

MINI-MAX/ARM-S

Single Board Computer

Technical Manual

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MINI-MAX/ARM-S Single Board Computer Technical Manual. No part of this work may be reproduced in any manner without written permission of BiPOM Electronics.

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WARRANTY:

BiPOM Electronics warrants MINI-MAX/ARM-S for a period of 1 year. If the board becomes defective during this period, BiPOM will at its option, replace or repair the board. This warranty is voided if the product is subjected to physical abuse or operated outside stated electrical limits. BiPOM Electronics will not be responsible for damage to any external devices connected to MINI-MAX/ARM-S. BiPOM Electronics disclaims all warranties express or implied warranties of merchantability and fitness for a particular purpose. In no event shall BiPOM Electronics be liable for any indirect, special, incidental or consequential damages in connection with or arising from the use of this product. BiPOM Electronics' liability is limited to the purchase price of this product.

1. Overview

MINI-MAX/ARM-S is a general purpose, low-cost and highly-expandable micro-controller system. It is based on the ATMEL AT91SAM7S256-AU-001 single-chip Flash micro-controller. This micro-controller features:

- Up to 55 MIPS program execution speed
- 256 Kilobytes of In-System Re-programmable Downloadable Flash Memory
- 64 Kilobytes bytes of RAM
- 3-channel 16-bit Timer/Counter
- Programmable 32 bit Watchdog Timer
- USB 2.0 Full Speed (12 Mbit per Second) Device Port
- 2 Programmable Enhanced UART Serial Interfaces
- SPI Serial Interface
- 2-wire Serial Interface (I²C)
- Four channel 16-bit PWM controller
- 8-channel 10-bit ADC with external Reference Voltage input
- 11-channel DMA controller
- 32 general purpose I/O pins
- Real time In-System debug support through JTAG Interface

MINI-MAX/ARM-S board complements these features by providing

- In-circuit Programming and debugging of the micro-controller through the JTAG Interface
- USB Port with 5V signals for data communication
- 5-channel 10-bit ADC with internal Reference Voltage
- Keypad connector
- LCD connector (with programmable contrast adjustment for LCD)
- Expansion bus interface to low-cost peripheral boards such as
 - Instrumentation amplifiers
 - Pressure inputs
 - Strain-gage inputs
 - 12 and 16-bit Analog-to-Digital Converters
 - Digital Input/Output cards
 - LED and LCD displays.

The Flash micro-controller can be programmed through USB or JTAG. Customers can program the micro-controller with the most recent firmware or custom firmware. This function of the FLASH micro-controller simplifies new program development and debugging. Downloading of a program to the micro-controller typically takes few seconds.

MINI-MAX/ARM-S is powered from a 5 Volt (DC) external power source through the USB bus connector. A current consumption is less than 60mA

Software examples for MINI-MAX/ARM-S are available from <http://www.bipom.com/>

2. Specifications

MINI-MAX/ARM-S board has the following configuration:

- ATMEL AT91SAM7S256-AU-001 micro-controller with
 - 256 Kbytes on-chip Flash program/data Memory,
 - 64 Kbytes RAM
- JTAG Port for In-circuit Programming and a real time debugging
- USB Port with 5V signals for data communication and a power supply
- 10-pin terminal block for 5 analog inputs, Vref +3V output and Vdd 3.3V output
- 20-pin Expansion connector for peripheral boards
(http://www.bipom.com/periph_boards.php)
- 10-pin connector for matrix and non-matrix keypads
- Dual-row 14-pin LCD connector (with software contrast adjustment for LCD)
- Single operating voltage: 5 VDC, 60 mA maximum supply consumption.
- On-board 3.3 Volt regulator
- Dimensions are 2.35 X 2.40 inches (5.97 X 6.10 centimeters).
- Mounting holes of 0.138 inches (3.5 millimeters) are on four corners.
- 0° - 70° C operating, -40° - +85° C storage temperature range.

3. Functional Blocks

Figure 1 shows the block diagram of the MINI-MAX/ARM-S board

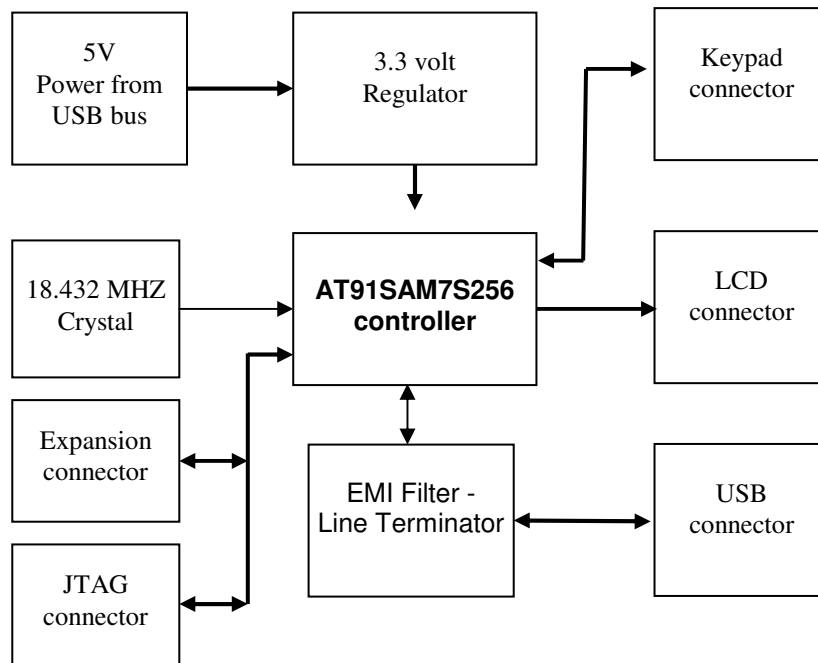


Figure 1

Keypad Connector

8 port pins of the MINI-MAX/ARM-S are connected to the Keypad Connector (J1). Matrix keypads such as 3 x 5 or 4 x 4 can be connected directly to the connector. 5 Volt and Ground power lines are also available on the connector.

The keypad connector can also be used as a general-purpose 8-pin input/output port.

Table 4 shows the pin assignments for the Keypad connector.

Keypad Connector (J1)

Name	Signal	Pin
VCC	+5V output	10
GND	Ground	9
Key 7	PA31 In/Out	8
Key 6	PA30 In/Out	7
Key 5	PA29 In/Out	6
Key 4	PA28 In/Out	5
Key 3	PA27 In/Out	4
Key 2	PA26 In/Out	3
Key 1	PA25 In/Out	2
Key 0	PA24 In/Out	1

Table 1

Expansion connector

Control signals and 5 Volt power supply output are available on 20-pin connector (J2) for interfacing to peripheral boards. A peripheral board can be connected to MINI-MAX/ARM-S board either as a piggyback daughter-board using standoffs or can be placed away from the micro-controller board using a 20-wire ribbon cable (Part #: EXPCABLE-6).

Table 2 shows the pin assignments for the J2 connector.

Expansion Connector (J2)

Signal	Pin	Pin	Signal
RXD0	20	19	TXD0
RXD1	18	17	MISO
SCK	16	15	CS
TXD1	14	13	MOSI
IO1	12	11	IO0
DRXD	10	9	DTXD
IO2	8	7	PWM
I2C SCL	6	5	I2C SDA
Not connected	4	3	GND
VCC (+5V)	2	1	Not connected

Table 2

LCD Connector

Alphanumeric 24 Characters x 2 lines LCD such as BiPOM's **LCD242** (http://www.bipom.com/periph_boards.php)

or other LCD displays can be connected directly to MINI-MAX/ARM-S.

LCD Connector (J3)

Signal	Pin	Pin	Signal
LCD3 (PA18)	14	13	LCD2 (PA17)
LCD1 (PA16)	12	11	LCD0 (PA15)
Not connected	10	9	Not connected
Not connected	8	7	Not connected
STROBE (PA0)	6	5	READ (PA2)
CTRL (PA1)	4	3	Vee (V-PWM)
VCC (+5V) output	2	1	GND

Table 3.

USB Connector

Standard Type 'B' Single Right Angle Receptacle connector is used for USB bus

USB Connector (J4)

Name	Signal	Pin
VBUS	+5V Power input	1
D-	Data (-)	2
D+	Data (+)	3
GND	Ground	4

Table 4.

JTAG Port connector

JTAG port is available on a 20-pin male connector J5.

Table 5 shows the pin assignments for the JTAG port connector

JTAG Port Connector (J5)

Pin	Name	Signal
1, 2	VDD	MM-ARM 3.3V Power Output
3	TRST	MM-ARM Reset Input
5	TDI	MM-ARM Test Data Input
7	TMS	Test Mode Select Input
9	TCK	MM- ARM Test clock Input
11	RTCK	MM- ARM Test clock Input
13	TDO	MM-ARM Test Data Output
15	RST	MM-ARM Reset Input
17,19	-	Not Connected (NC)
4,6,8,10,12, 14,16,18,20	GND	GND

Table 5

Analog Input connector

Table 6 shows the pin assignments for the input connector

Analog Input Connector (J6)

Name	Signal	Pin
AN0	Analog input 0	1
AN1	Analog input 1	2
AGND		3
AN2	Analog input 2	4
AGND		5
AN3	Analog input 3	6
VREF	+3V Output	7
AN4	Analog input 4	8
AGND		9
Vdd	+3.3V Output	10

Table 6

Jumpers

Table 7 shows the jumpers assignments

Jumpers JP1 ... JP5

Name	Signal	Normal operations	Special operations if installed
JP1	Reset	removed	Reset MCU
JP2	RTCK	removed	
JP3	Test mode select	removed	MCU Program through USB
JP4	Erase MCU	removed	MCU Flash memory erase
JP5	JTAG selection	removed	JTAG active mode

Table 7

Power Supply

External power supply should be able to supply 5 Volts DC at 60 mA current through USB connector or Expansion connector.

WARNING: Correct polarity should be observed when applying external DC supply to Expansion connector.

4. Application Notes

The SAM Boot Assistant (SAM-BA) software is used for a programming of MM-ARM-S through USB interface. It runs under Windows 2000 and XP.

http://www.atmel.com/dyn/resources/prod_documents/doc6132.pdf

A peripheral board can either be stacked on top of MINI-MAX/ARM-S using stand-offs or connected in a chain configuration using flat ribbon cable. Figure 2 shows how DAC-2 peripheral board can be connected to a Micro-Computer board in a stacked fashion. Figure 3 shows the chain connection.

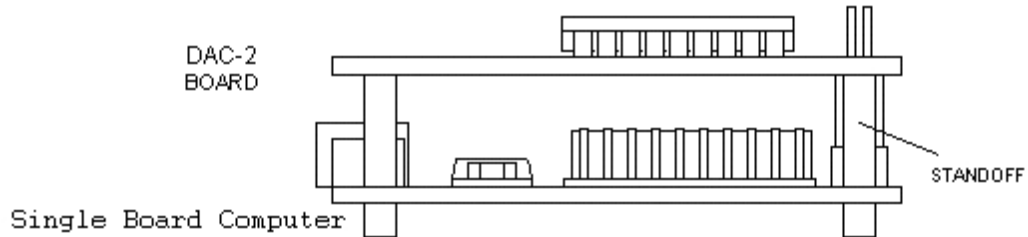


Figure 2

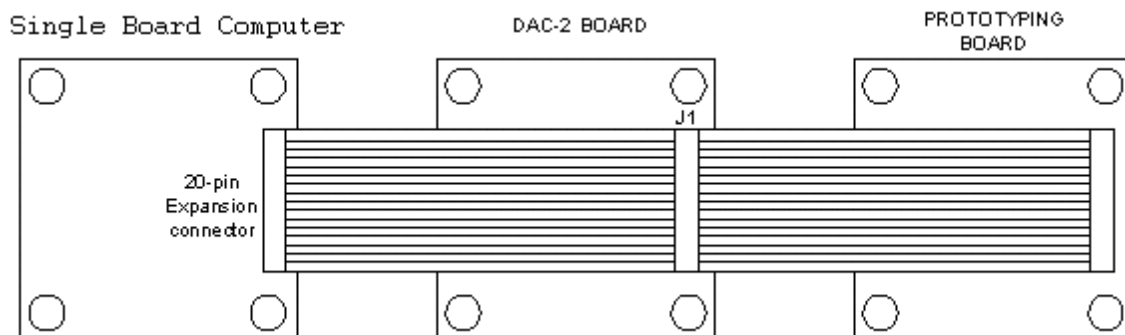


Figure 3

More details concerning BiPOM Peripheral boards are available from:

http://www.bipom.com/periph_boards.php

ARM Development System provides examples for MINI-MAX/ARM-S.

Please download ARM Development System from:

<http://www.bipom.com/armdev.php>

5. Board Layout

Layout of MINI-MAX/ARM-S board is shown below:

