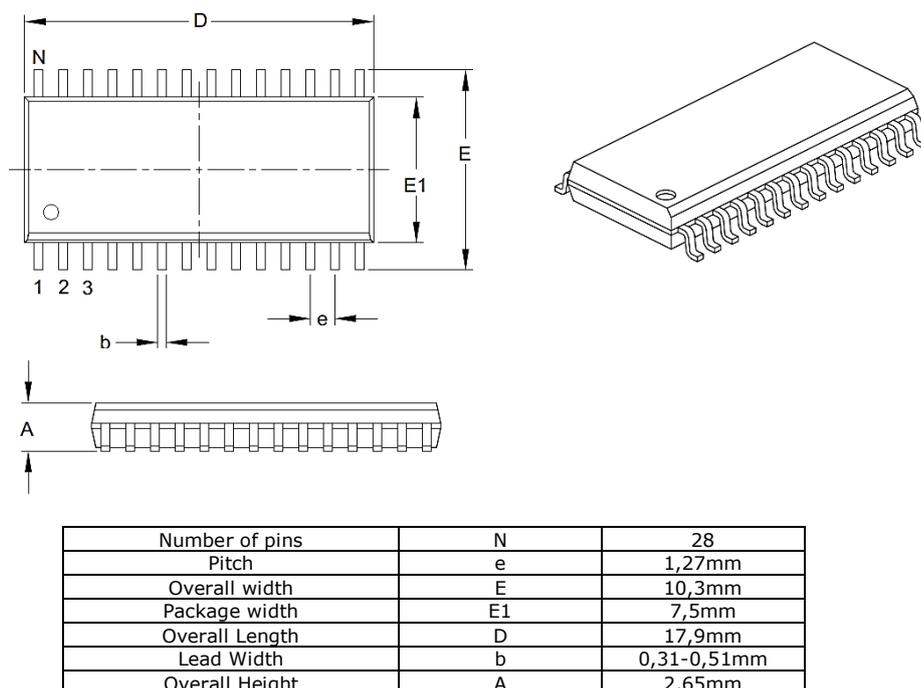


Figure 4. UNIV 3 CPU dimensions

5. Software

5.1. Bootloader

The bootloader is the program that is executed immediately after processor is powered up. Thanks to bootloader, communication with processor is possible even if there is no firmware uploaded or it is incorrect. To communicate with the processor there are needed: PC needed with installed HAPCAN Programmer and HAPCAN <-> PC interface.

The UNIV 3 CPU processor has pre-programmed bootloader version 3.x. A detailed description of the current version of the bootloader can be found at hapcan.com.

5.2. Functional firmware

Bootloader enables uploading of functional firmware that manages the operation of the device. The firmware must be dedicated to a specific device, otherwise the device may be damaged.

6. Document version

| File | Note | Date |
|----------------|--------------------|--------------|
| univ_3cpua.pdf | Original version | January 2013 |
| univ_3cpub.pdf | Figure 3 corrected | August 2013 |