

BAE0911- Programmable 22 i/o 1-Wire slave device

i/o, adc, pwm, counter, EEPROM, Automation Engine

Microcontroller based 1-wire slave for flexible solutions.

Overview

This 1-Wire slave chip adds many i/o capabilities and interfaces to your 1-Wire network. The Automation Engine supports a familiar Basic-like programming language that allows to define autonomous behaviors.

Main Features

22 i/o pins allows mixed functions selectable from

- Four 16 bit PWM (pulse width modulation) from 3Hz to 10MHz
- 16 ADC inputs at 10 bit resolution (0 to 5V range)
- Two 32 bit counters
- 22 pio TTL digital input/output
- One buffered TTL serial port (RX/TX) baud rate from 50 to 1000.000 bauds
- One i²c interface with master and slave support up to 100kbps
- One spi (aka four wires) interface with master/slave support up to 1MHz

Advanced features

- **Firmware upgradable via 1-wire bus.**
The chip firmware is contained in FLASH and can be upgraded directly from 1-wire bus.
- **Automation Engine:** allows to embed Basic-like programs for autonomous behavior
- 32 bit RTC clock incrementing each second.
- PIO has configurable internal pull-up / pull-down resistor
- Counters is configurable on rising/falling edge
- 32Kbit of EEPROM storage (8 pages of 512 bytes)
- 64 bytes of user RAM
- ADC is working in continuous conversion mode (no start conversion command, no delays)

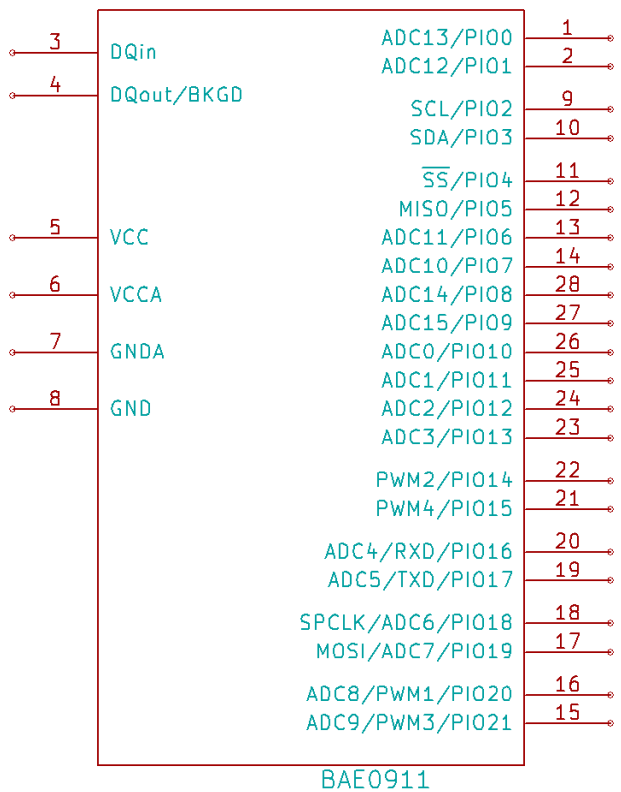
Compatibility with 1-wire protocol

- Standard speed operation: protocol implemented with low latency interrupts in background.
- Support every standard ROM commands: read rom, match rom, search rom, skip rom, resume rom and conditional search
- Unique serial number
- Family code 0xFC: with extended identification commands: *read_type* & *read_version*.
- Control functions: see FUNCTION COMMANDS page

Physical characteristics

- Single chip microcontroller based solution in an 28-pin SOIC.
- 5.0V supply voltage, 10mA typical consumption
- 40MHz operation

Pin an connections



PIN	NAME	DESCRIPTION
1	PIO0 ADC13	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion.
2	PIO1 ADC12	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion.
3	DQin	1-Wire input pin. The 1-Wire input and output signal are decoupled. This allows easy addition of isolation circuit.
4	DQout	1-Wire output pin. This pin has to be connected to DQ via a Schottky diode.
5	VCC	Power supply 2,7V to 5,5V, 10mA typical consumption @ 5V. For reliable 1wire communication, 5V supply is recommended.
6	VCCA	Voltage supply and reference for adc. 2,7V to 5,5V
7	GNDA	Ground for analog supply/reference
8	GND	Ground
9	PIO2 SCL	General purpose digital input/output pin with configurable pullup/down resistors. I ² C clock signal SCL. When I ² C mode is selected, an external pullup resistor need to be installed on this pin.
10	PIO3 SDA	General purpose digital input/output pin with configurable pullup/down resistors. I ² C data signal SDA. When I ² C mode is selected, an external pullup resistor need to be installed on this pin.
11	PIO4 SS	General purpose digital input/output pin with configurable pullup/down resistors. When spi mode is configured this pin acts as Slave Select signal.
12	PIO5 MISO	General purpose digital input/output pin with configurable pullup/down resistors. When spi mode is configured this pin acts as Master In Slave Out signal.
13	PIO6 ADC11	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion.

14	PIO7 ADC10	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion.
15	PIO21 ADC9 PWM3	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion. When Pulse Width Modulation mode is selected, to pin act an output signal. PWM3 share the same clock as PWM1.
16	PIO20 ADC8 PWM1	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion. PWM: when Pulse Width Modulation mode is selected, to pin act an output signal. PWM1 share the same clock as PWM3.
17	PIO19 ADC6 MOSI	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion. When spi mode is configured this pin acts as Master Out Slave In signal.
18	PIO18 ADC SPCLK	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion. When spi mode is configured this pin acts as Clock signal.
19	PIO17 ADC5 TXD	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion. When configured as serial interface, this pin acts as transmit. To connect an RS232 interface, a TTL to RS232 converter is required (MAX232).
20	PIO16 ADC5 TXD	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion. When configured as serial interface, this pin acts as receive. To connect an RS232 interface, a TTL to RS232 converter is required (MAX232).
21	PIO15 PWM4	General purpose digital input/output pin with configurable pullup/down resistors. When Pulse Width Modulation mode is selected, to pin act an output signal. PWM4 share the same clock as PWM2.
22	PIO14 PWM2	General purpose digital input/output pin with configurable pullup/down resistors. When Pulse Width Modulation mode is selected, to pin act an output signal. PWM2 share the same clock as PWM4.
23	PIO13 ADC3	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion.
24	PIO12 ADC2	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion.
25	PIO11 ADC1	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion.
26	PIO10 ADC0	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion.
27	PIO9 ADC15	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion.
28	PIO8 ADC14	General purpose digital input/output pin with configurable pullup/down resistors. Regardless of PIO mode, the adc operates in continuous 10 bit conversion.

Typical usage

Extend the functionalities normally available on 1-wire networks by embedding local logic in the slave device. This includes but not limits to:

PIO

- Applications with large count of digital input (alarm sensors, buttons/keyboards,...)
- Applications with large count of digital output (relays, status leds, light effects,...)
- Lcd interface, with autonomous interactive menu
- Counter input: water-meter, anemometer, RPM, pulse counting

PWM

- very precise servo controller for toys, webcams, ...
- DC Motor controller; requires power drivers like mosfet or H-drive
- Buzzer control with programmable volume and tone
- From LED dimming down to LED blinking (2Hz)
- RGB LEDs: precise control of intensity for each component of RGB LEDs
- DAC: digital to analog conversion

ADC

- Measure of various sensors: pressure, temperature, humidity, voltage, current, weight, ...
- Inputs for potentiometers: volume control, temperature, speed setpoint, ...
- Position feedback

I²C (aka two wire interface)

- Allows using large variety of sensors
- The slave i²c mode allows easy interfacing of custom PIC projects to 1-Wire
- Extend number of possible i/o
- Control DAC chips and digital potentiometers
- Advanced stepper motor control

SPI (aka four wires interface)

- Allows using large variety of sensors
- Interface your PIC custom designs to 1-Wire network
- Access large flash storage with SD/MMC cards
- Interface to graphical lcd displays

Serial interface

- Capture information from many domestic standalone devices: solar inverters, boilers, air conditioners, alarm systems, indoor bicycle, ...
- Controls distributed equipments: led scrolling boards, RF transmitters, pagers,
- Interface custom projects to 1-Wire network

Automation Engine

- Closed loop control applications: motor speed , temperature, liquid level, flows ...
- Alarms/security applications, access control
- HVAC applications
- Home automation projects
- Custom electronic interfaces for toys, robotics, gadgets, etc...