

MINI-MAX/AVR-C1

Single Board Computer

Technical Manual

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BiPOM Electronics

16301 Blue Ridge Road, Missouri City , Texas 77489
Telephone: 1-713-283-9970. Fax: 1-281-416-2806
E-mail: info@bipom.com
Web: www.bipom.com

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MINI-MAX/AVR-C1 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/AVR-C1 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/AVR-C1. 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.

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1. Overview

MINI-MAX/AVR-C1 is a general purpose, low-cost and highly-expandable micro-controller system. It is based on the ATMEL ATMEGA2560-16 single-chip Flash micro-controller. This micro-controller features

- Up to 16 MIPS Throughput at 16 MHz
- 256 Kilobytes of In-System Re-programmable Downloadable Flash Memory
- 8 Kilobytes bytes of RAM
- 4 Kilobytes bytes of EEPROM
- Two 8 bit Timer/Counters and four 16 bit Timer/Counters
- Programmable Watchdog Timer
- Four Programmable Enhanced UART Serial Interfaces
- SPI Serial Interface
- 2-wire Serial Interface (I²C)
- 12 Pulse Width channels
- 16 channel 10-bit ADC with selectable 2.56V or 1.1V Reference Voltage
- 86 general purpose I/O pins
- Real time In-System debug support through JTAG Interface

MINI-MAX/AVR-C1 board complements these features by providing

- In-circuit Programming and debugging of the micro-controller through either the JTAG or SPI interface
- Two RS232 Serial Ports and two UART Ports with 5V signals for data communications
- 5-channel 10-bit ADC with selectable 2.56V or 1.1V 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 serially programmed while in the target application circuit. 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/AVR-C1 should be powered from a 6 to 12 Volt (DC) external power source. A current consumption is not more than 60mA.

Software examples for MINI-MAX/AVR-C1 are available from <http://www.bipom.com/>

2. Specifications

MINI-MAX/AVR-C1 board has the following configuration:

- ATMEL ATMEGA2560-16 micro-controller with
 - 256 Kbytes on-chip Flash program/data Memory,
 - 8 Kbytes RAM
 - 4 Kbytes EEPROM
- JTAG Port for In-circuit Programming and a real time debugging
- SPI Port connector for In-circuit Programming and for data communication
- Two RS232 Serial Ports for data communications
- Two UART Ports with 5V signals for data communications
- 10-pin terminal block for 5 analog inputs, Vref output and AVcc output
- Three 20-pin Expansion connectors for a peripheral boards
- 10-pin connector for matrix and non-matrix keypads
- Dual-row 14-pin LCD connector (with software contrast adjustment for LCD)
- Single operating voltage: 6 to 12 VDC, 60 mA maximum supply consumption.
- On-board 5 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/AVR-C1 board

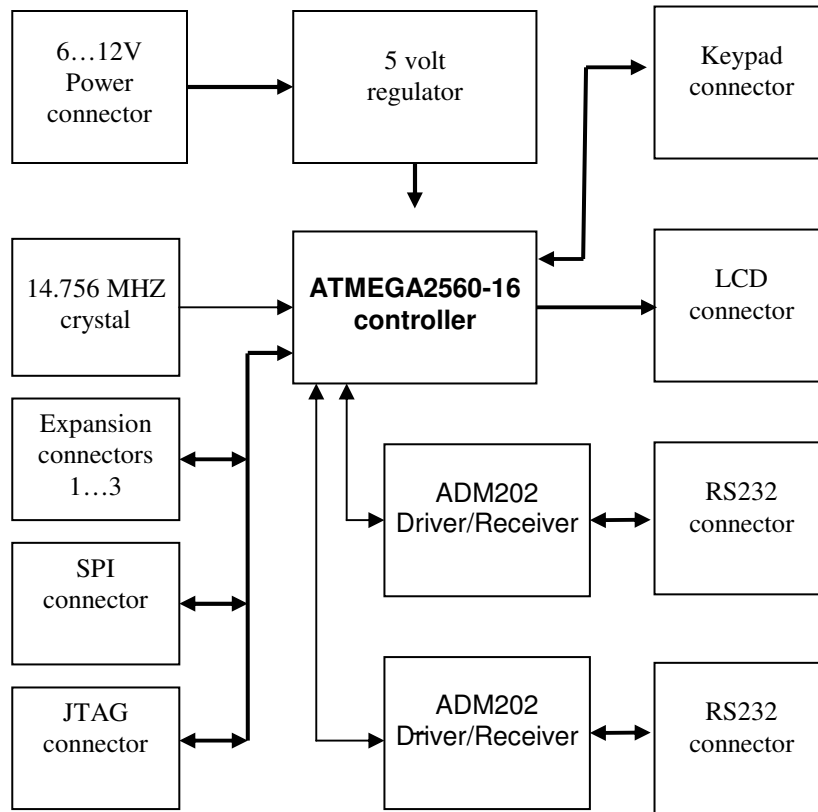


Figure 1

JTAG Port connector

JTAG port is available on a 10-pin male connector X1.

Table 1 shows the pin assignments for the JTAG port connector

JTAG Port Connector (X1)

Name	Signal	Pin
TCK	MINI-MAX/AVR Test clock Input	1
GND	GND	2
TDO	MINI-MAX/AVR Test Data Output	3
VDD	MINI-MAX/AVR Power Output	4
TMS	Test Mode Select Input	5
/RST	MINI-MAX/AVR Reset Input	6
VCC	MINI-MAX/AVR Power Output	7
-	Not Connected (NC)	8
TDI	MINI-MAX/AVR Test Data Input	9
GND	GND	10

Table 1

SPI Port connector

SPI port is available on a 6-pin male connector X2.

Table 2 shows the pin assignments for the SPI port connector

SPI Port Connector (X2)

Name	Signal	Pin
MISO	SPI Data Input/Output	1
VCC	+5V output	2
SCK	SPI clock	3
MOSI	SPI Data Input/Output	4
/RST	MINI-MAX/AVR Reset Input	5
GND	GND	6

Table 2

LCD Connector

Alphanumeric LCD displays can be connected directly to MINI-MAX/AVR-C1.

For example, **LCD242**, Alphanumeric 24 Characters x 2 lines

<http://www.bipom.com/documents/peripherals/lcd242.pdf>.

LCD Connector (X3)

Signal	Pin	Pin	Signal
LD3 (PL3)	14	13	LD2 (PL2)
LD1 (PL1)	12	11	LD0 (PL0)
Not connected	10	9	Not connected
Not connected	8	7	Not connected
STROBE (PL6)	6	5	READ (PL5)
LD4 (PL4)	4	3	Vee (V-PWM)
VCC (+5V) output	2	1	GND

Table 3

Keypad Connector

8 port pins of the MINI-MAX/AVR-C1 are connected to the Keypad Connector (X4). Matrix keypads (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 (X4)

Name	Signal	Pin
VCC	+5V output	10
GND	Ground	9
Key 7	PH7 In/Out	8
Key 6	PH6 In/Out	7
Key 5	PH5 In/Out	6
Key 4	PH4 In/Out	5
Key 3	PK3 In/Out	4
Key 2	PK2 In/Out	3
Key 1	PK1 In/Out	2
Key 0	PK0 In/Out	1

Table 4

Asynchronous Serial Port 0

Asynchronous RS232 serial port 0 is available on a 10-pin male connector X5.

Table 5 shows the pin assignments for the RS232 serial port 0 connector

Serial Port Connector (X5)

Name	Signal	Pin
-	Not Connected (NC)	1
PGM	MINI-MAX/AVR Input	2
RXD0	MINI-MAX/AVR Input	3
RTS0	MINI-MAX/AVR Output	4
TXD0	MINI-MAX/AVR Output	5
CTS0	MINI-MAX/AVR Input	6
-	NC	7
-	NC	8
GND	GND	9
-	NC	10

Table 5

Asynchronous Serial Port 1

Asynchronous RS232 serial port 1 is available on a 10-pin male connector X8.

Table 6 shows the pin assignments for the RS232 serial port 1 connector

Serial Port Connector (X8)

Name	Signal	Pin
-	Not Connected (NC)	1
-	NC	2
RXD1	MINI-MAX/AVR Input	3
RTS1	MINI-MAX/AVR Output	4
TXD1	MINI-MAX/AVR Output	5
CTS1	MINI-MAX/AVR Input	6
-	NC	7
-	NC	8
GND	GND	9
-	NC	10

Table 6

Expansion connectors

50 control pins and 5 Volt power supply pins are available on 3 20-pin connectors (X6, X7, X9) for interfacing to peripheral boards. A peripheral board can be connected to MINI-MAX/AVR-C1 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).

Signals TXD, RXD of the UART port 2 and SPI signals are available on the 20-pin connector X6.

Signals TXD, RXD of the UART port 3 are available on the 20-pin connector X7.

Tables 7, 8, 9 shows the pin assignments for the X6, X7, X9 connectors.

Connector X6

Signal	Pin	Pin	Signal
/RXD2	20	19	/TXD2
IO6	18	17	MISO
SCK	16	15	SS
IO22	14	13	MOSI
IO1	12	11	IO0
IO3	10	9	IO2
IO5	8	7	IO4
I2C SCL	6	5	I2C SDA
VCC (+5V)	4	3	GND
VCC (+5V)	2	1	GND

Table 7

Connector X7

Signal	Pin	Pin	Signal
/RXD3	20	19	/TXD3
IO20	18	17	IO21
IO8	16	15	IO9
IO10	14	13	IO11
IO12	12	11	IO13
IO14	10	9	IO15
IO16	8	7	IO17
IO18	6	5	IO19
VCC (+5V)	4	3	GND
VCC (+5V)	2	1	GND

Table 8

Connector X9

Signal	Pin	Pin	Signal
D1	20	19	D0
D3	18	17	D2
D5	16	15	D4
D7	14	13	D6
A3	12	11	A2
A1	10	9	A4
IOR	8	7	A0
AEN	6	5	RESET
IOW	4	3	INT0
VCC (+5V)	2	1	GND

Table 9

Analog Input connector

Table 10 shows the pin assignments for the input connector

Analog Input Connector X10

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

Table 10

Power Supply

External power supply should be able to supply 6...16 Volts DC at 100 mA current

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

4. Application Notes

A peripheral board can either be stacked on top of MINI-MAX/AVR-C1 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.

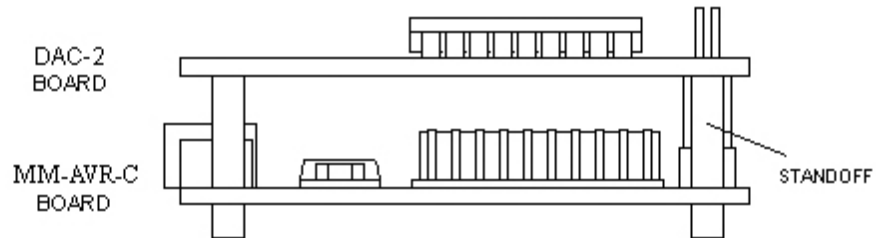


Figure 2

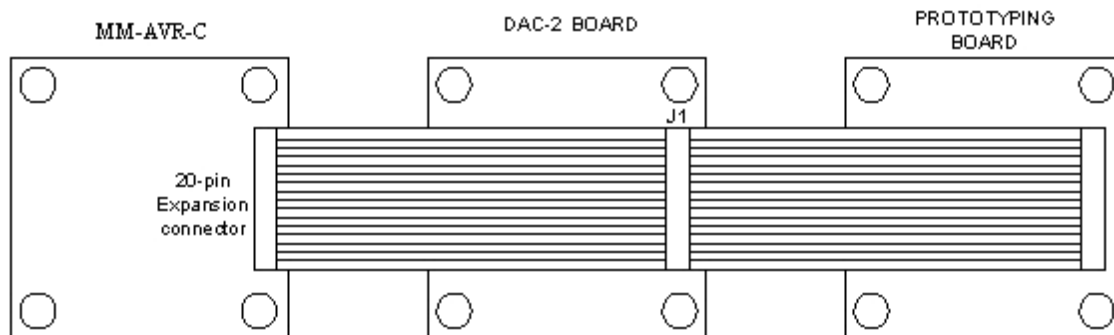
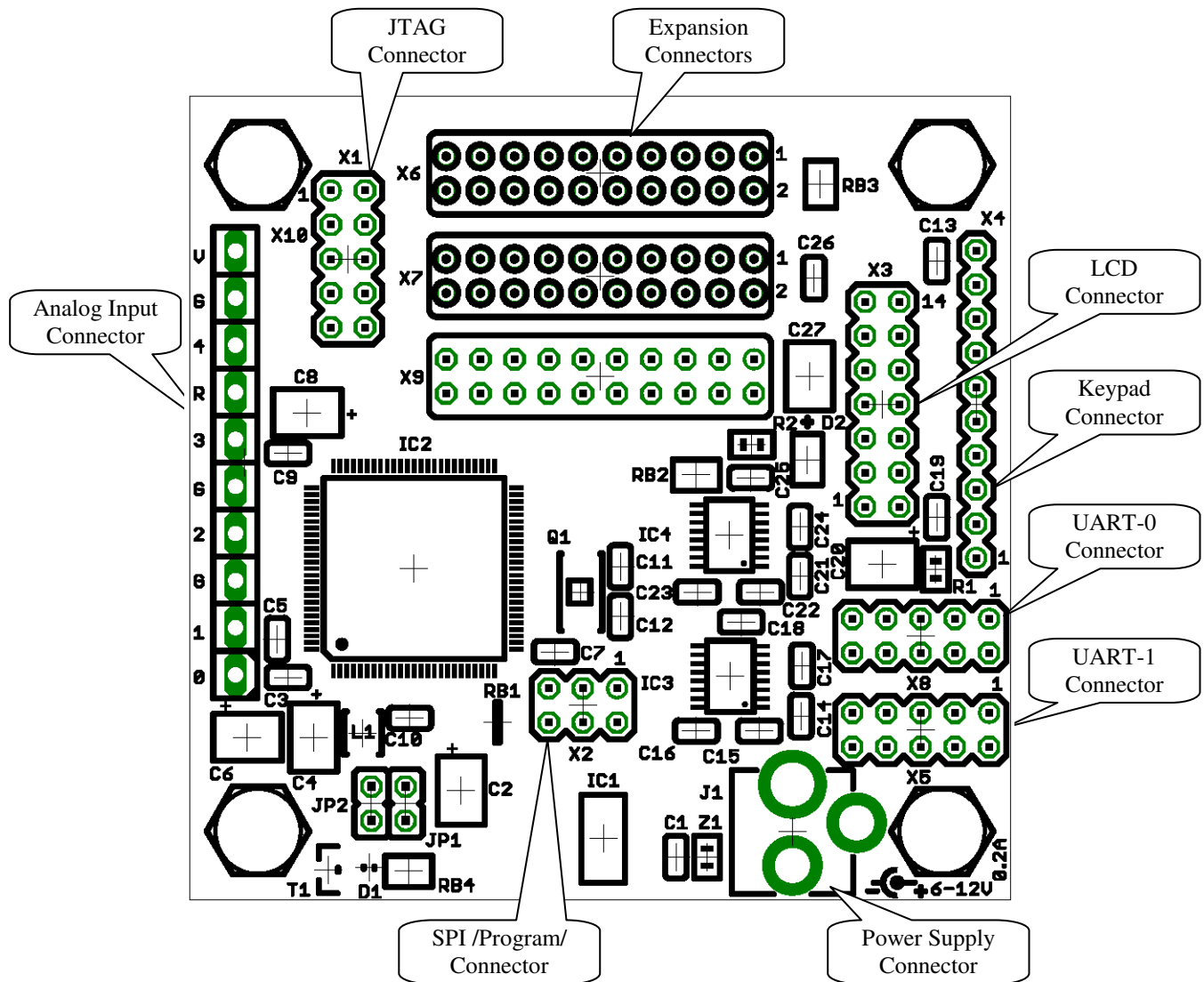


Figure 3

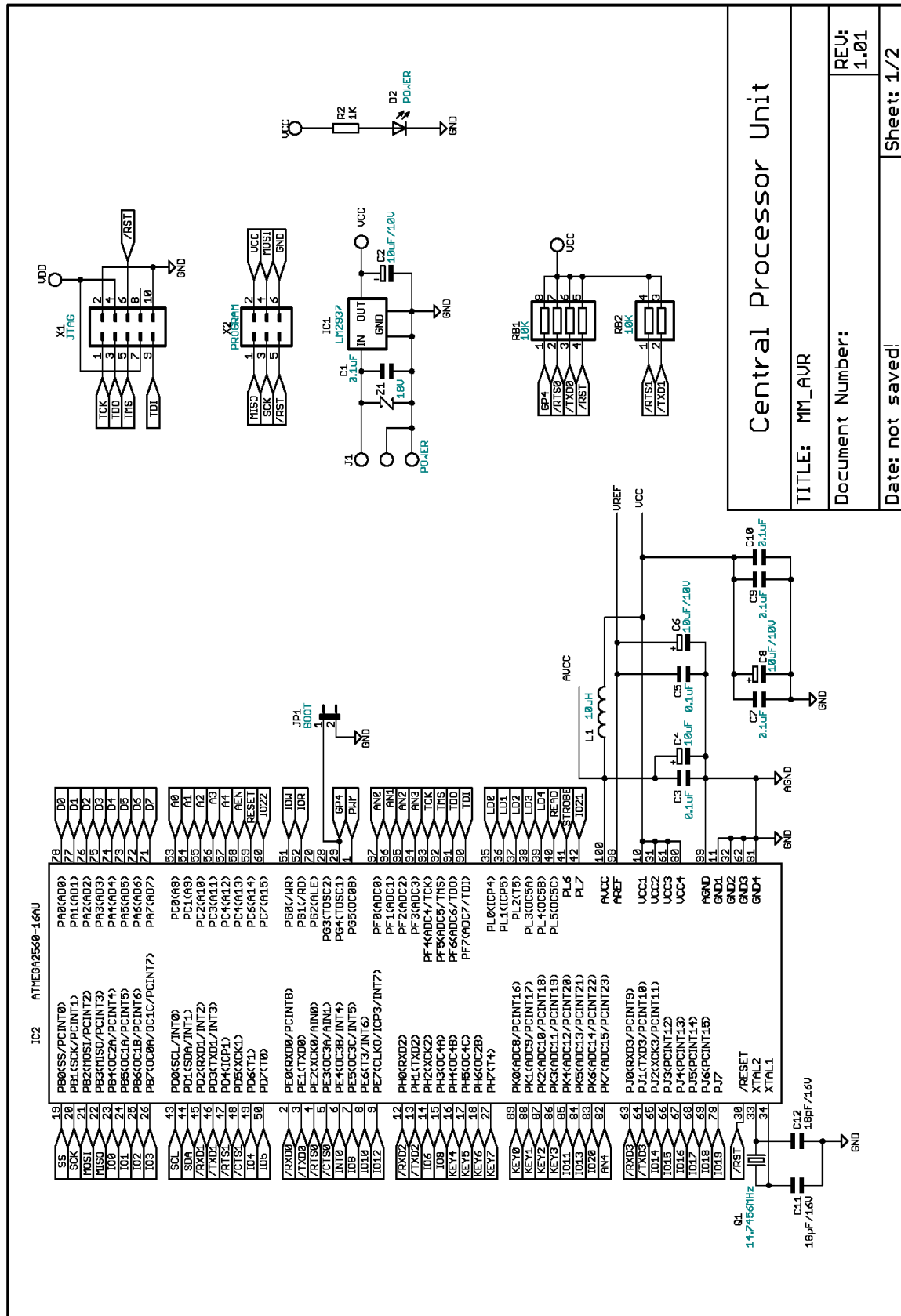
More details concernig BiPOM Peripheral boards are available from the link below:

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

Layout of MINI-MAX/AVR-C1 board is shown below:



6. Schematics



Central Processor Unit

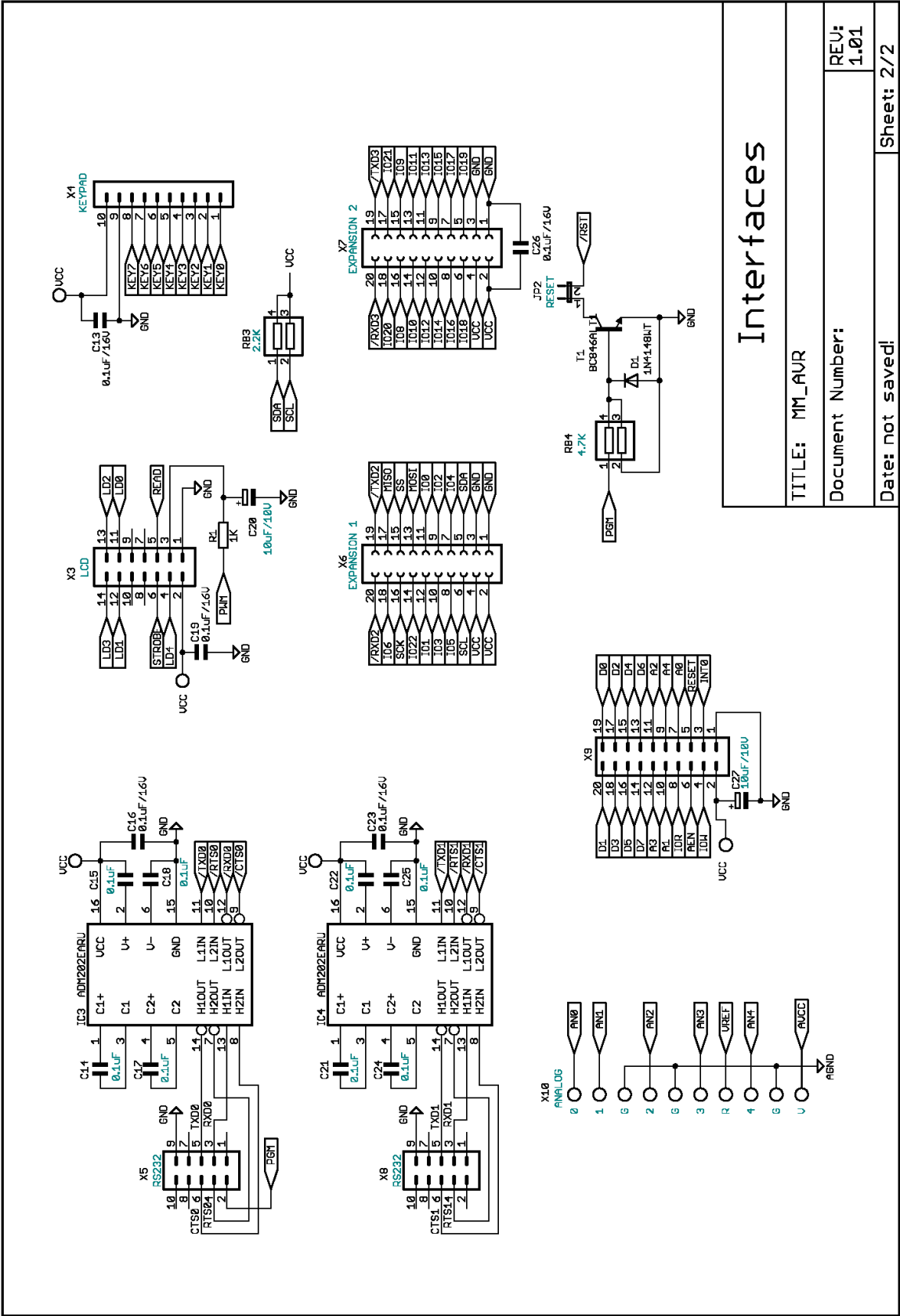
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Interfaces

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