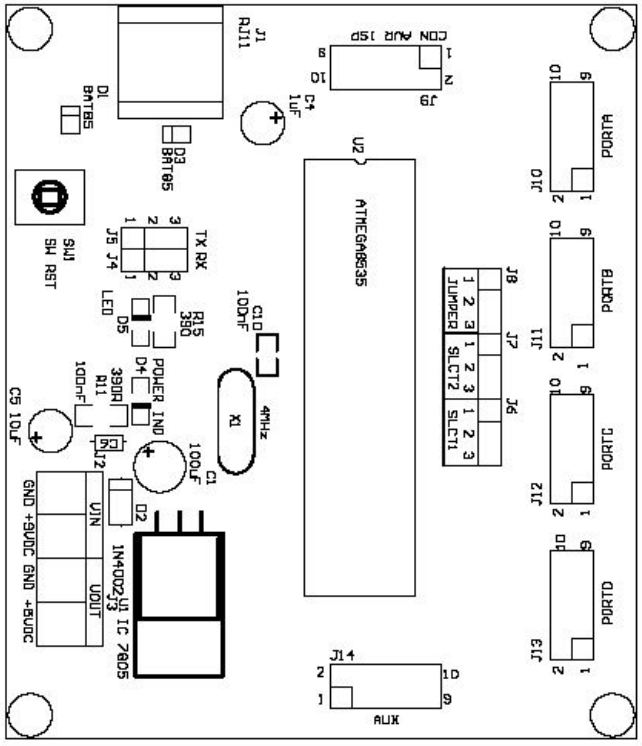
DT-AVR
Low Cost Micro System

DT-AVR Low Cost Micro System is a single chip module based on AVR® Microcontroller and has the ability to perform UART RS-232 serial data communication and memory programming through ISP (In-System Programming). Examples of this module's application are: LED display controller, motor driver controller, digital voltmeter, data communications between module and PC, etc.

Specification

1. ATmega16A, a High-performance, Low-power AVR® 8-bit Microcontroller with 16 KB Flash Memory, 1 KB SRAM, 512 Bytes EEPROM, and 8-channel, 10-bit ADC.
2. Supports variant of 40-pins AVR®, such as: ATmega8535, ATmega8515, AT90S8515, AT90S8535, etc. Conversion socket is required for AVR® without internal ADC.
3. Up to 35 pins programmable I/O lines.
4. An external brown out detector in reset circuit.
5. Jumper configuration to select types of reference voltage for AVR® with internal ADC.
6. Programming indicator LED.
7. 4 MHz oscillator frequency.
8. UART RS-232 serial communication lines with RJ11 connector.
9. ISP programming port.
10. Power supply input voltage 9-12 VDC (VIN) and output voltage 5 VDC (VOUT).

Layout and Jumper Configuration



J10 Header Pinout		J11 Header Pinout	
PA.7	PA.6	PB.7	PB.6
PA.5	PA.4	PB.5	PB.4
PA.3	PA.2	PB.3	PB.2
PA.1	PA.0	PB.1	PB.0
VCC	GND	VCC	GND
PORT A		PORT B	

J12 Header Pinout		J13 Header Pinout	
PC.7	PC.6	RST	PD.6
PC.5	PC.4	PD.5	PD.4
PC.3	PC.2	PD.3	PD.2
PC.1	PC.0	*PD.1	PD.0*
VCC	GND	VCC	GND
PORT C		PORT D	

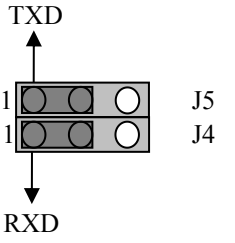
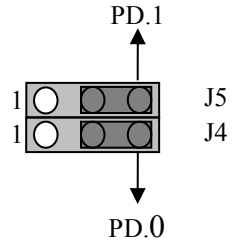
* If UART RS-232 lines in this module are used, PD.1 and PD.0 won't be connected to this header as digital I/O.

J14 Header Pinout	
AVCC	AVCC
AGND	AGND
AGND	Aref/PE.2
PE.1	PE.0
VCC	GND
AUX	

Programming through ISP (In-System Programming) uses ISP Header. The pin configuration is shown in the following figure:

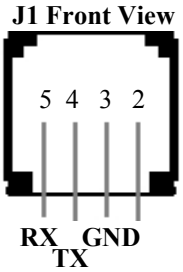
J6 Header Pinout	
GND	MISO
GND	SCK
GND	RST AVR
GND	LED
VCC	MOSI
ISP HEADER	

To use UART RS-232 serial communication in the module, configure J4 and J5 as follows:

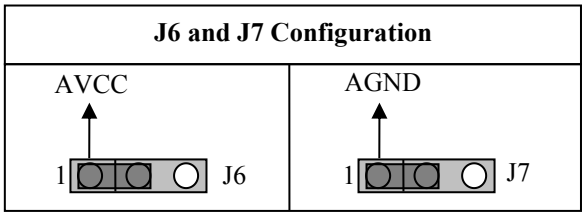
J4 and J5 Configuration	
	
Jumper configuration when PD.0 and PD.1 are used for UART RS-232 serial communication lines	Jumper configuration when PD.0 and PD.1 are used for digital I/O or UART TTL serial communication lines

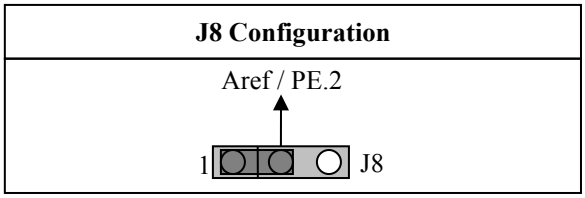
The table below shows the connection between computer and Low Cost Micro System through UART RS-232:

COM port Komputer DB9	DT-AVR Low Cost Micro System J1
RX (pin 2)	RX (pin 5)
TX (pin 3)	TX (pin 4)
GND (pin 5)	GND (pin 3)

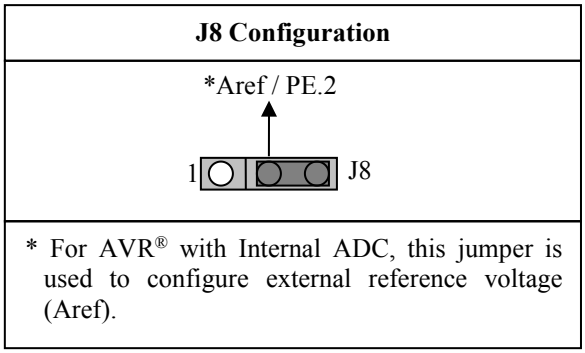


To use AVR® with internal ADC, reference voltage can be obtained from AVCC or Aref. To obtain reference voltage from AVCC, configure jumper J6, J7, and J8 as follows:

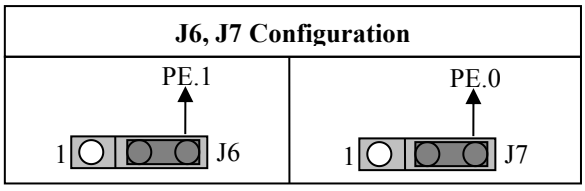


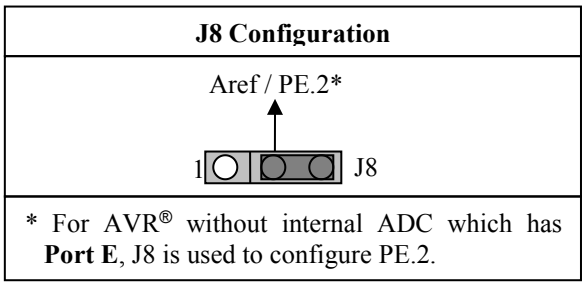


To obtain reference voltage (Aref) from external source, configure jumper J8 as follows:



To use AVR® without internal ADC, a **conversion socket** must be used. Configure jumper J6, J7, and J8 as follows:





J6, J7, and J8 jumper configuration is used to configure microcontroller's pin 30, 31, and 32. For some microcontrollers, such as Atmega8515, the pins function as Port E (PE.0 - PE.2).

Supporting Files

Documentation at www.Innovativeelectronics.com -- Products -- DT-AVR -- DT-AVR Low Cost Micro System:

1. Manual.
2. Schematic.
3. Testing software.
4. Datasheet.

Testing Procedure

A program that has been written down into ATmega16A (avrtest.prj) can be used for preliminary testing. This program will generate square waves through all Port B, Port C, and Port D I/O pins, except PD.0 and PD.1 because they are used as UART communication lines.

The steps to test serial port are as follows:

1. Configure J4 and J5 for UART RS-232 communication, and then apply power supply input voltage to Low Cost Micro System.
2. Connect DB-9 Connector on computer and RJ11 on Low Cost Micro System using the provided serial cable.
3. Run TESTBOARD.EXE program. Determine COM Port to be used. Click **Serial Test** button. If serial communication is successful, information about the sent and received data ("0 = 0 ", "1 = 1 ", "2 = 2 ", etc) will be displayed in green, and a window containing text "Success! " will appear. If serial communication is failed, the text "Fail " will be displayed in red and a window containing text "Fail! "will appear.

The square waves on Port B, Port C, and Port D can be examined by oscilloscope or by connecting the ports to LED circuitry or to DT-I/O LED Logic Tester to see the blinking LED lights.

In ADC testing, Port A is used as input channel. Before testing, configure J6, J7, and J8 to obtain reference voltage from AVCC. Input the voltage between 0 – 5 Volt to one of ADC channel (channel 0 – channel 7). Select input channel to be measured, then click **Test ADC** button. If there is no error, the result of input voltage measurement will be displayed on screen.

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