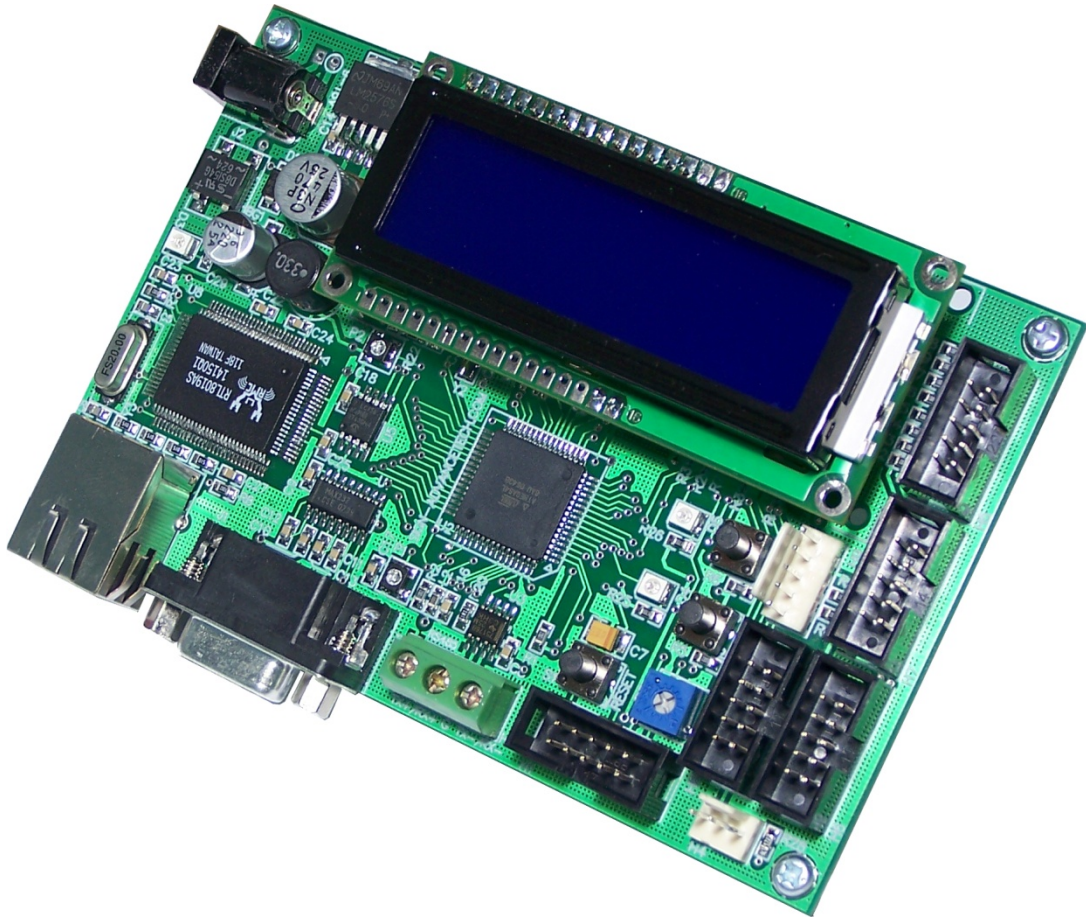


**DMMEGA128A.Net Development Board  
User's Guide**



# ***DMMEGA128A.Net User' Guide***

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## **CHAPTER 1. INTRODUCTION TO THE DMMEGA128A.Net DEVELOPMENT BOARD**

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### **INTRODUCTION**

This Document describes the DMMEGA128A.Net dedicated to the ATmega64/128 AVR microcontroller this board is designed to allow an easy evolution of the product using demonstration software development software use AVR Studio Compiler

To complement the evaluation and enable additional development capability, the DMMEGA128A.Net with Easy features this stand alone board has numerous interface dual serial RS232 and RS485, SPI, I2C, 1Wire) and onboard resources Ethernet 10Base-T, SD/MMC, LEDs, I2C EEPROM, RTC, LCD, Switch, Voltage Reading, Speaker, controller onboard

### **HIGHLIGHTS**

This chapter covers the following:

- The Development Kit: What's in the packet?
- The DMMEGA128A.Net Development Board
- The Development Kit CD

### **THE DEVELOPMENT KIT: WHAT'S IN THE BOX**

Your Development Kit contains the following items:

- The DMMEGA128A.Net Development Board
- A CAT5 "crossover" network cable for networking the board directly to a Computer
- The DMMEGA128A.Net Development Kit" CD-ROM

# DMMEGA128A.Net User' Guide

## THE DMMEGA128A.Net DEVELOPMENT BOARD

The DMMEGA128A.Net Development Board has all the features to begin developing Ethernet connection applications. The preprogrammed firmware allows users to begin evaluating the board right out of the box with no additional programming or configuration. All that is required to begin exploring the board is a network-enabled computer with an Ethernet adapter and Internet browser.

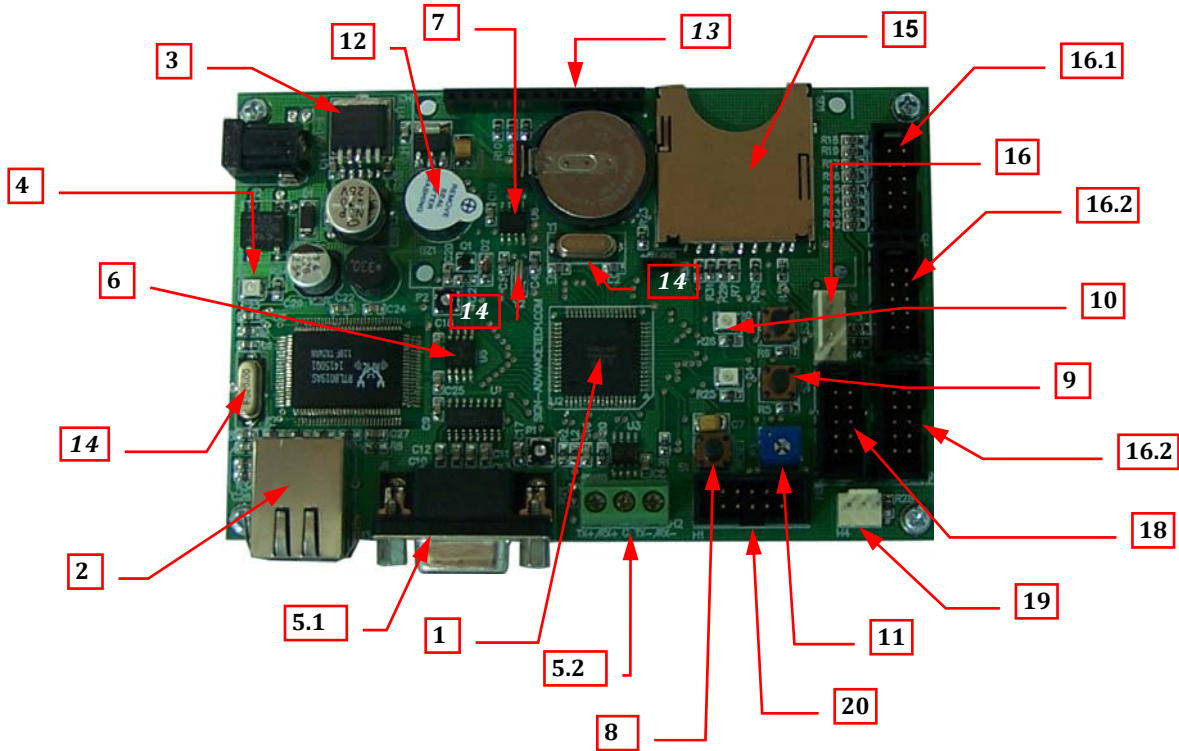


FIGURE 1-1: DMMEGA128A.Net DEVELOPMENT BOARD LAYOUT

### FEATURES ON THE DMMEGA128A.Net DEVELOPMENT BOARD INCLUDE:

#### 1. MICROCONTROLLER:

An Atmel AVR® 8-Bit RISC ATmega64/128 with 64 Pins type Microcontroller installed on the board. The device has been preprogrammed with the Demo Application.

#### 2. 10BASE-T Ethernet Controller:

The DMMEGA128A.Net board includes RTL8019AS Ethernet Controller with connect to RJ-45 Supported 10BASE-T.

#### 3. ON-BOARD POWER:

On-board Switching regulators provide separate 5 VDC 1A. And 3.3 VDC Regulator From the 9 VDC supplied.

#### 4. POWER-ON LED:

This LED shows the board is powered up.

#### 5. SERIAL PORT: The

DMMEGA128A.Net Development Board includes an RS-232 port with a DB9 connector non level-shifting hardware. A RS485 serial interface with terminal block

# ***DMMEGA128A.Net User' Guide***

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## **6. MEMORY:**

A Microchip 24LC256 I2C EEPROM provides 256 Kbits (32 Kbytes)

## **7. REAL TIME CLOCK:**

A Dallas Maxim DS1307 I2C Interface provides optional Holder battery backup.

## **8. RESET PUSH BUTTON:**

This is a push button switches RESET (S1) for device Reset and on the controller.

## **9. USER-DEFINED PUSH BUTTON:**

X2 Switch Push button switch (S2, S3) for device user-defined input on the controller.

## **10. USER-DEFINED LEDS:**

X2 LED (D4, D5) is driven by digital I/O pins of the controller on jumper is disconnected.

## **11. TRIM POT 10-Bit A/D TEST:**

X1 10KOhm 0-VCC Input TRIM POT 10-bit ADC Analog to Digital Converter Test.

## **12. SPEAKER:**

This is a Magnetic transducer buzzer (BZ1) speaker.

## **13. CHARACTER LCD:**

The DMMEGA128A.Net board supports 14 PINs Connector Characters LCD display.

## **14. OSCILLATOR OPTION:**

The installed microcontroller has two separate oscillator circuits connected. The main oscillator uses a 16MHz crystal. Using a 32.768 kHz (watch type) crystal functions as the DS1307 oscillator and serves as the source for the RTC oscillator. A 20 MHz crystal functions as the RTL8019AS Ethernet Controller on Board.

## **15. SD/MMC MEMORY SOCKET:**

This is SD/MMC Socket supported

## **16. I/O PORT CONNECTOR: (x8 PORTA, x4 PORTB x4 PORTE x8 PORTF)**

The 10 Pins IDC Header allows direct access of the microcontroller's I/O ports.

## **17. OPTIONAL EXTERNAL I2C CONNECTOR:**

The 5 Pins Header I2C devices Interface for user-define Application.

## **18. OPTIONAL EXTERNAL SPI CONNECTOR:**

The 10 Pins IDC Header SPI devices Interface for user-define Application.

## **19. OPTIONAL EXTERNAL 1-WIRE HEADER:**

This is a 1-wire header for developing custom Application.

# ***DMMEGA128A.Net User' Guide***

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## **20. ISP PROGRAMMING:**

DMMEGA128A.Net Support In-System Programming SPI (Serial Peripheral Interface) to download code into the flash memory.

# ***DMMEGA128A.Net User' Guide***

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## **THE DEVELOPMENT KIT CD**

The "*DMMEGA128A.Net Development Kit*" CD contains:

- The source code for the DMMEGA128A.Net Application.
  - Demo source code for DMMEGA128A Net Application.
  - Free TCP/IP Stack Demo Application.
  - Free SD/MMC Card Source code.
- Other example applications for use ATMega128 source code.
- This manual, in Adobe® format.

# ***DMMEGA128A.Net User' Guide***

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NOTES:

# DMMEGA128A.Net User' Guide

## CHAPTER 2. DMMEGA128A.Net HARDWARE DEVELOPMENT BOARD

### INTRODUCTION

This content provides a more detailed description of the hardware features of the *DMMEGA128A.Net* Development Board.

### HARDWARE FEATURES

The key features of the *DMMEGA128A.Net* are listed below. They are presented in the order given in “*DMMEGA128A.Net* Board Functionality and Features”, (see Figure 1-1).

### PROCESSOR SUPPORT

The DMMEGA128A.Net board has been designed to accommodate both TQFP-64 pin for ATmega128 device at U2. The microcontroller is an ATmega128, running at either 16 MHz

### OSCILLATOR OPTION:

The installed microcontroller has two separate oscillator circuits connected. The main oscillator uses a 16MHz crystal. Using a 32.768 kHz (watch type) crystal functions as the DS1307 oscillator and serves as the source for the RTC oscillator. A 20 MHz crystal functions as the RTL8019AS Ethernet Controller on Board.

### POWER SUPPLY

There are two ways to supply power to the DMMEGA128A.Net

- An unregulated AC/DC supply of 9V to 16V (preferably 9-16V) supplied to J2. For default functionality, a power supply with a current capability of 250 mA is sufficient. Since the board can serve as a modular development platform that can connect to multiple expansion boards, voltage regulators with a maximum current capability of 1A are used. Because the regulators do not have heat sinks, long-term operation at such loads is not recommended.



FIGURE 2-1: ADAPTOR POWER JACK

- One green LED is provided to show when the DMMEGA128A.Net board is powered up. The power-on LED indicates the presence of +5V.

### SD/MMC MEMORY SOCKET

This is SD/MMC Socket supported Figure 1-1 Connector (SD1) or Schematic

TABLE 2.1: DMMEGA128A.Net SD/MMC Socket Interface

Signal Name	I/O	Description	SD/MMC
MISO	PB3	Data Input	SDO
MOSI	PB2	Data Output	SDI
SCK	PB1	Clock	SCK
CS	PB0	SD/MMC Selected.	Chip Selected.
DETC.	PE6	Switch Detect.	DET.

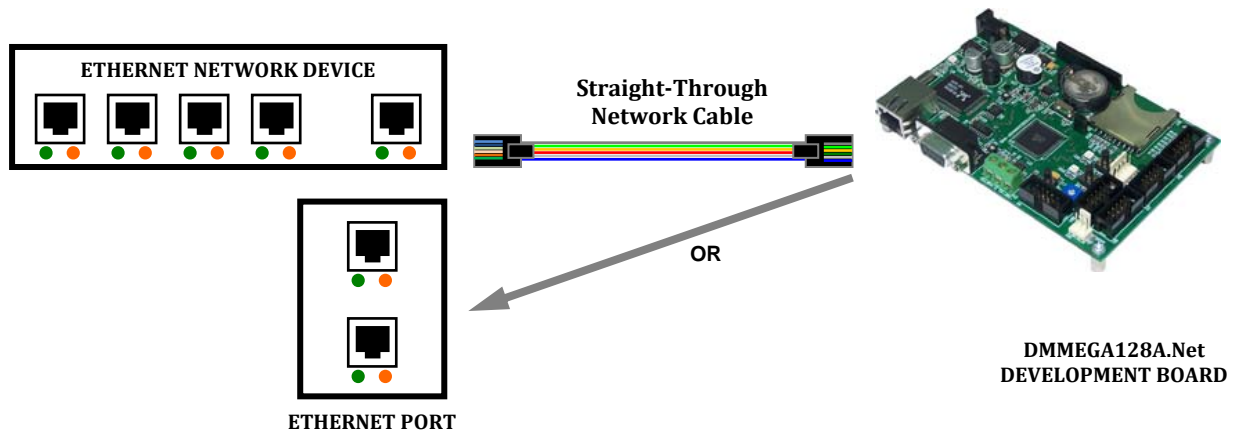
# DMMEGA128A.Net User' Guide

## 10BASE-T Ethernet Controller Connecting to a Network

The DMMEGA128A.Net board includes RTL8019AS Ethernet Controller with connect to RJ-45 Supported 10BASE-T. This configuration is the basic method of networking the DMMEGA128A.Net Development Board. To set up the board for direct networking (see Figure 2-2):

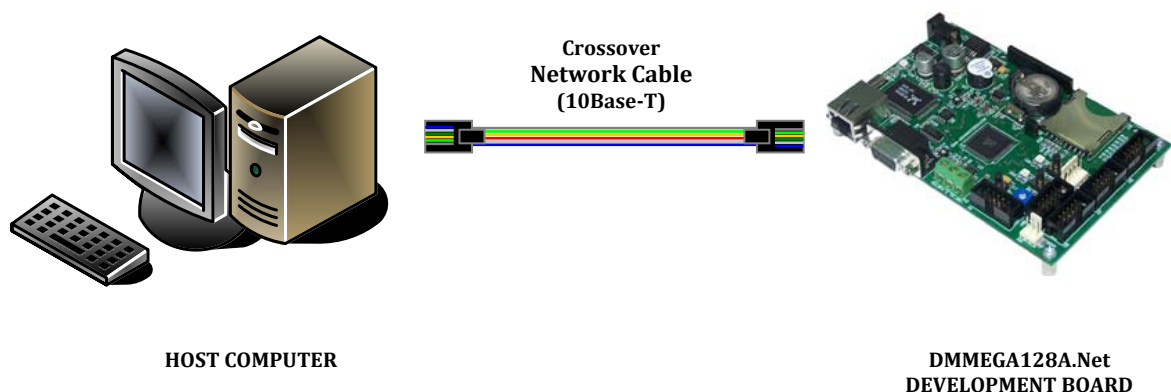
**TABLE 2.2:** DMMEGA128A.Net Ethernet I/O Pins Configurations.

Signal Name	I/O	Direction	Description
A0-A4	PC0-PC4	Out	Address line. TTL/CMOS compatible
D0-D7	PA	Bi.	Data line. TTL/CMOS compatible
IOR	PD4	Out	Read. Defines a read cycle Directly Connected to RTL8019AS compatible.
IOW	PD5	Out	Write. Defines a read cycle Directly connected to RTL8019AS compatible.
RESET	PD6	Out	System Reset. Connect to the Switch Reset.



**FIGURE 2-2:** CONNECTING THE DMMEGA128A.Net DEVELOPMENT BOARD TO A NETWORK

**For direct connections to a host system:** Connect the Ethernet crossover cable (supplied in the kit) to the board, then to the computer (Option in Figure 2-3).



**FIGURE 2-3:** CONNECTING TO A HOST SYSTEM THROUGH ANETHERNET DIRECT CONNECTION

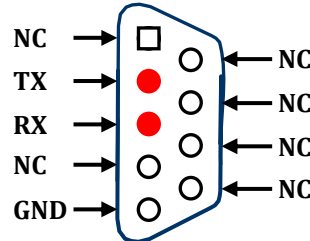
## RS232 SERIAL PORT

An RS232 level shifter has been provided with all necessary hardware to support RS232 connection with out hardware flow control through the DB9 connector. The DMMEGA128A.Net RX and TX pins are tied to the RX and TX lines of the MAX232.

# DMMEGA128A.Net User' Guide

**TABLE 2.3:** DMMEGA128A.Net Serial Port RS232 Pins Configurations.

Signal Name	I/O	Description
TXD	PD3	TTL Transmit Data
RXD	PD2	TTL Receive Data



**FIGURE 2-4:** D-SUB FEMALES CONNECTOR 9 PIN

**TABLE 2.4:** DMMEGA128A.Net D-SUB 9 pins RS-232 SIGNAL INTERFACE

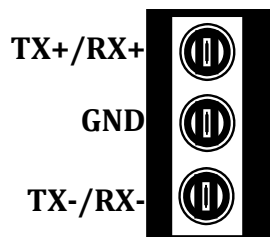
Signal Name	Direction	Description	DB-9 Female
TX	OUT	RS232 Level Transmit Data	2
RX	IN	RS232 Level Receive Data	3
GND	-	Ground	5

## RS485 SERIAL PORT

An RS485 Deferential has been provided with all necessary hardware to support RS485 2-WIRE connection hardware through the terminal Block 3-PINs connector. The DMMEGA128A.Net TX+/RX+ & TX-/RX- pins are tied to the RX and TX lines of the RS485 Deferential Integrate Control Circuit

**TABLE 2.5:** DMMEGA128A.Net Serial Port RS485 Pins Configurations.

Signal Name	I/O	Description
TXD	PE1	TTL Transmit Data
RXD	PE0	TTL Receive Data
CONTROL	PC7	RS485 Control Send or Receive



**FIGURE 2-5:** DMMEGA128A.Net TERMINAL BLOCK CONNECTOR 3 PIN

**TABLE 2.6:** DMMEGA128A.Net RS485 TERMINAL BLOCK CONNECTOR 3 PIN INTERFACE

Signal Name	Direction	Description	Terminal block
TX+/RX+	IN/OUT	TX+/RX+ Transmit & Receive Data	1
TX-/RX-	IN/OUT	TX-/RX- Transmit & Receive Data	3
GND	-	Ground	2

# DMMEGA128A.Net User' Guide

## I2C EEPROM

A 24LC256 256K (32K x 8) I2C EEPROM is included for nonvolatile firmware storage. It is also used to demonstrate I2C bus operation.

**TABLE 2.7:** DMMEGA128A.Net I2C EEPROM I/O Configurations.

Signal Name	I/O	Description
SDA	PD1	Serial Data I2C Bus.
SCL	PD0	Serial Clock I2C Bus
A0-A2	GND	Address Set to LOW "00"

## REAL TIME CLOCK

A Dallas Maxim DS1307 I2C is included for Interface provides optional Holder battery backup. It is also used to demonstrate I2C bus operation.

**TABLE 2.8:** DMMEGA128A.Net I2C REAL TIME CLOCK I/O Configurations.

Signal Name	I/O	Description
SDA	PD1	Serial Data I2C Bus.
SCL	PD0	Serial Clock I2C Bus
VBAT	3VDC	3VDC Battery Backup

## X 2 SWITCHES USER DEFINE

Three push button switches provide the following functions:

- S1: Active-high RESET switch to hard reset the processor.
- S2: Active-low switch connected user-defined.
- S3: Active-low switch connected user-defined.

**TABLE 2.9:** DMMEGA128A.Net Push Buttons Switch I/O Configurations.

Signal Name	I/O	Description
S1	RESET	Reset switch.
S2	PG3	Active-low switch connected.
S3	PG4	Active-low switch connected.

## X2 LEDS USER DEFINE

The DMMEGA128A.Net Direct to connect the pins is set low to light the LED.

Three push button switches provide the following functions:

- D3: Power Green LED.
- D4: Active-low LED connected user-defined.
- D5: Active-low LED connected user-defined.

**TABLE 2.10:** DMMEGA128A.Net LED I/O Configurations.

Signal Name	I/O	Description
D3	-	POWER LED
D4	PC5	Active-low LED connected.
D5	PC6	Active-low LED connected.

# DMMEGA128A.Net User' Guide

## TRIM POT 10-Bit A/D TEST

10KOhm 0-VCC Input TRIM POT 10-bit ADC Analog to Digital Converter Test.

**TABLE 2.11:** DMMEGA128A.Net 10-bit ADC Analog to Digital Converter Test

Signal Name	I/O	Description
ADC0	PF0	10-bit ADC Analog to Digital Converter

## SPEAKER

This is a Magnetic transducer buzzer (BZ1) speaker.

**TABLE 2.12:** DMMEGA128A.Net Buzzer I/O Configurations.

Signal Name	I/O	Description
SPK	PE2	Speaker Magnetic transducer

## OPTIONAL EXTERNAL 1-WIRE HEADER

The DMMEGA128A.Net board has been designed with the 1-wire serial device interface, allowing the board to provide basic generic functionality to available customer application.



**FIGURE 2-6:** DMMEGA128A.Net Header 1 Pin 1 Wire Connector.

**TABLE 2.13:** DMMEGA128A.Net 1 Wire I/O External Configurations.

Signal Name	I/O	Description
VCC	VCC	PIN 1 VCC Power
DQ	PD7	PIN 2 DQ
GND	GND	PIN 3 GND Power

## OPTIONAL EXTERNAL I2C CONNECTOR

The 10 Pins Header I2C devices Interface for user-define Application.



**FIGURE 2-7:** DMMEGA128A.Net 5 Pins Header I2C Interface.

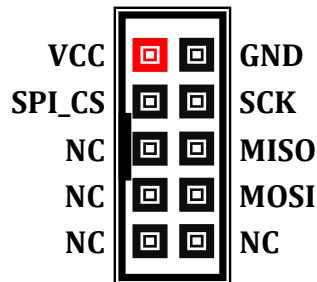
# DMMEGA128A.Net User' Guide

**TABLE 2.14:** DMMEGA128A.Net 5 Pins Header I2C Net I/O Configurations.

Signal Name	I/O	Description	PIN/HEADER
SCL	PD0	Signal Clock.	3
SDA	PD1	Signal Data.	2
INT	PE7	INT or Chip Select.	1
GND	GND	GND Power	5
VCC	+5VDC	+5VDC Power	4

## OPTIONAL EXTERNAL SPI CONNECTOR

The 10 Pins Header SPI devices Interface for user-define Application.



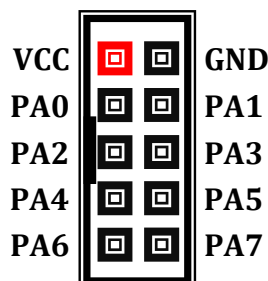
**FIGURE 2-8:** DMMEGA128A.Net 10 Pins Header SPI Interface.

**TABLE 2.15:** DMMEGA128A.Net 10 Pins Header SPI Net I/O Configurations.

Signal Name	I/O	Description	HEADER
CLK	PB1	Signal Clock.	4
MISO	PB3	Signal Data In.	6
MOSI	PB2	Signal Data Out.	8
INT/CS	PB0	INT or Chip Select.	3
GND	GND	GND Power	2
VCC	+5VDC	+5VDC Power	1
NC	NC	NC	5, 7, 9, 10

## HEADERS5 (H5) PORTA CONNECTOR

The DMMEGA128A.Net board PORTA 10 Pins IDC Header allows direct access of the microcontroller's I/O ports.



**FIGURE 2-9:** DMMEGA128A.Net PORTA 10 Pins IDC Header I/O Interface.

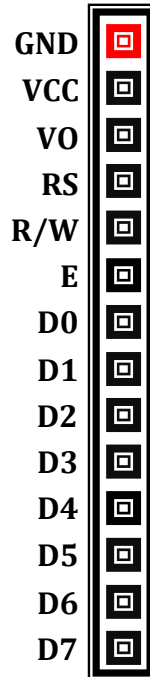
# DMMEGA128A.Net User' Guide

**TABLE 2.16:** DMMEGA128A.Net PORTA 10 Pins IDC Header I/O Interface.

Signal Name	Direction	Description	I/O Pins
VCC	+5.0VDC	Power +5.0VDC	1
GND	GND	Power Ground	2
PA0-PA7	PA0-PA7	Port 0 8 Bits I/O	3-10

**CHARACTOR LCD:**

The DMMEGA128A.Net board supports 14 PINs connector Characters LCD display.



**FIGURE 2-10:** DMMEGA128A.Net 14 Pins Single Header C-LCD Interface.

**TABLE 2.17:** DMMEGA128A.Net 14 Pins Header C-LCD I/O Configurations.

Signal Name	Direction	Description	G-LCD/Pins
RS	PG1	C-LCD RS Pin	4
VO	Adj.	C-LCD Display Adj.	3
E	PG2	Enable the C-LCD	6
R/W	PG0	Write/Read C-LCD	5
D0-D7	PA0-PA7	Data of the C-LCD 8 Bits	7-14
VCC	+5VDC	Power +5VDC	2
GND	GND	Power Ground	1

# DMMEGA128A.Net User' Guide

## HEADER6 (H6) PORTF CONNECTOR I/O OR A/D INTERFACE

The DMMEGA128A.Net board PORTF 10 Pins IDC Header allows direct access of the microcontroller's I/O ports.

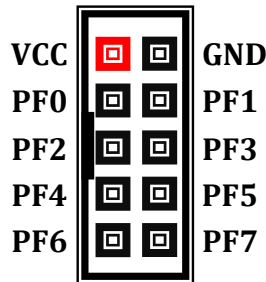


FIGURE 2-11: DMMEGA128A.Net PORTF 10 Pins IDC Header I/O Interface.

TABLE 2.18: DMMEGA128A.Net PORTF 10 Pins IDC Header I/O Interface.

Signal Name	Direction	Description	I/O Pins
VCC	+5.0VDC	Power +5.0VDC	1
GND	GND	Power Ground	2
PF0-PF7	PF0-PF7	Port F 8 Bits I/O	3-10

## PORTB AND PORTE CONNECTOR I/O INTERFACE

The DMMEGA128A.Net board PORTB and PORTE 10 Pins IDC Header allows direct access of the microcontroller's I/O ports.

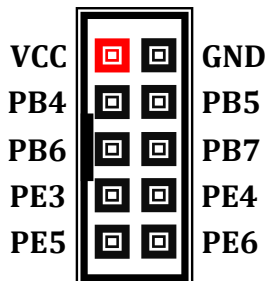


FIGURE 2-12: DMMEGA128A.Net PORTB and PORTE 10 Pins IDC Header I/O Interface.

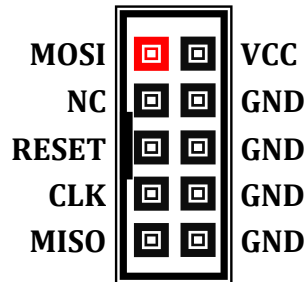
TABLE 2.19: DMMEGA128A.Net PORTB and PORTE 10 Pins IDC Header I/O Interface.

Signal Name	Direction	Description	I/O Pins
VCC	+5.0VDC	Power +5.0VDC	1
GND	GND	Power Ground	2
PB4-PB7	PB4-PB7	PORTB 4 Bits I/O	3-6
PB4-PB7	PE3-PE6	PORTB 4 Bits I/O	7-10

# DMMEGA128A.Net User' Guide

## ISP PROGRAMMING:

DMMEGA128A.Net Support In-System Programming SPI (Serial Peripheral Interface) to download code into the flash memory.



**FIGURE 2-13:** DMMEGA128A.Net In-System Programming SPI (Serial Peripheral Interface)

**TABLE 2.20:** DMMEGA128A.Net SPI Programming Pins Configurations.

Signal Name	I/O	Description	HEADER
CLK	PB1	Signal Clock.	7 (CLK)
PDO	PE1	Signal Data Out.	9 (MISO)
PDI	PE0	Signal Data In.	1 (MOSI)
RESET	RESET	RESET Select.	5 (RESET)
GND	GND	GND Power	4, 6, 8, 10 (GND)
VCC	+5VDC	+5VDC Power	2 (VCC)
-	NC	NC	3 (NC)

# ***DMMEGA128A.Net User' Guide***

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**NOTES:**

# DMMEGA128A.Net User' Guide

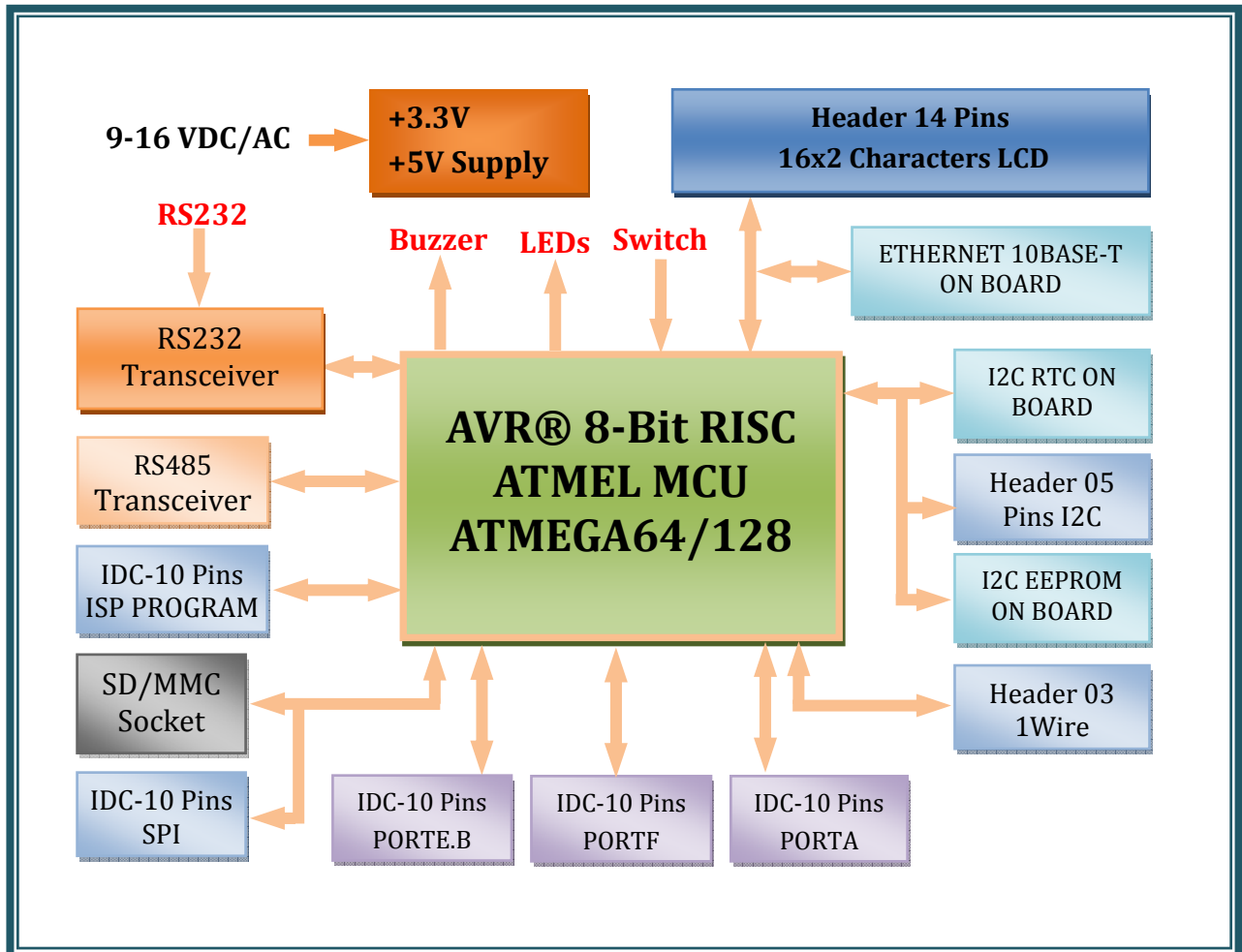
## Appendix A. DMMEGA128A.Net Development Board Schematics

### A.1 INTRODUCTION

This section provides detailed technical information on the DMMEGA128A.Net.

### A.2 DEVELOPMENT BOARD BLOCK DIAGRAM

FIGURE A-1: BLOCK DIAGRAM OF THE DMMEGA128A.Net V2.0 DEVELOPMENT BOARD



# ***DMMEGA128A.Net User' Guide***

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***NOTES:***

