

RoBoard RB-110

Hardware Introduction

DMP Electronics Inc
Robotic Division
Aug 2010

Agenda

- DMP SoC Family
- RB-110 Overview
- Hardware Introduction
- Accessory
- Application
- Q & A

DMP's SoC Family



- Jul. 1998
- 386 – 40MHz
- 0.50 um process

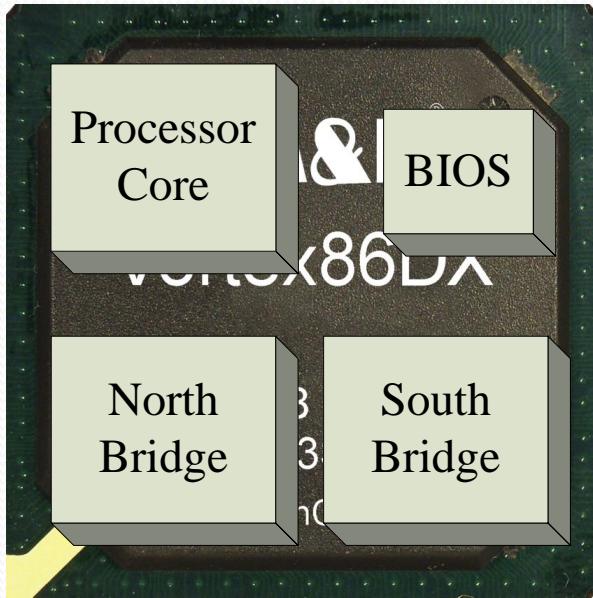


- Feb. 2007
- 486 – 300MHz
- 0.13 um process



- Aug. 2008
- 486 – up to 1GHz
- 90 nm process

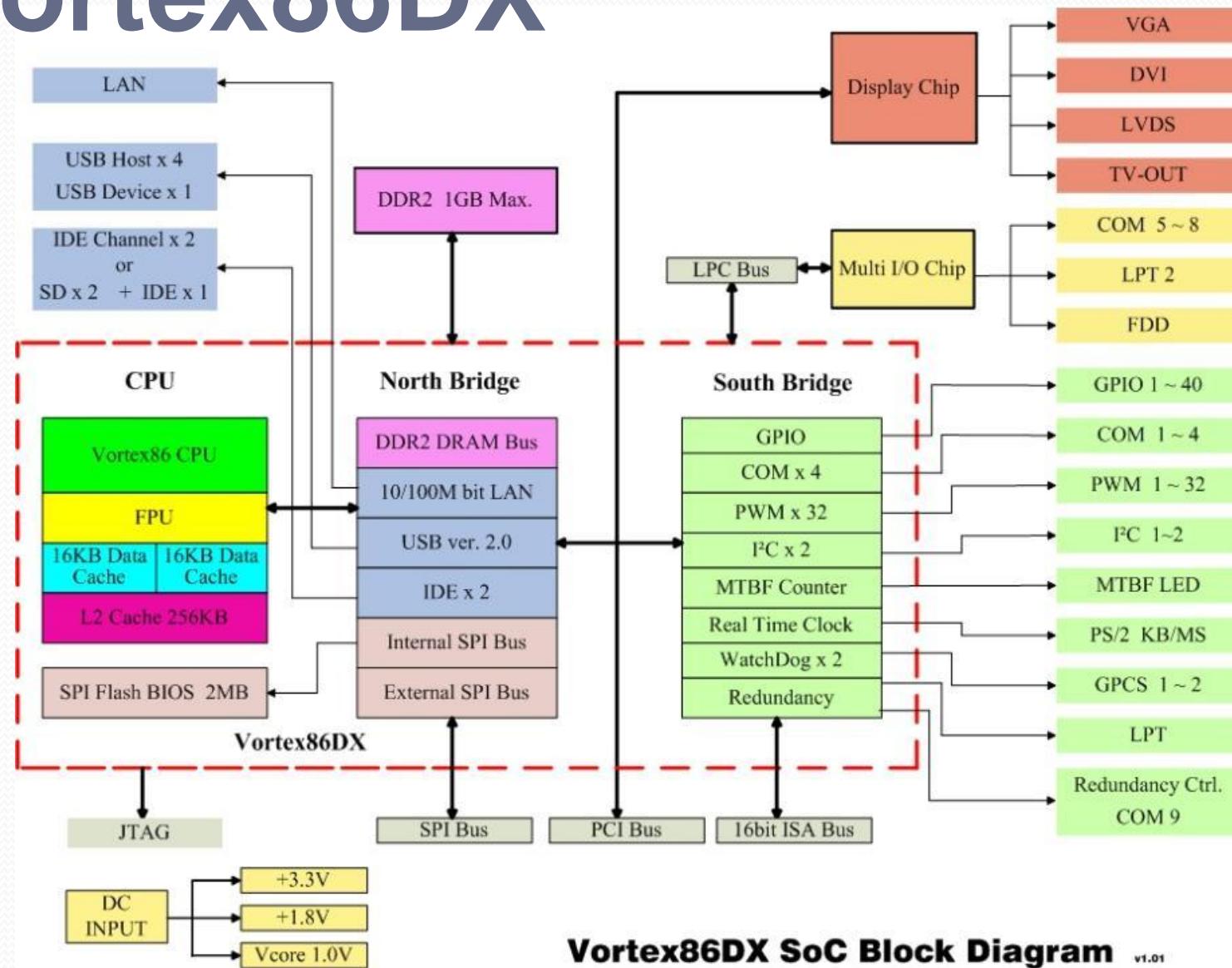
Vortex86DX



→ 4 in 1 SoC

- x86 Legacy Support
- Unique function for **future** Embedded
- Power Consumption, 2.3Watt@800MHz
- 10 Years Life Cycle , 2008~2017
- Best C/P Ratio (Cost / Performance)

Vortex86DX



Vortex86DX SoC Block Diagram v1.01

OVERVIEW

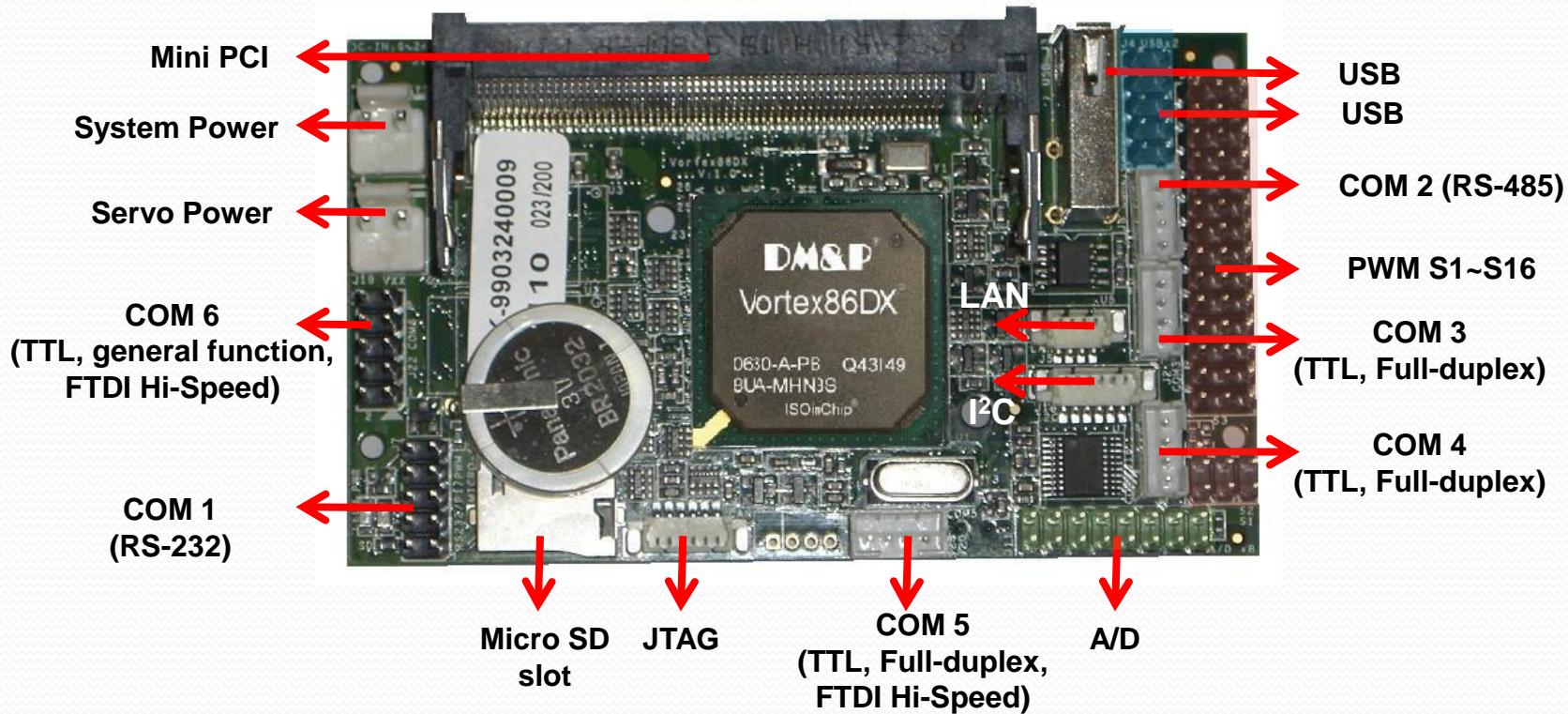
RoBoard RB-110

- Powerful, Tiny **Computer** dedicated to robotics applications
- Based on the **Vortex86DX**, a 32bit x86 CPU running at 1000MHz with 256MB DRAM
- High-Speed Serial Ports (Up to 12Mbps)
- Compatible with Windows, Linux and DOS
- Open Source C++ Library for RoBoard's unique I/O functions (sensors, actuators, etc.)



RoBoard RB-110

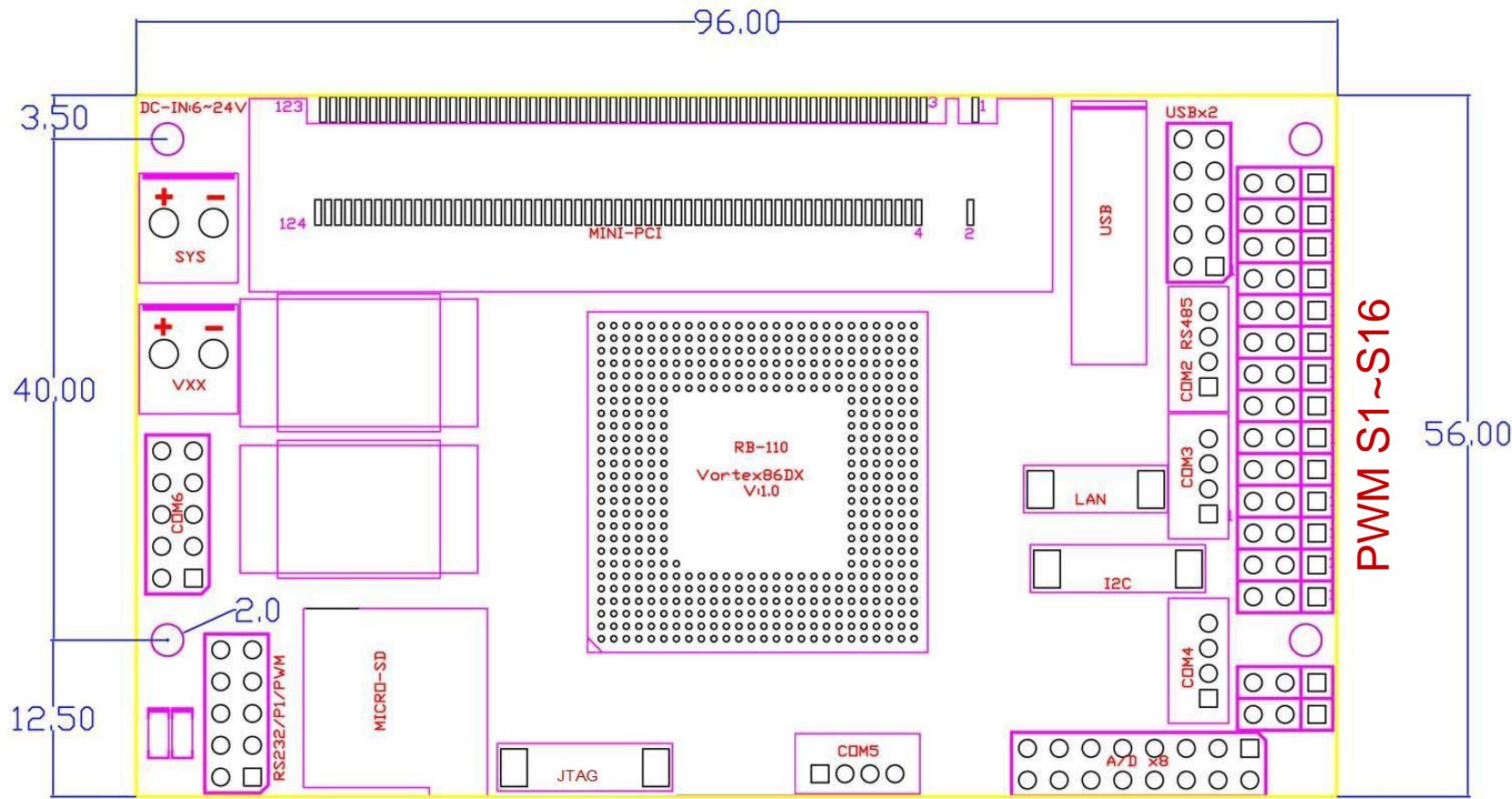
Size: 96 x 56mm



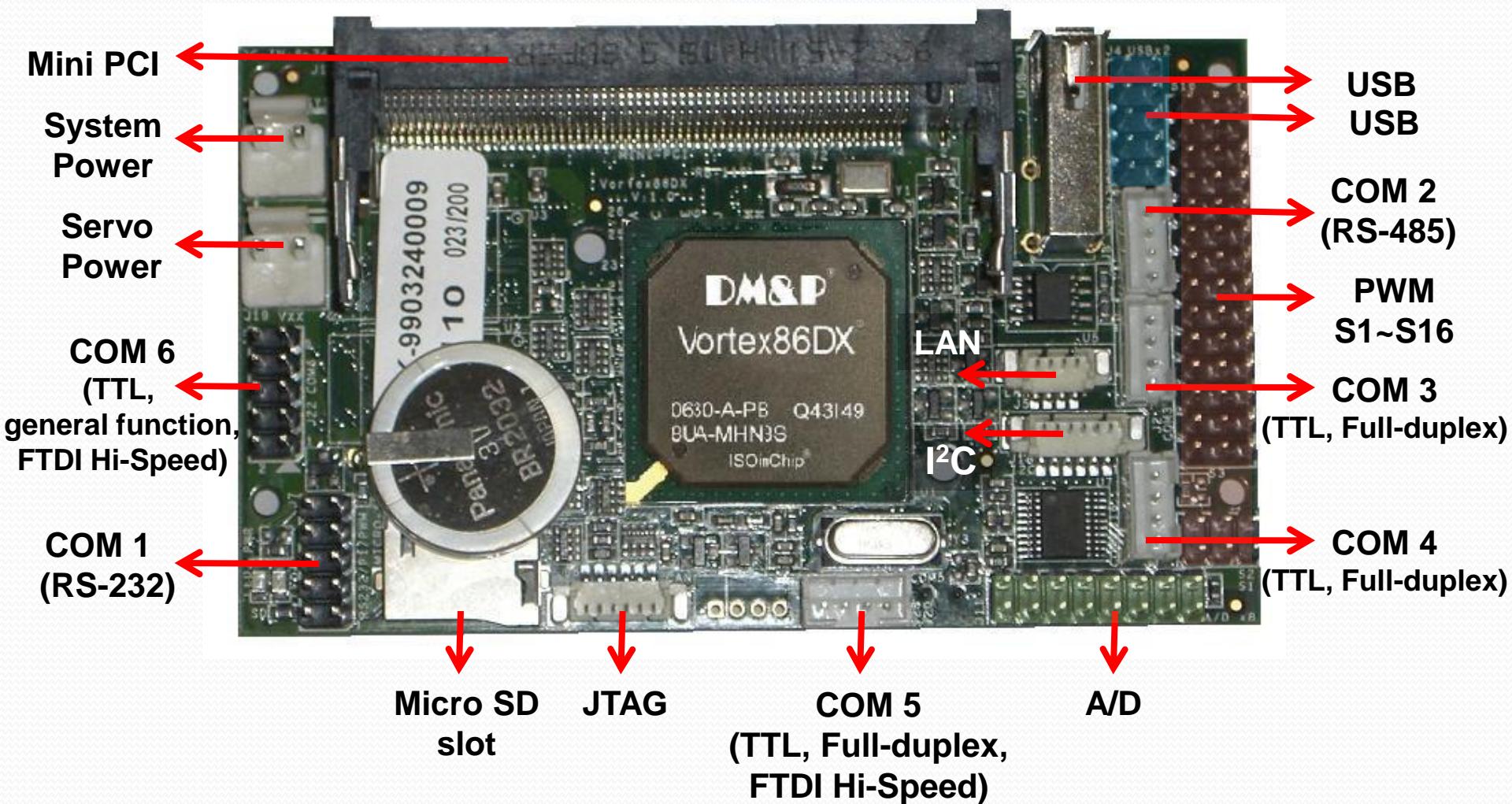
1. 1000MHz, 256MB DDR2
2. PC compatible
3. Build in PWM/GPIO 16Ch
4. USB v2.0 ports × 3
5. TTL COM ports × 2
6. RS-232 port × 1
7. RS-485 port × 1
8. FTDI Hi-Speed COM port × 1
9. FTDI general serial port (COM, SPI, ...) × 1
10. I²C Bus
11. Power consumption 5V@400mA (2W)
12. DC 6V-24V

HARDWARE INTRODUCTION

Locations

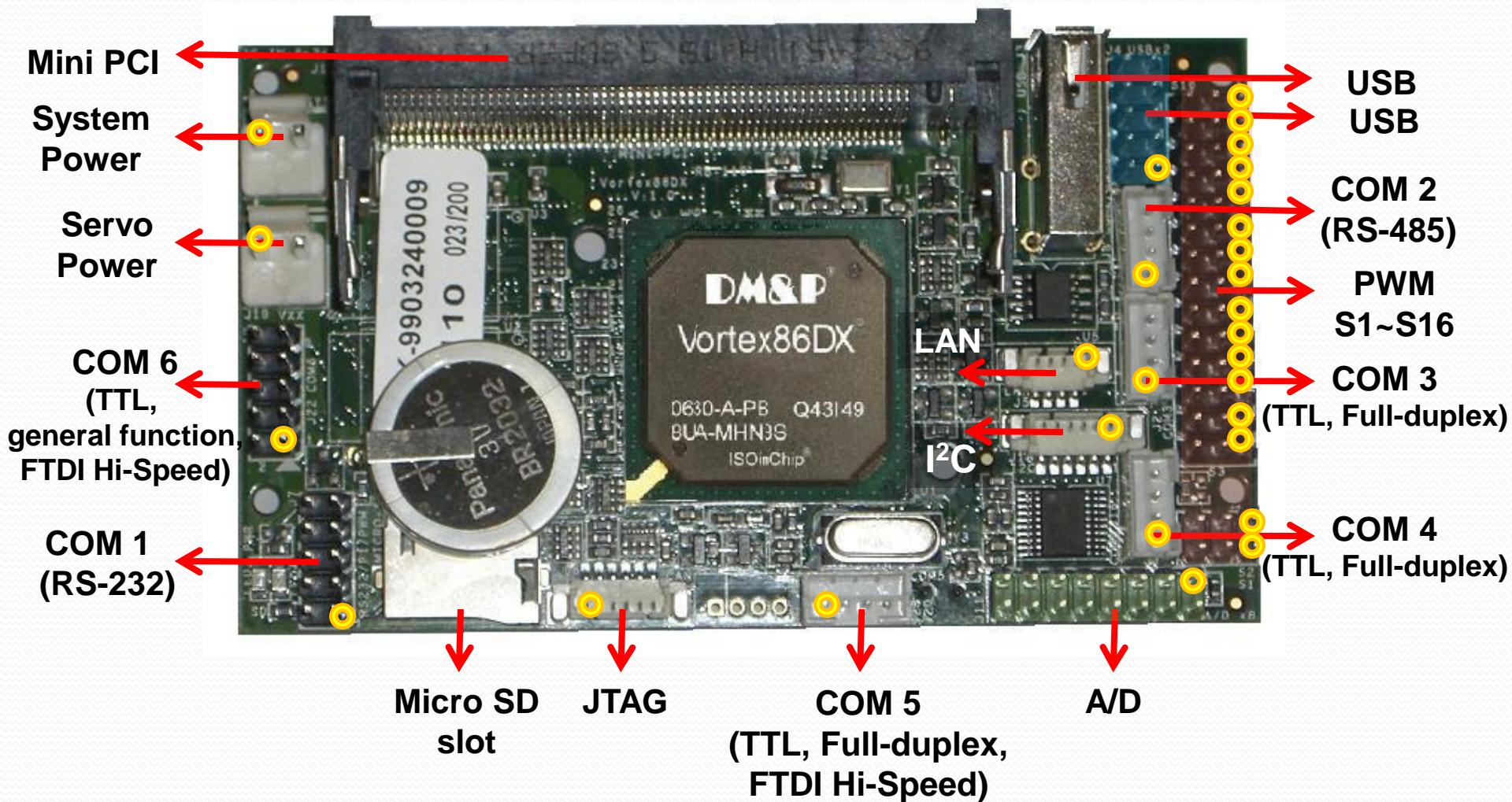


Locations



Pin 1 Location

○: Pin 1



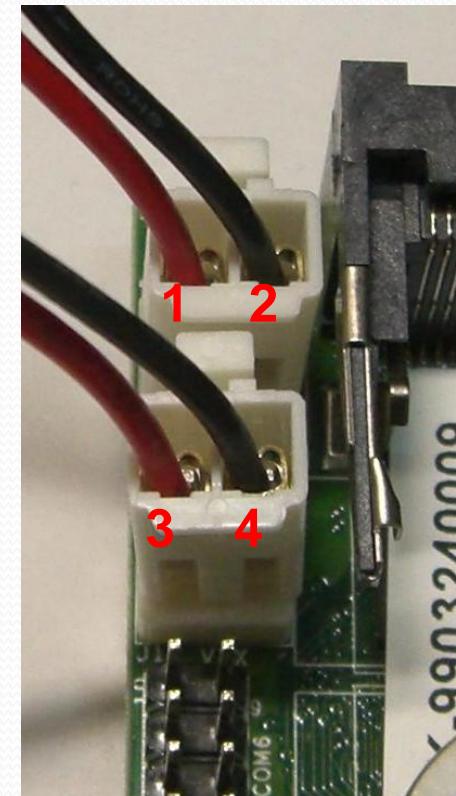
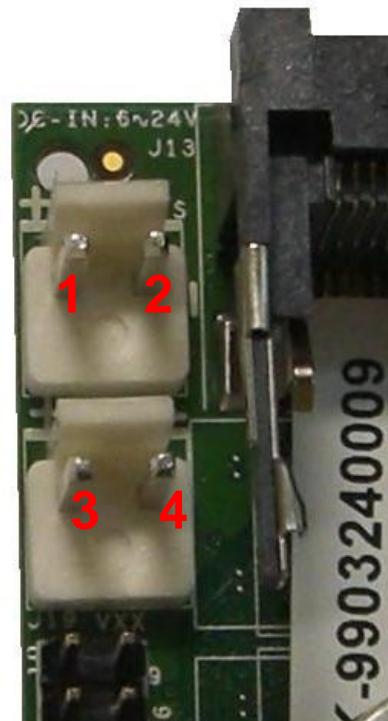
Power connector

System Power Connector

| Pin # | Signal Name |
|-------|--------------|
| 1 | System power |
| 2 | GND |

Servo Power Connector

| Pin # | Signal Name |
|-------|-------------|
| 3 | Vxx |
| 4 | GND |

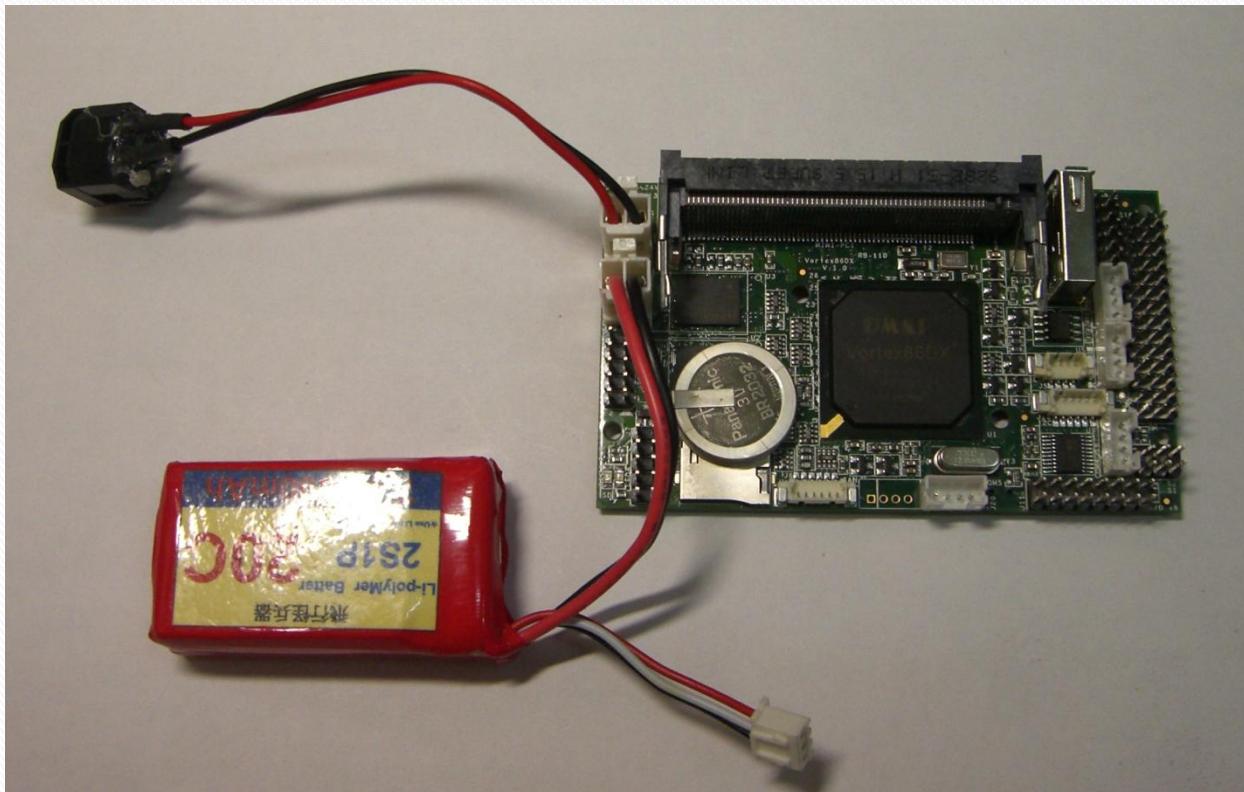


Power connector

- System power
 - power supply for RoBoard internal
 - DC 6V-24V
- Servo power (Vxx)
 - power supply for Servo motors
 - Input no limited, but recommend $\leq 24V$

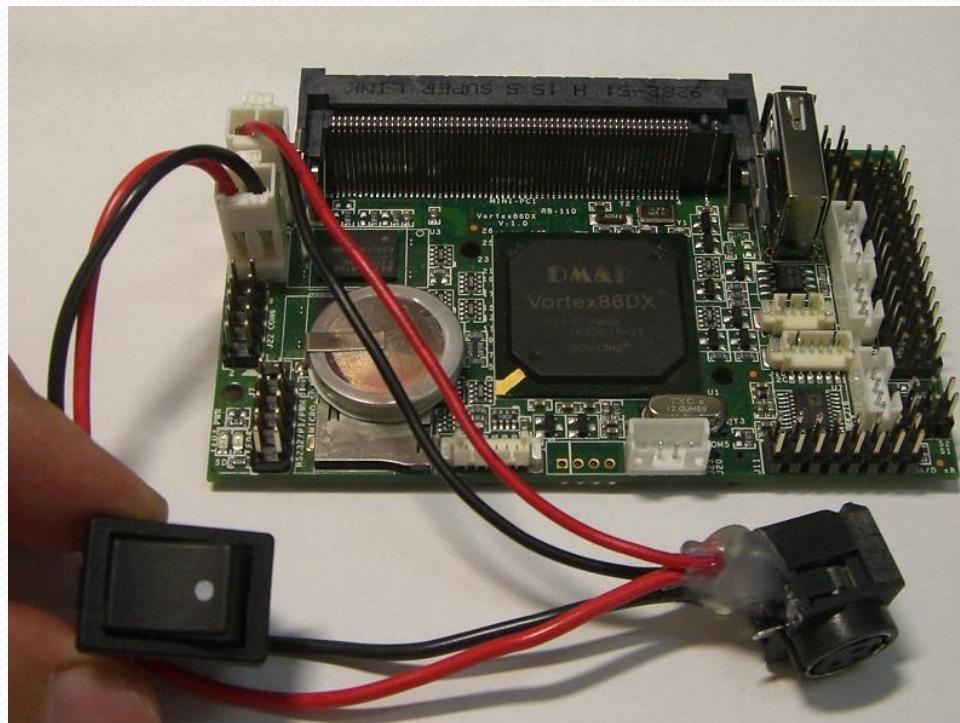
Power connector

Connection Example – use different power sources to avoid power interference of system & servos



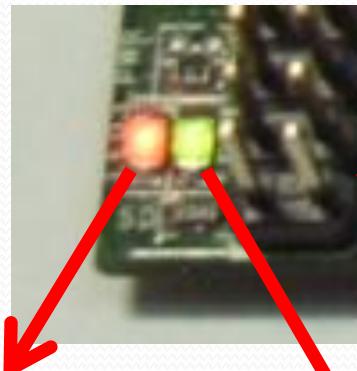
Power connector

Connection Example – share the same power source if you want the same battery for power supply of both system & servos



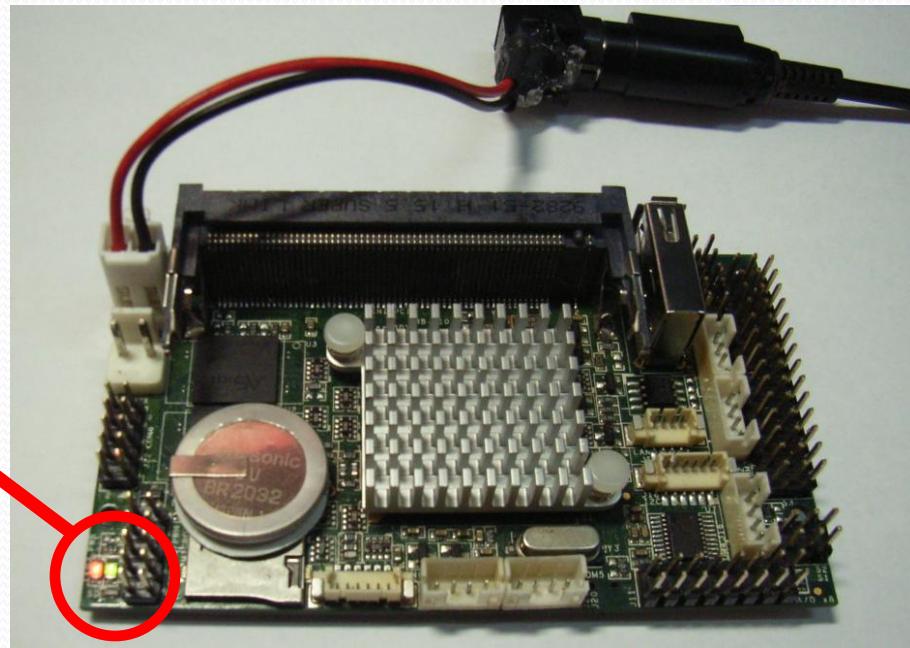
Power connector

After connecting the Power/HD LED will light



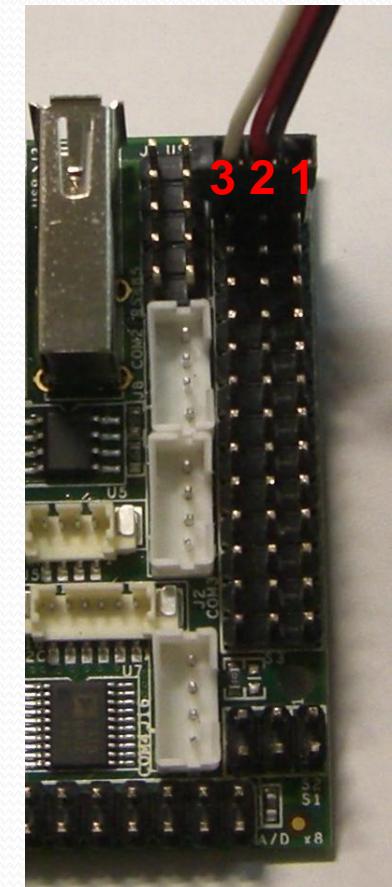
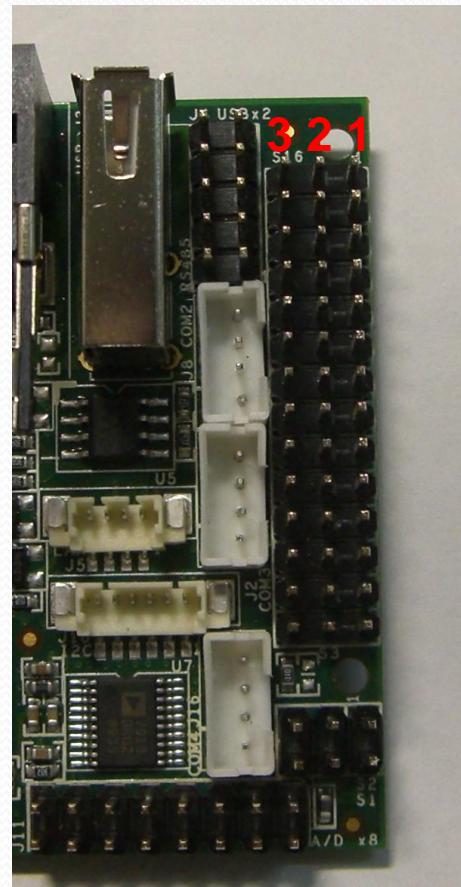
Power LED

Hard Disk LED
(Micro SD card)



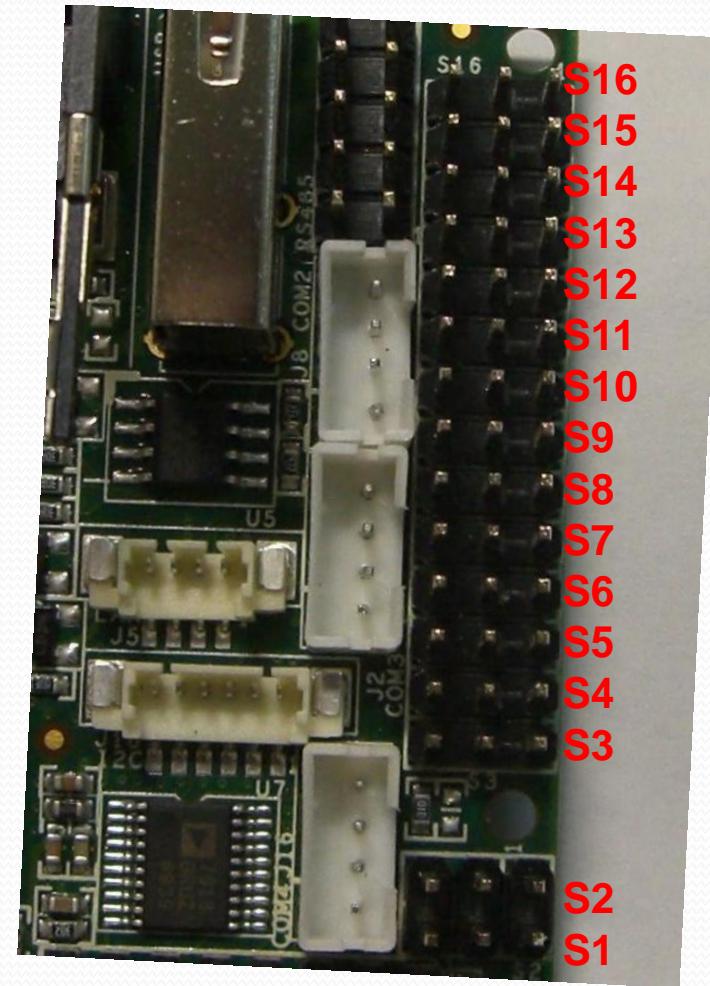
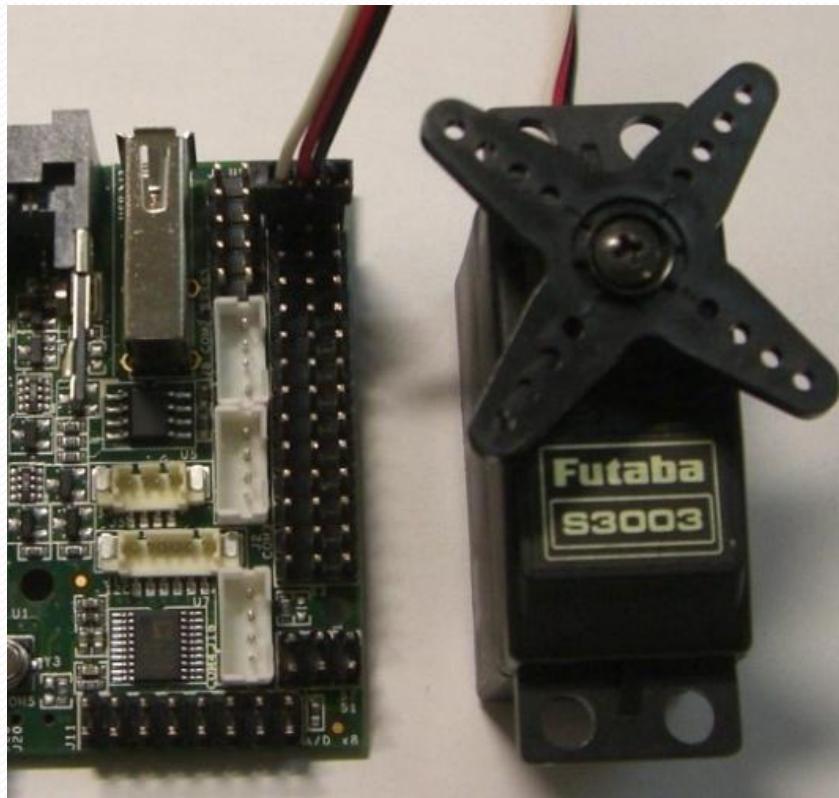
PWM 16ch

| Pin # | Signal Name |
|-------|-------------|
| 1 | GND |
| 2 | Vxx |
| 3 | GPXX |



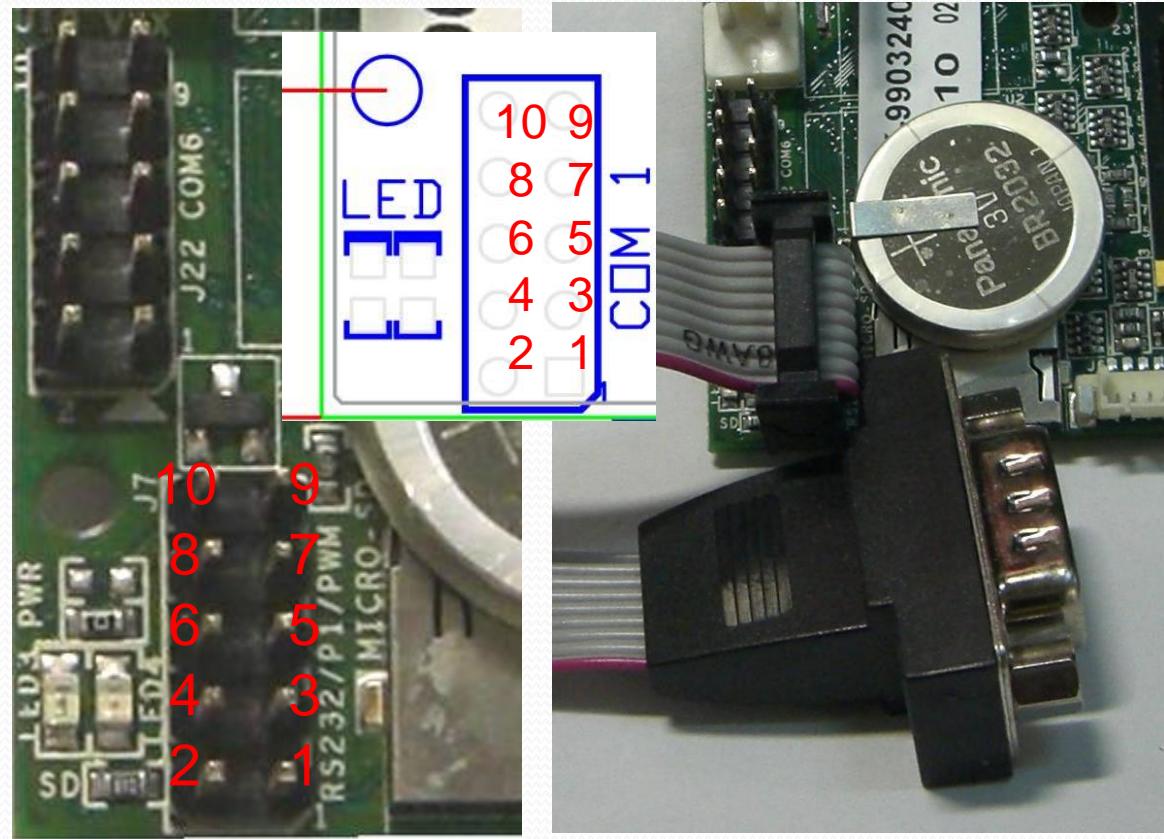
PWM 16ch

Connection Example



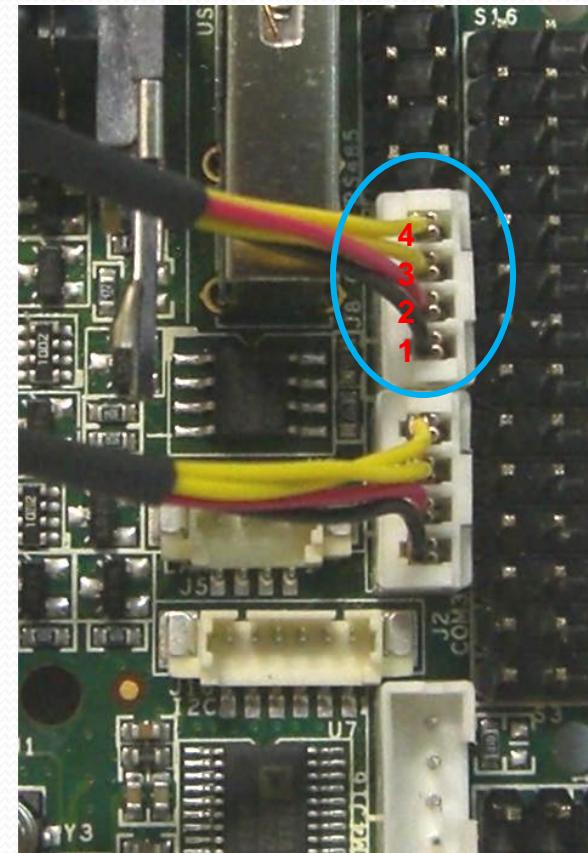
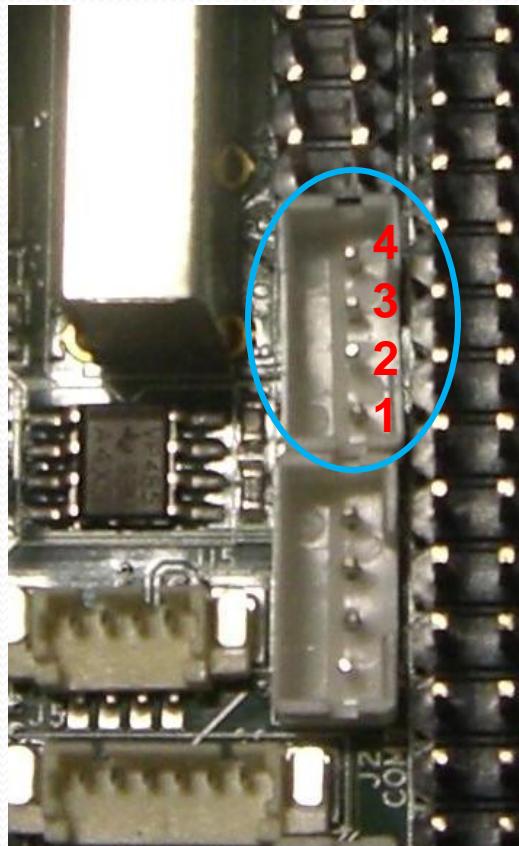
COM 1 / RS-232

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | DCD1 | 2 | RXD1 |
| 3 | TXD1 | 4 | DTR1 |
| 5 | GND | 6 | DSR1 |
| 7 | RTS1 | 8 | CTS1 |
| 9 | RI1 | 10 | VCC (5V) |



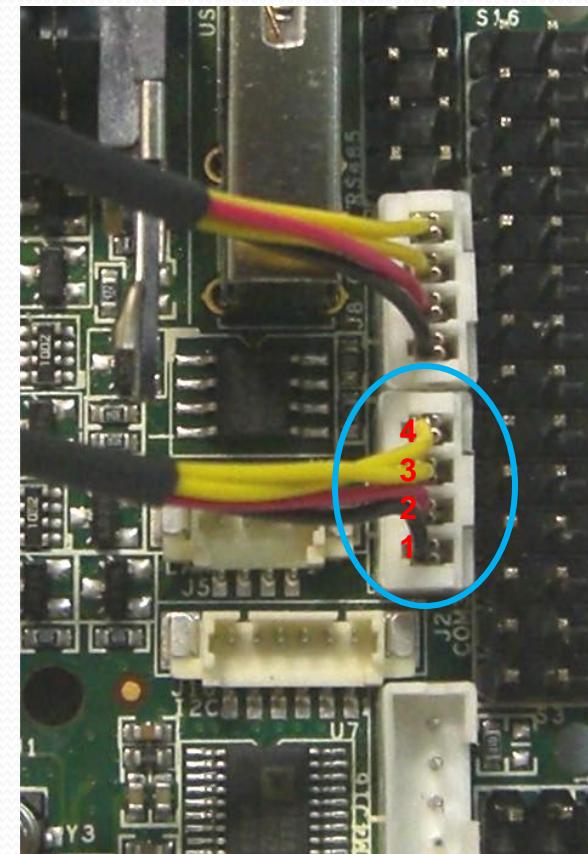
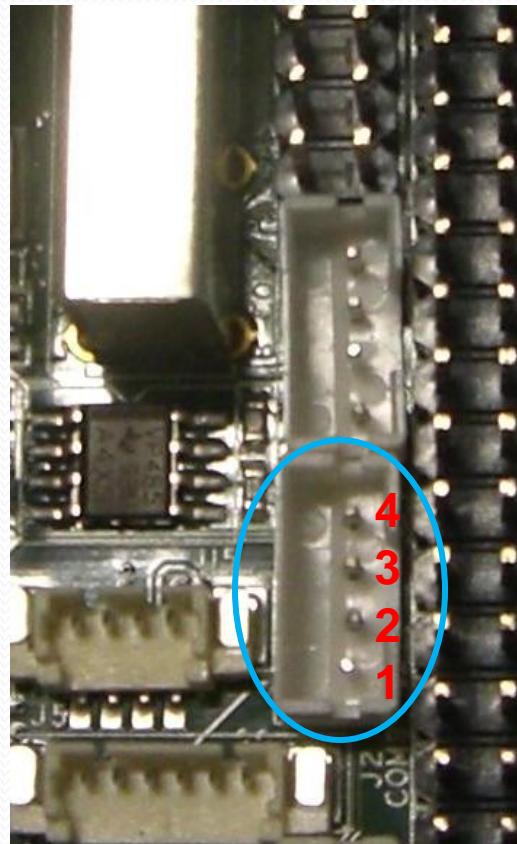
COM 2 / RS-485

| Pin # | Signal Name | Line Color |
|-------|-------------|------------|
| 1 | GND | Black |
| 2 | Vxx | Red |
| 3 | RS-485+ | Other |
| 4 | RS-485- | Other |



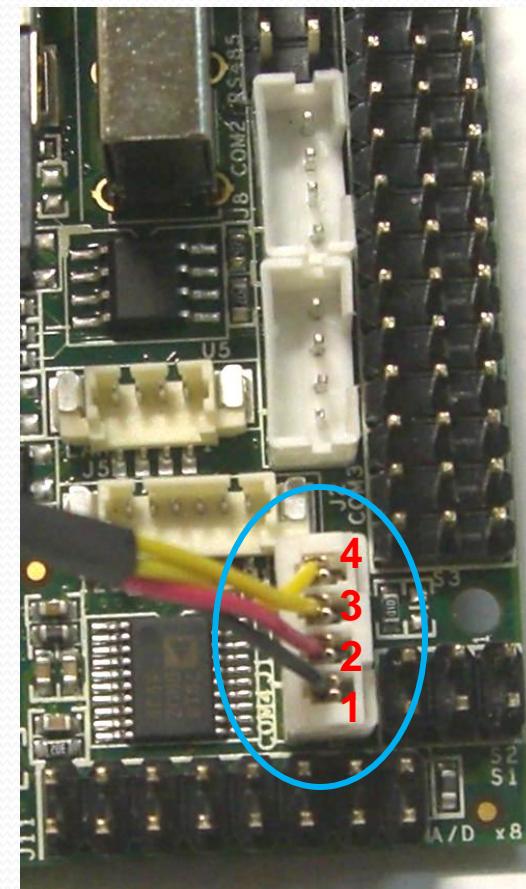
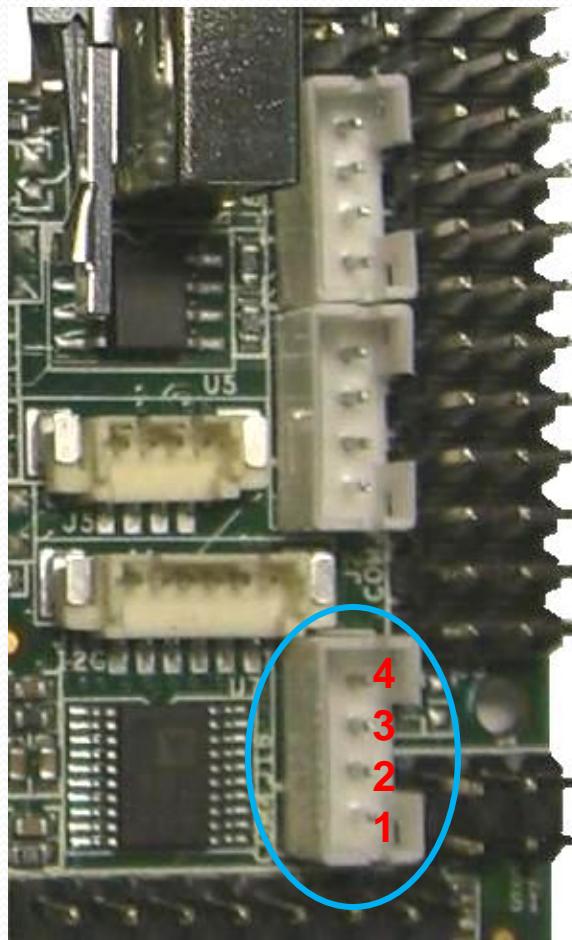
COM 3 / Full Duplex TTL

| Pin # | Signal Name | Line Color |
|-------|-------------|------------|
| 1 | GND | Black |
| 2 | Vxx | Red |
| 3 | TXD3 | Other |
| 4 | RXD3 | Other |



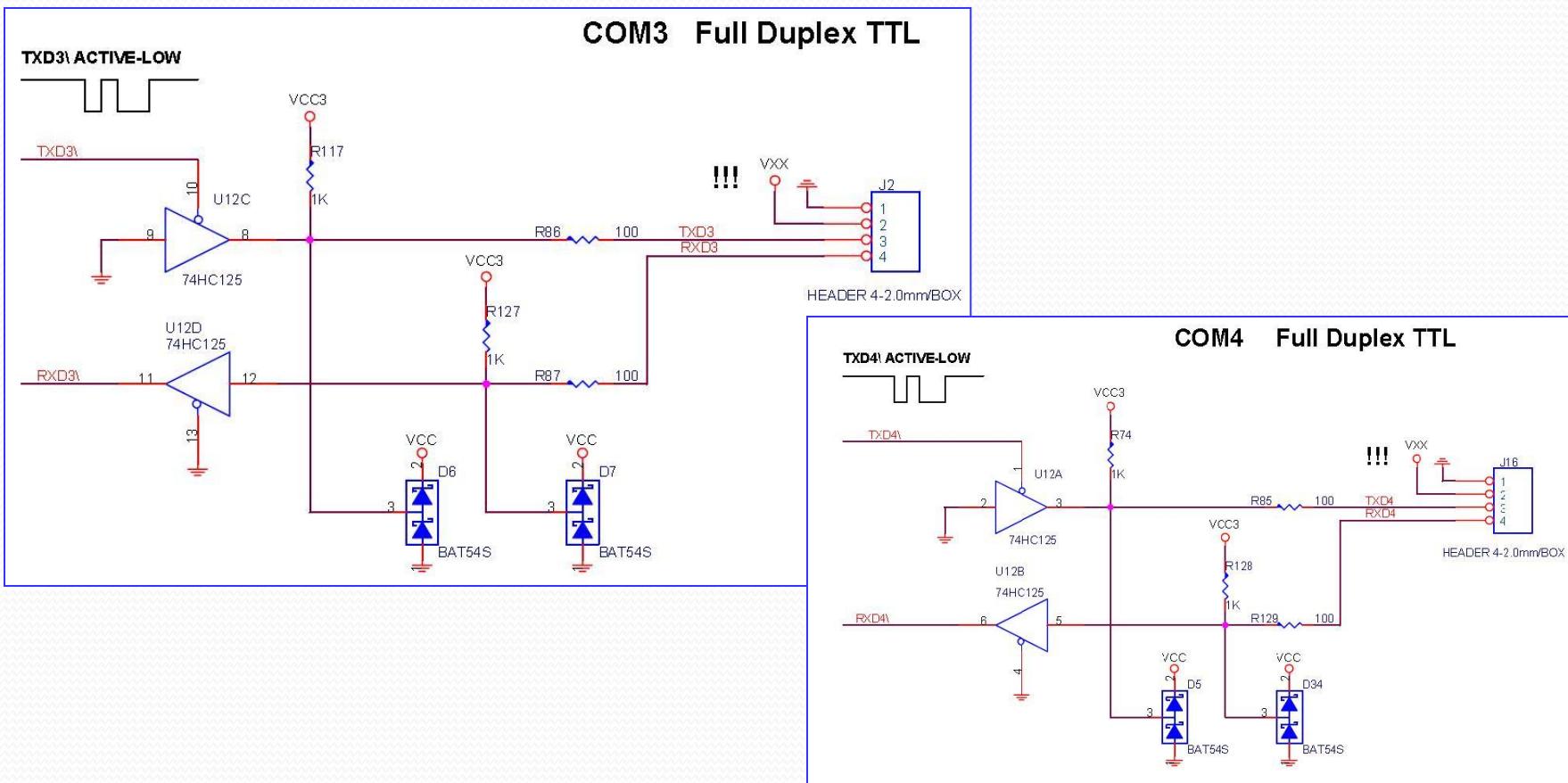
COM 4 / Full Duplex TTL

| Pin # | Signal Name | Line Color |
|-------|-------------|------------|
| 1 | GND | Black |
| 2 | Vxx | Red |
| 3 | TXD4 | Other |
| 4 | RXD4 | Other |



Use COM 3/4 as Half-Duplex TTL

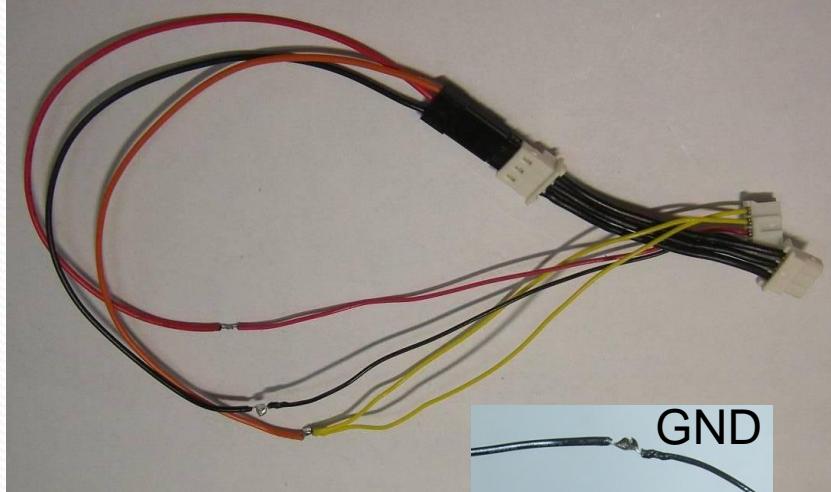
- COM3 & COM4 are buffered:



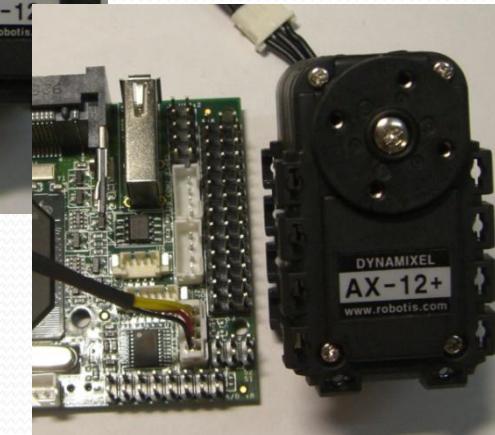
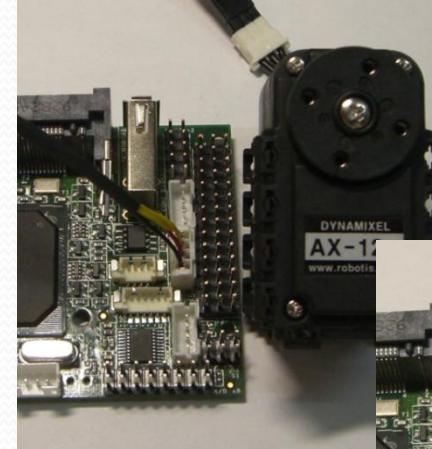
Use COM 3/4 as Half-Duplex TTL

- you can simply short TX & RX to get a half-duplex COM port:

Ex. connect COM3/4 to DYNAMIXEL AX-12+

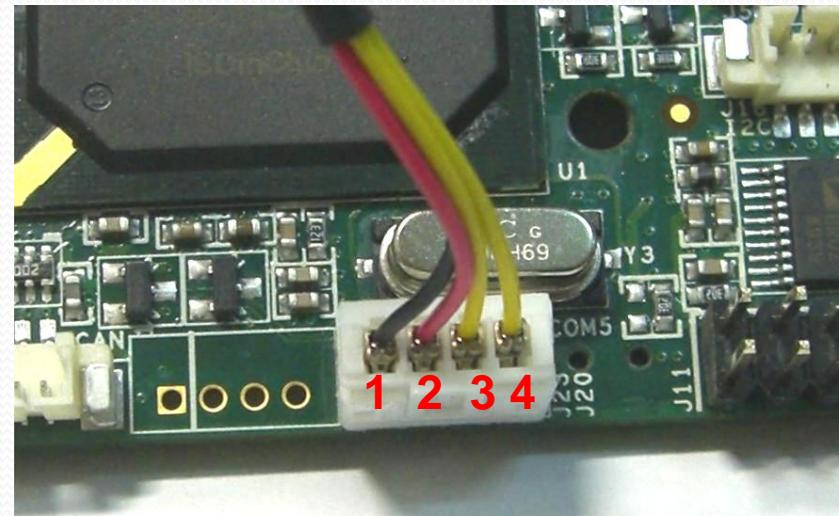
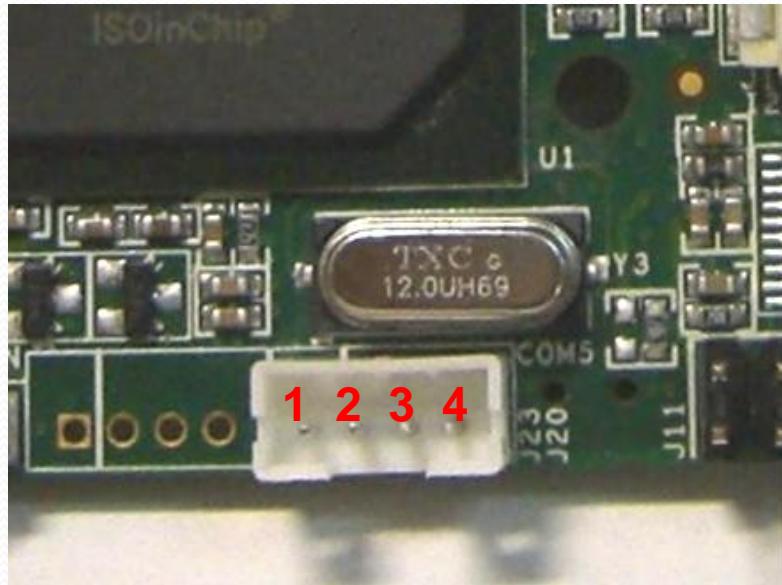


TXD & RXD



COM 5 / Full Duplex TTL / FTDI Hi-Speed

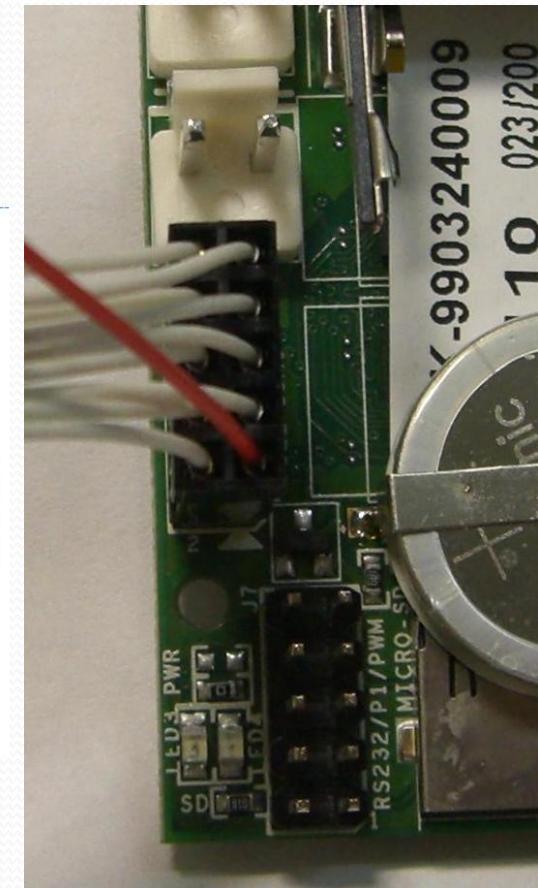
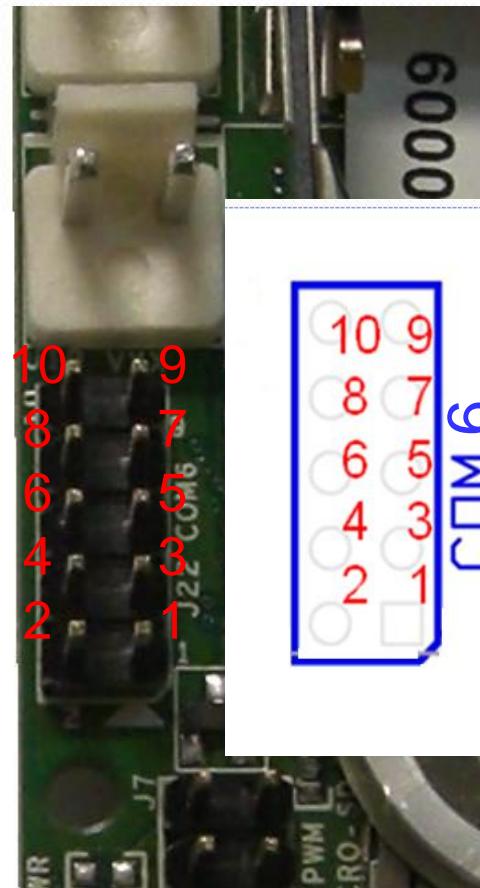
| Pin # | Signal Name |
|-------|-------------|-------|-------------|-------|-------------|-------|-------------|
| 1 | GND | 2 | Vxx | 3 | TXD5 | 4 | RXD5 |



Note: You can also use COM 5 as Half-Duplex TTL (same as COM 3/4)

COM 6 / TTL / FTDI General Serial Port

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | DCD6 | 2 | RXD6 |
| 3 | TXD6 | 4 | DTR6 |
| 5 | GND | 6 | DSR6 |
| 7 | RTS6 | 8 | CTS6 |
| 9 | RI6 | 10 | TXDEN6 |

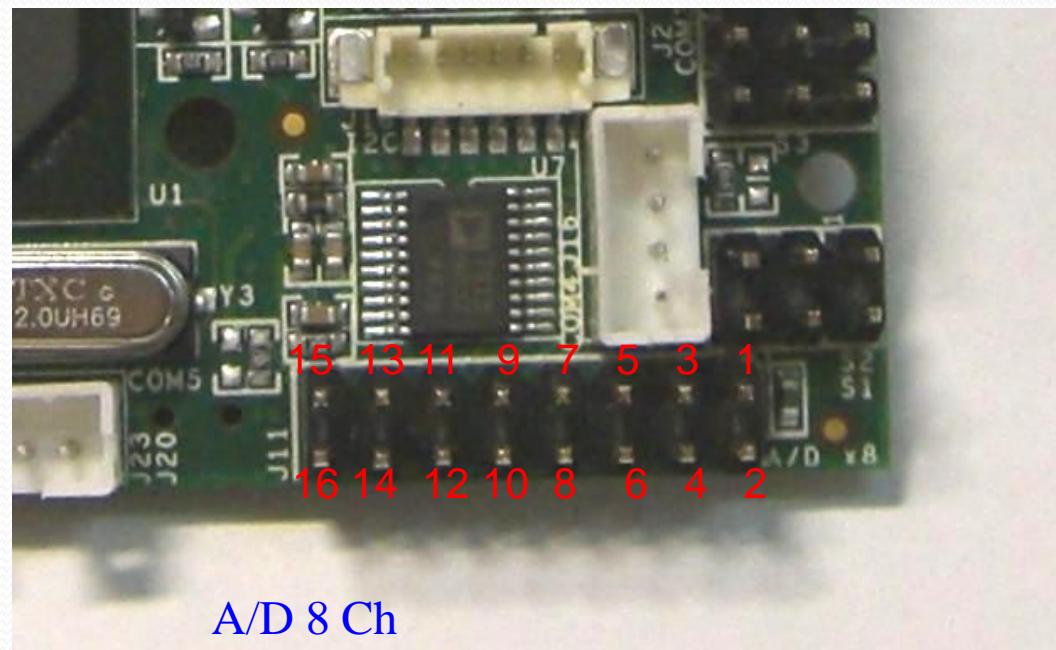


COM 6 / TTL / FTDI General Serial Port

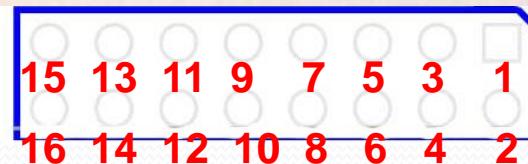
- COM6 is the second port of the built-in FTDI FT2232H, and can function as COM, SPI, I2C, ...
 - See FTDI FT2232H datasheet for more details
- References for FTDI FT2232H:
 - FT2232H Datasheet :
http://www.ftdichip.com/Documents/DataSheets/DS_FT2232H.pdf
 - VCP Drivers : <http://www.ftdichip.com/Drivers/VCP.htm>
 - D2XX Drivers : <http://www.ftdichip.com/Drivers/D2XX.htm>
 - More information : <http://www.ftdichip.com/Products/FT2232H.htm>

A/D 8 Ch

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | AD-VIN0 | 2 | ADGND |
| 3 | AD-VIN1 | 4 | ADGND |
| 5 | AD-VIN2 | 6 | ADGND |
| 7 | AD-VIN3 | 8 | ADGND |
| 9 | AD-VIN4 | 10 | ADGND |
| 11 | AD-VIN5 | 12 | ADGND |
| 13 | AD-VIN6 | 14 | ADGND |
| 15 | AD-VIN7 | 16 | ADGND |

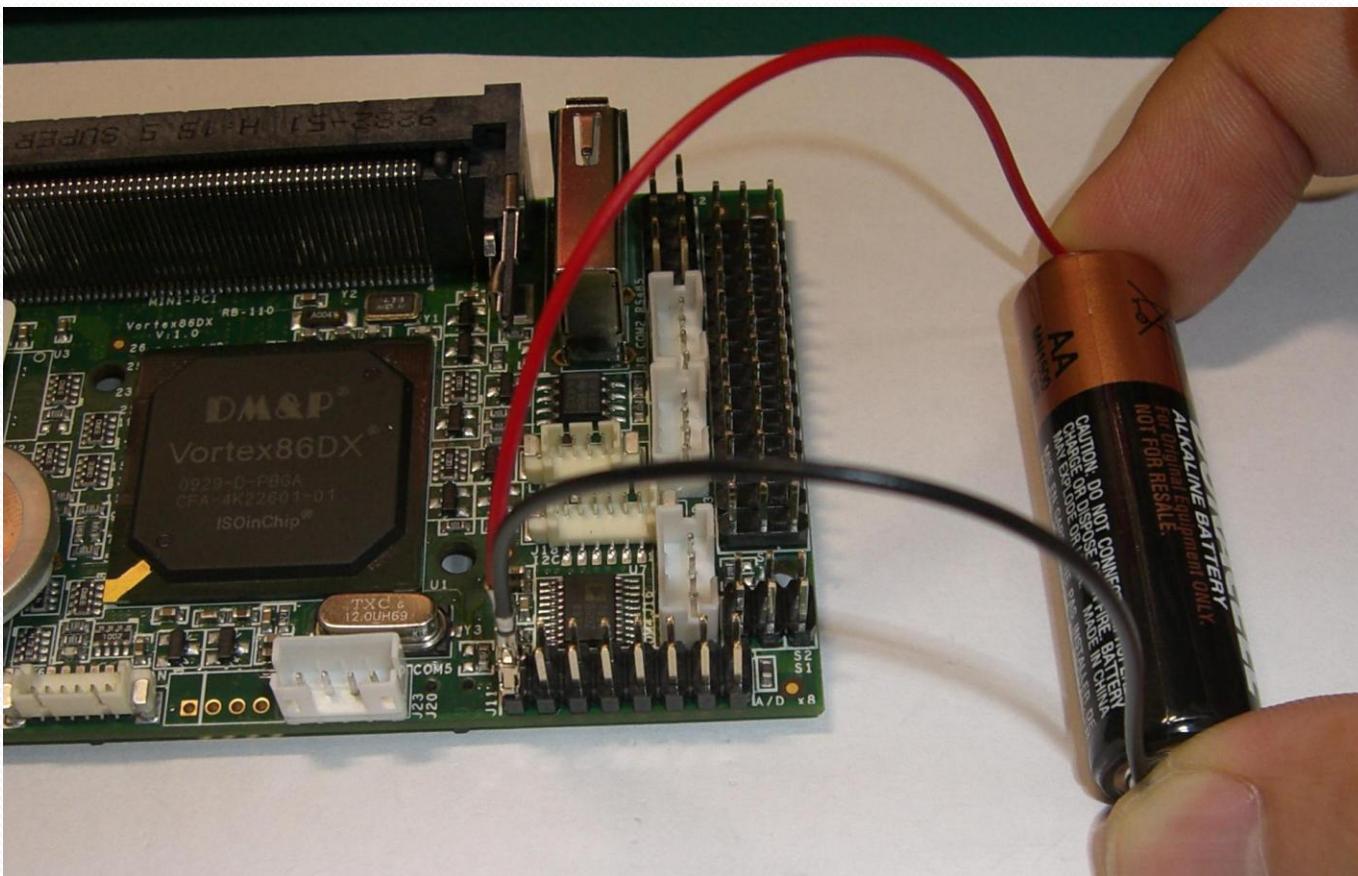


A/D 8 Ch



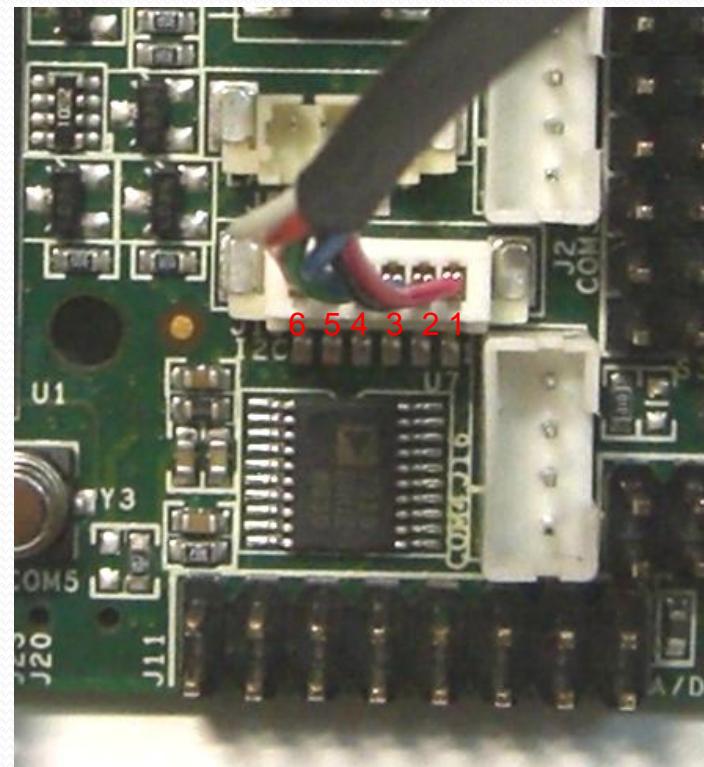
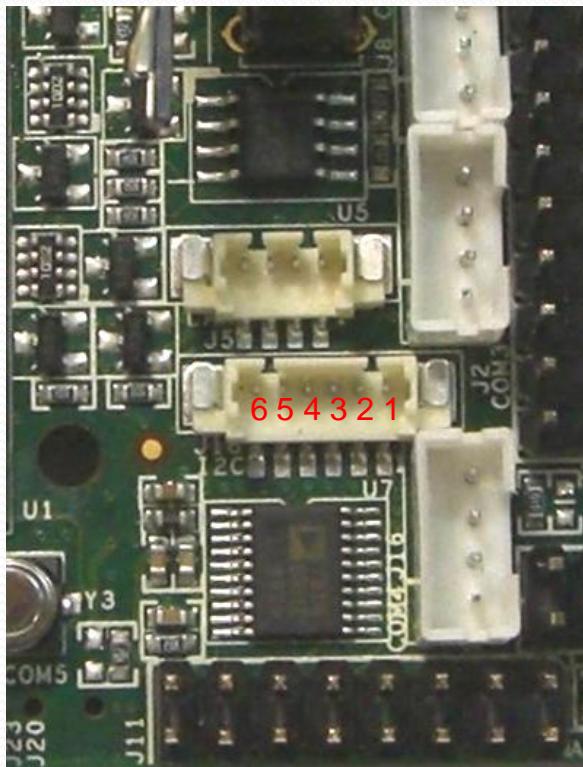
A/D 8 Ch

**Connection Example – Measure battery voltage
with A/D Channel7 (AD-VIN7)**



I²C

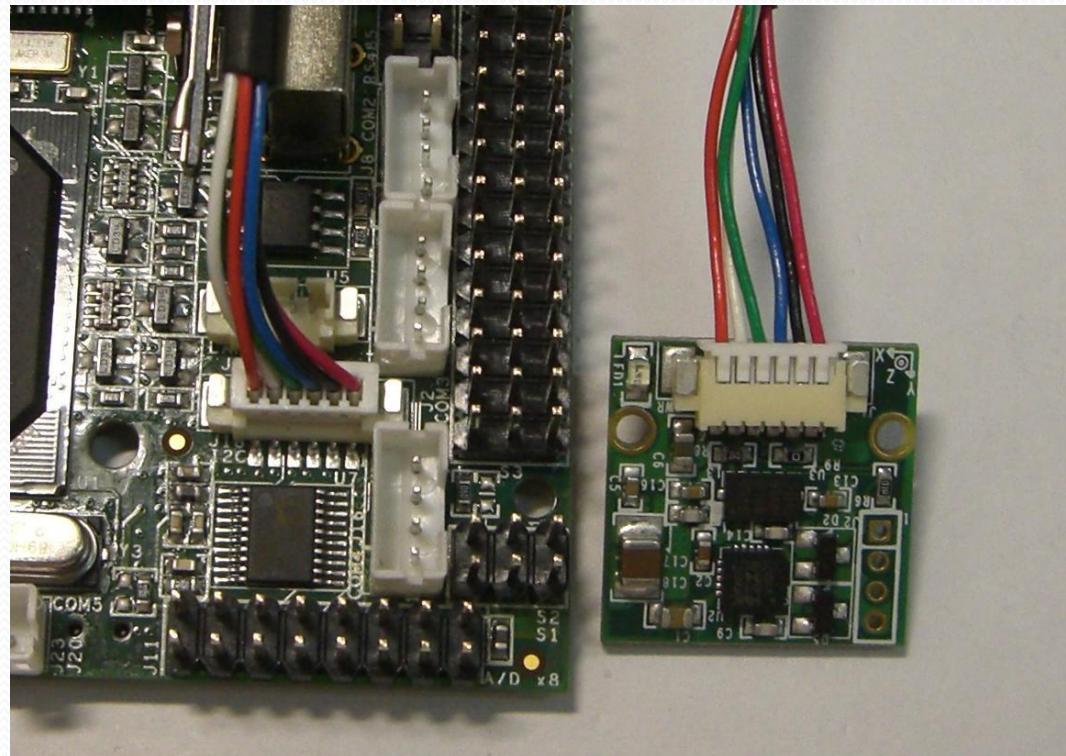
| Pin # | Signal Name |
|-------|-------------|
| 1 | VCC (5V) |
| 2 | GND |
| 3 | I2C0_SCL |
| 4 | I2C0_SDA |
| 5 | ~Reset |
| 6 | VCC3 (3.3V) |



I²C

Connection Example :

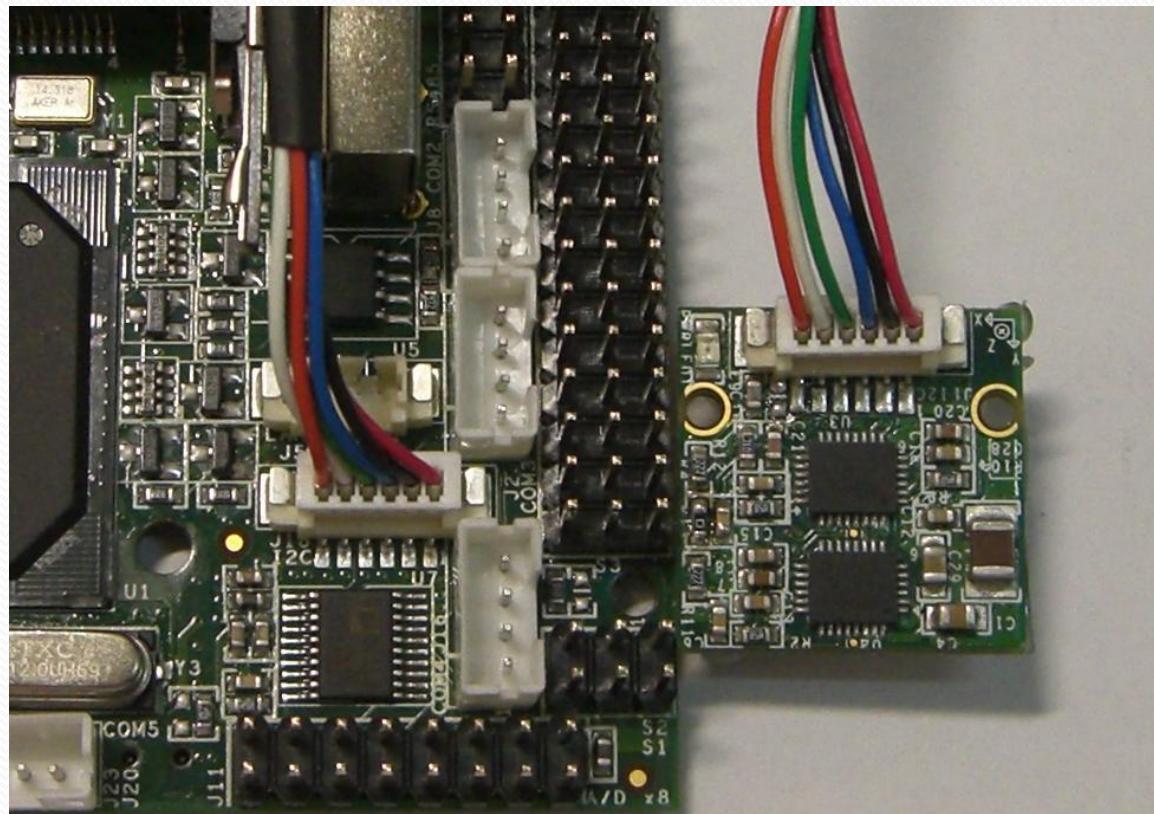
Connect to DMP RM-G144 6-Axis Magnetic Compass & Accelerometer



I²C

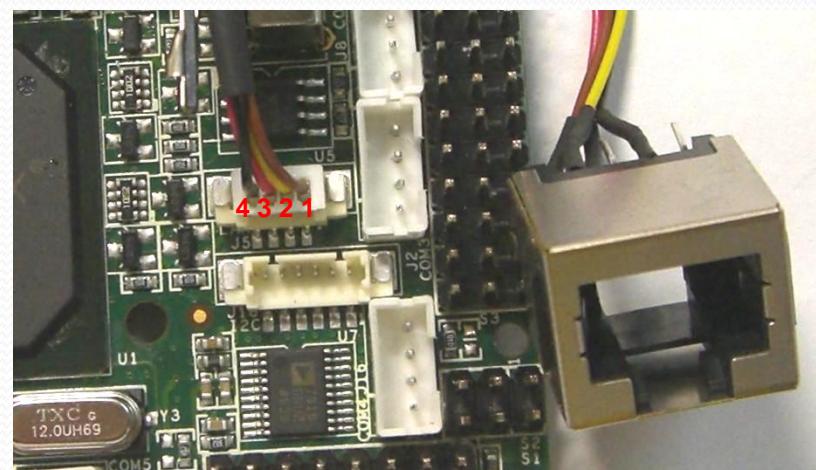
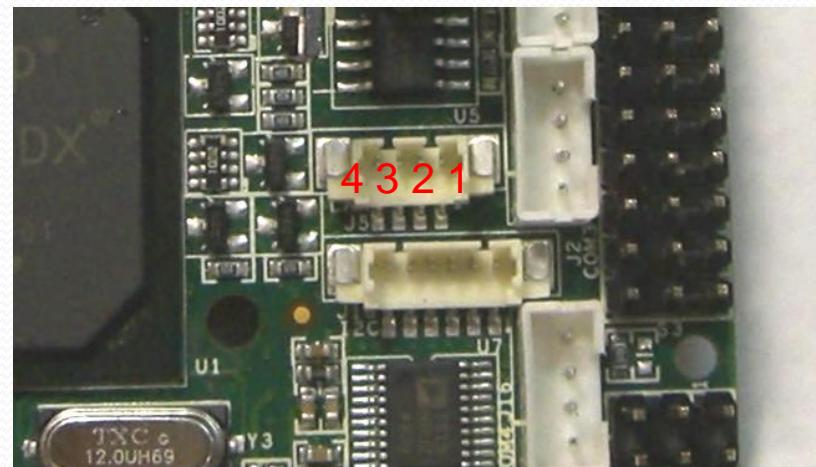
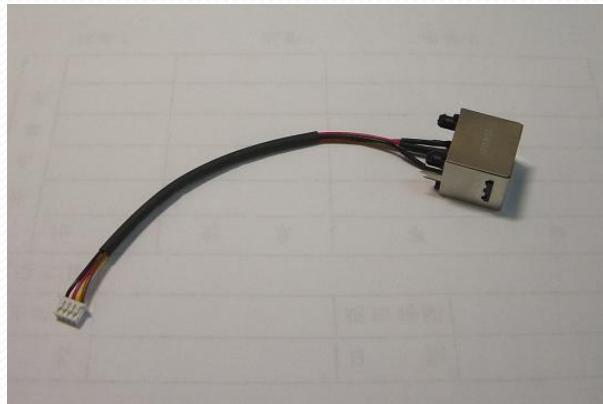
Connection Example :

Connect to DMP RM-G145 3-Axis Gyro



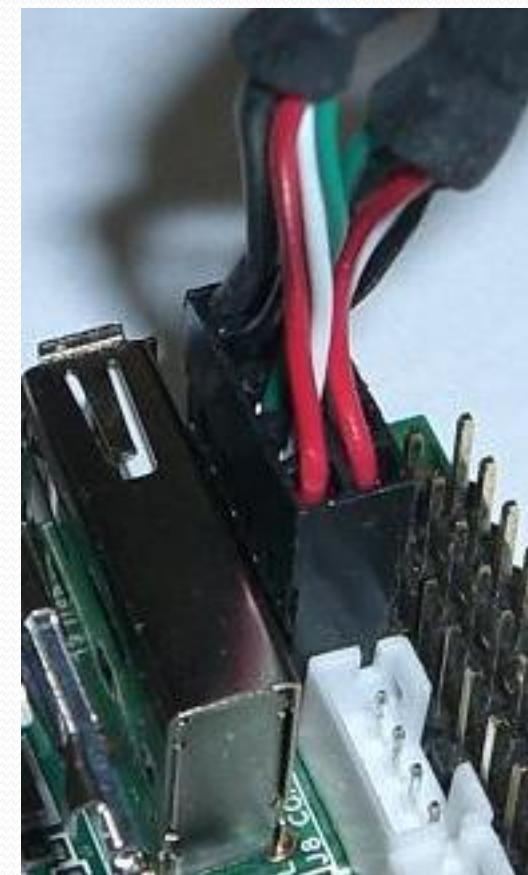
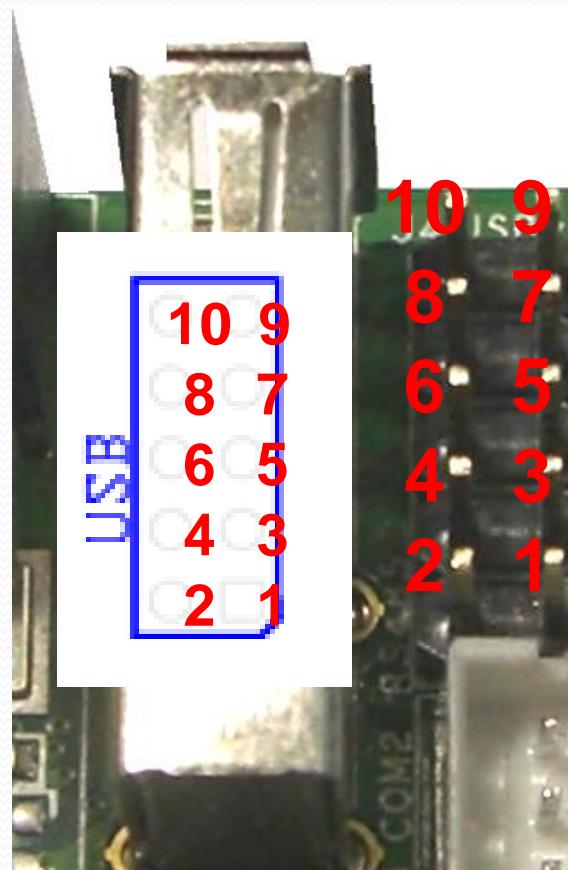
LAN connector

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | LAN-TX+ | 2 | LAN-TX- |
| 3 | LAN-RX+ | 4 | LAN-RX- |



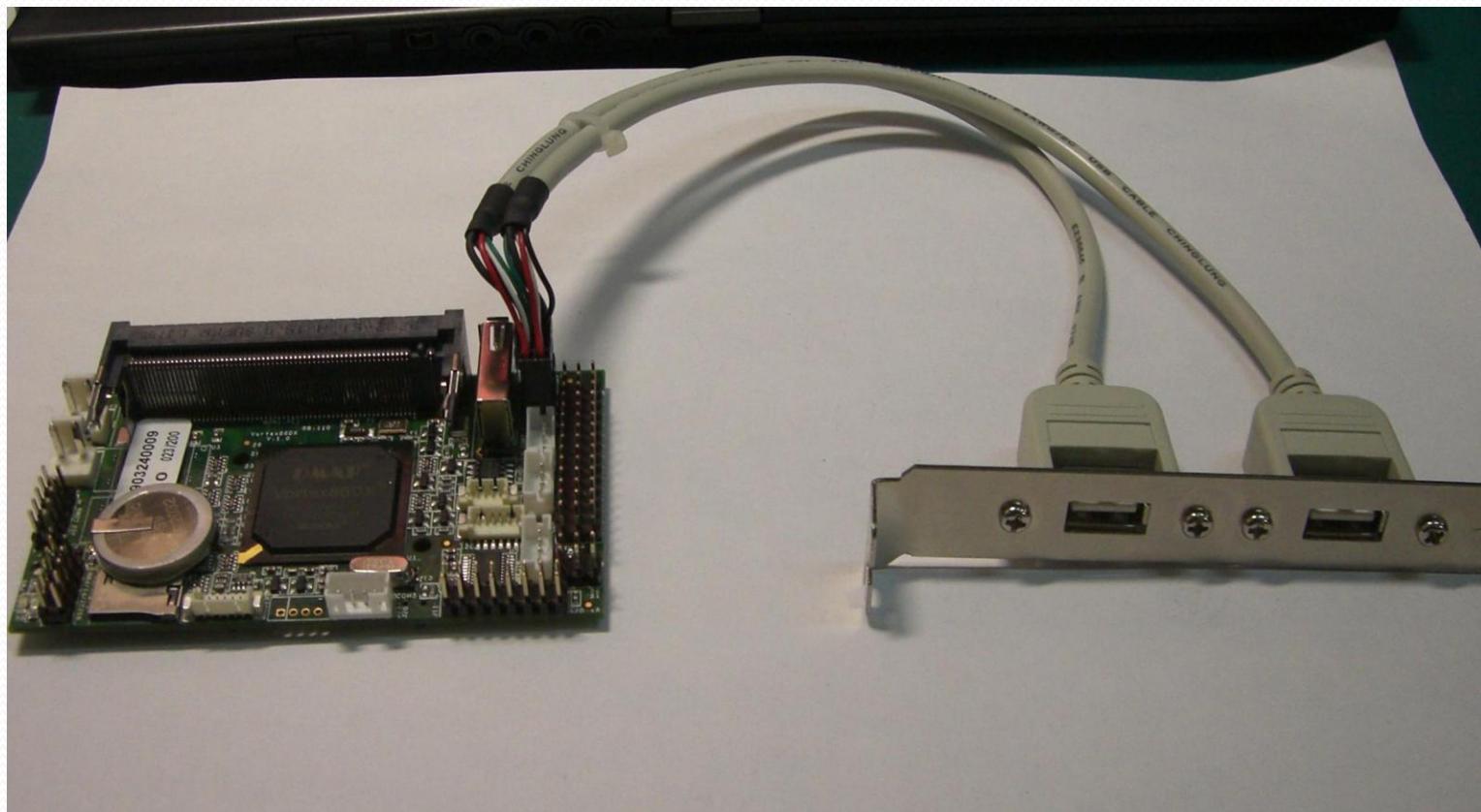
USB

| Pin # | Signal Name | Pin # | Signal Name |
|-------|-------------|-------|-------------|
| 1 | VCC | 2 | VCC |
| 3 | LUSBD0- | 4 | LUSBD1- |
| 5 | LUSBD0+ | 6 | LUSBD1+ |
| 7 | GND | 8 | GND |
| 9 | GGND | 10 | GGND |



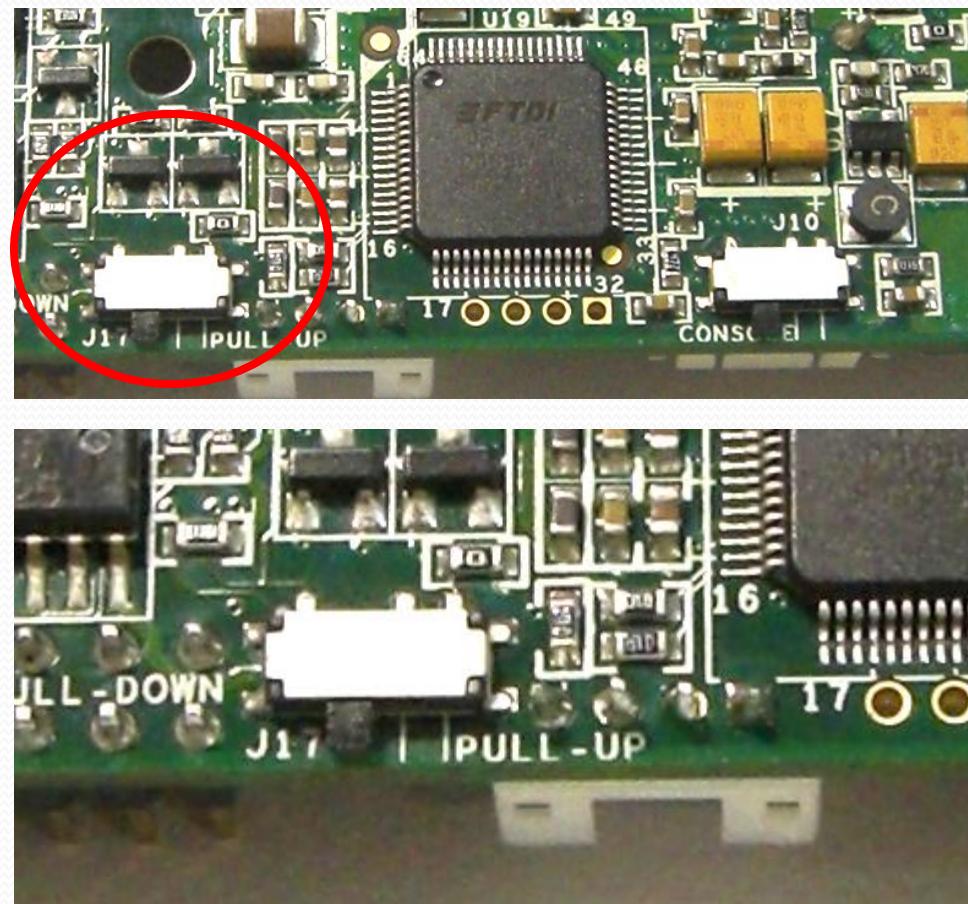
USB

Connection Example



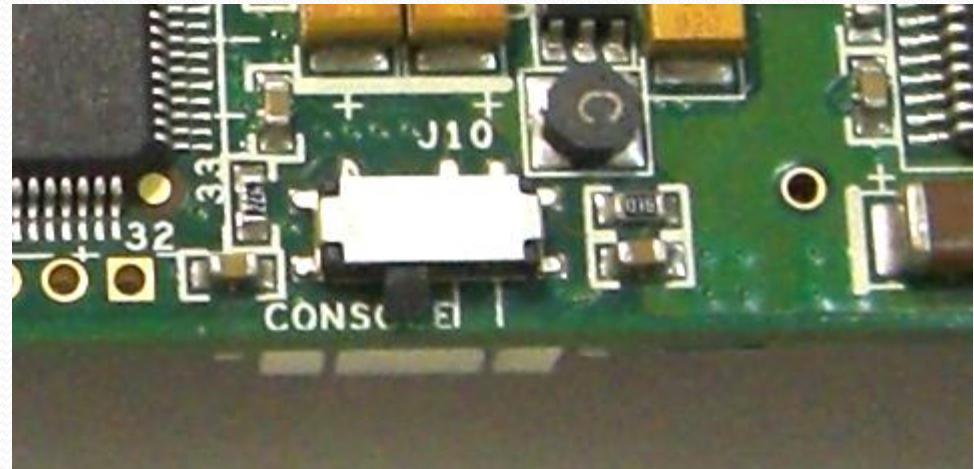
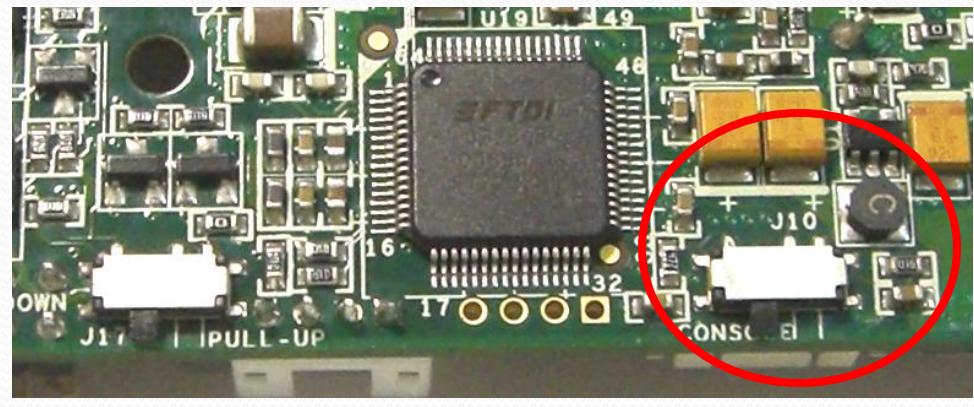
PWM Initial pull up/down switch

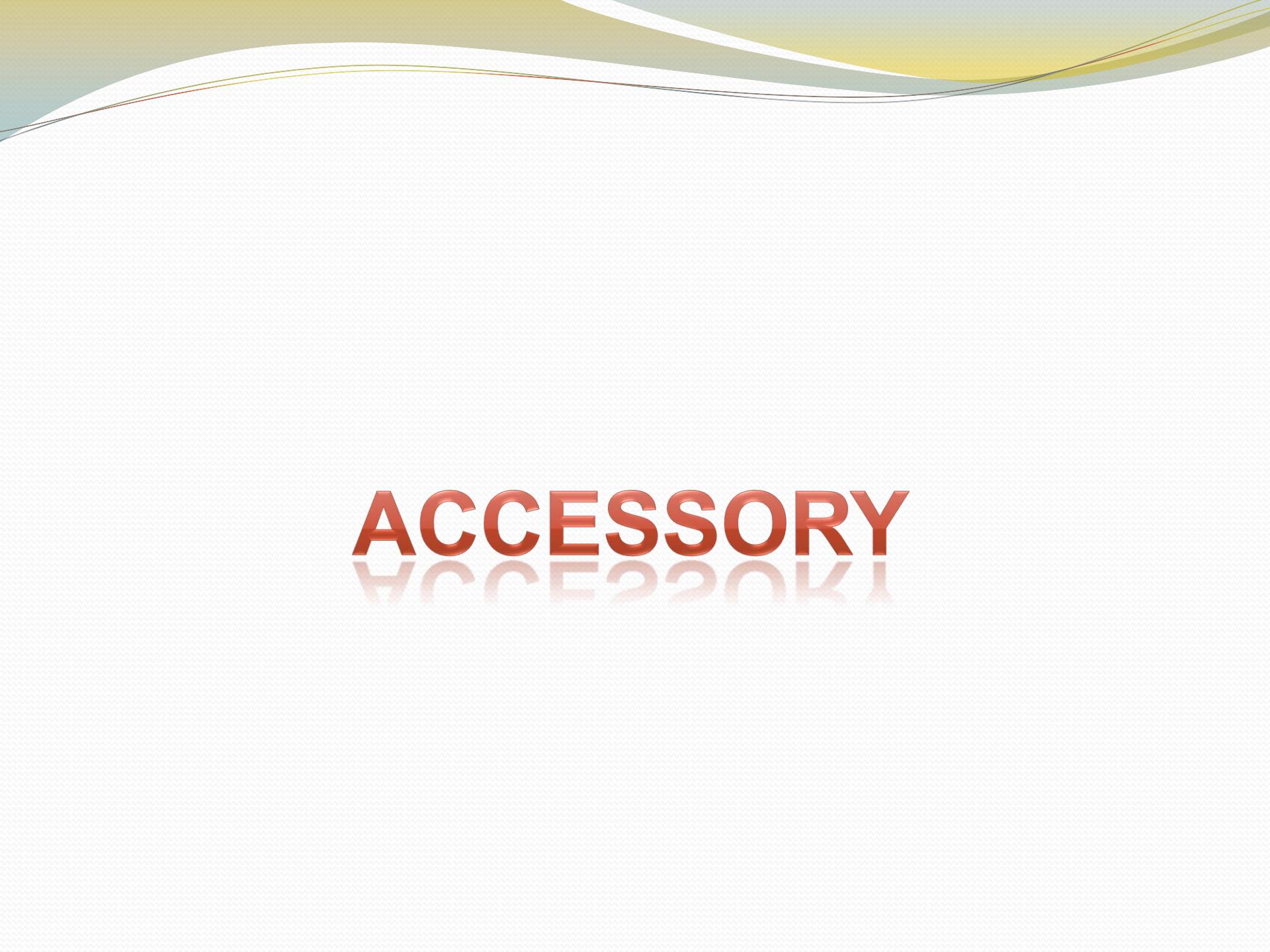
| Pin | Signal Name |
|-------|--------------------|
| Left | PWM init Pull Down |
| Right | PWM init Pull UP |



Console Redirection switch

| Pin | Signal Name |
|-------|-----------------------------|
| Left | Console Redirection enable |
| Right | Console Redirection disable |





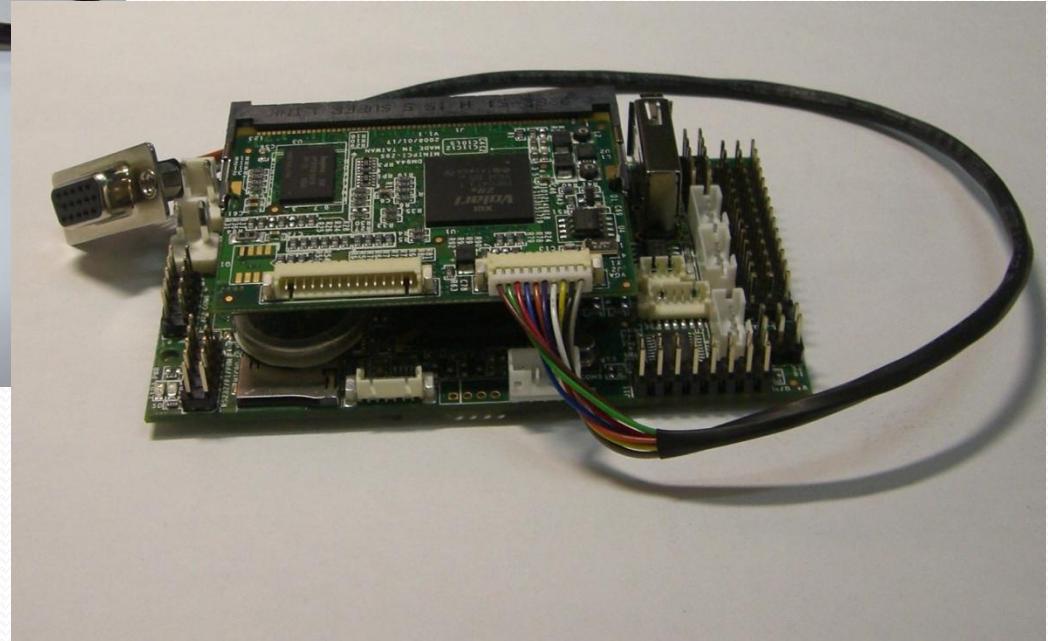
The background features a light gray grid pattern with a subtle texture. At the top, there are three wavy lines: a dark blue line on the left, a teal line in the center, and a yellow line on the right. The overall design is clean and modern.

ACCESSORY

Mini VGA Card



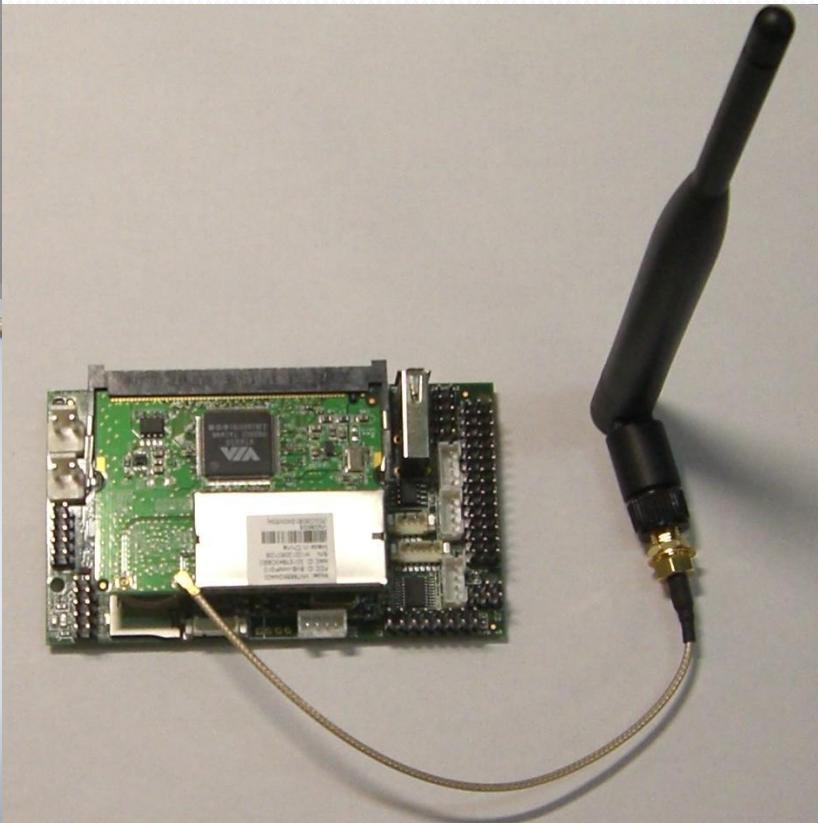
- Volari Z9S VGA Chipset with 32MB DDR2
- Up to 1600 x 1200 @16M Color
- Support Windows 98/2000/XP, Linux



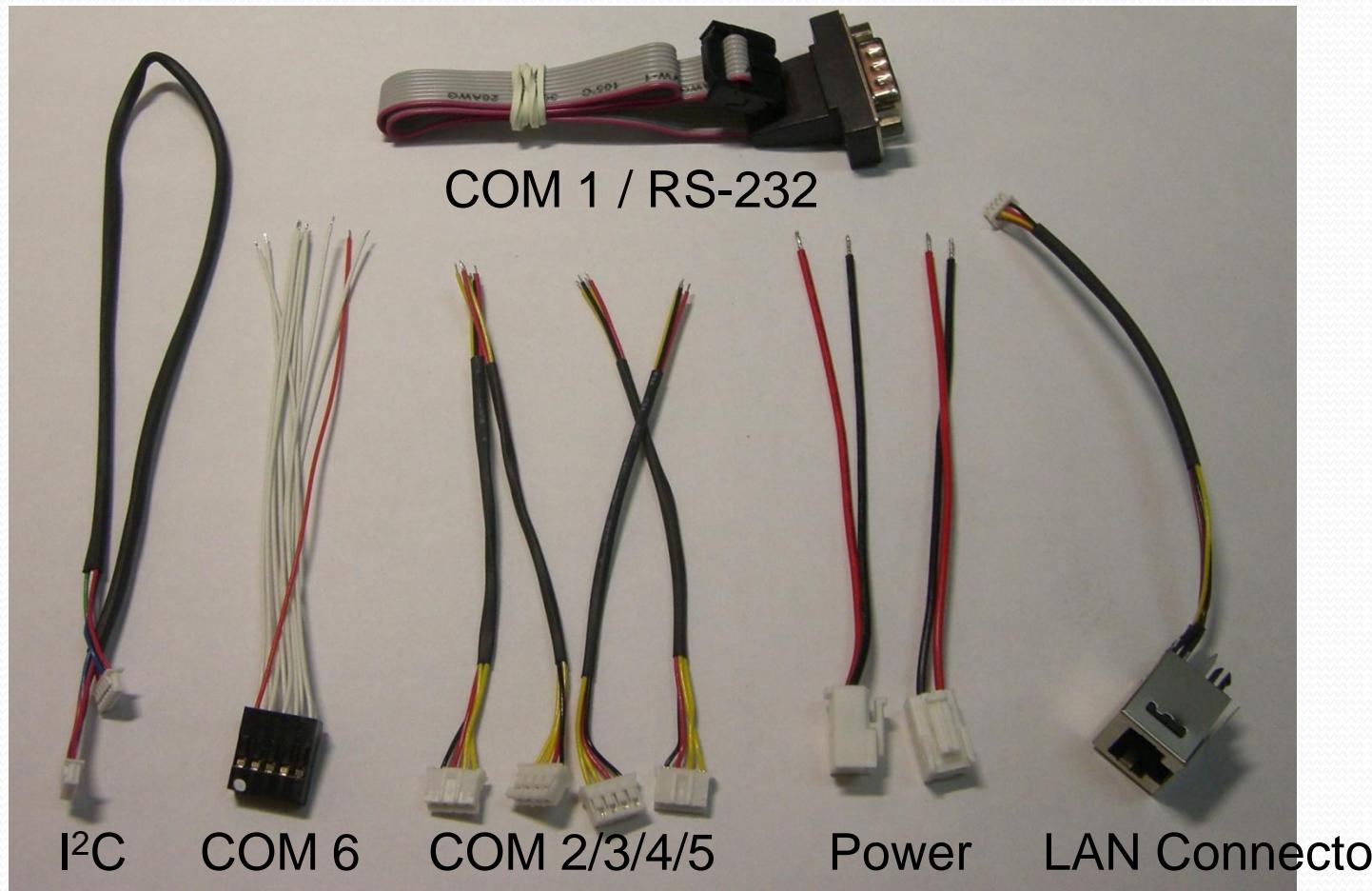
Mini PCI Wireless Card



- VIA VT6655 Chipset
- 802.11b/g

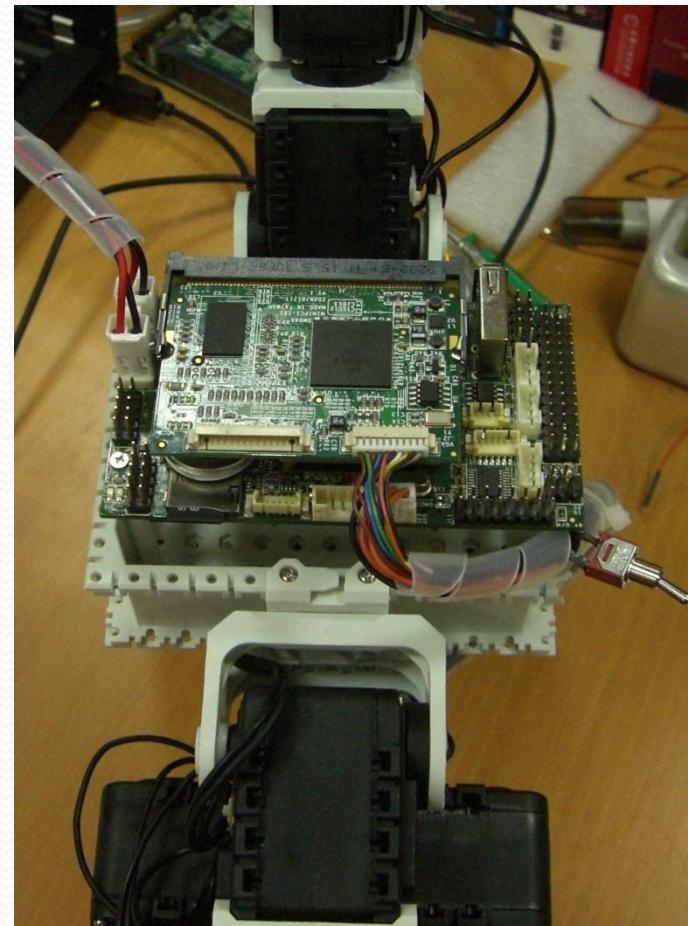
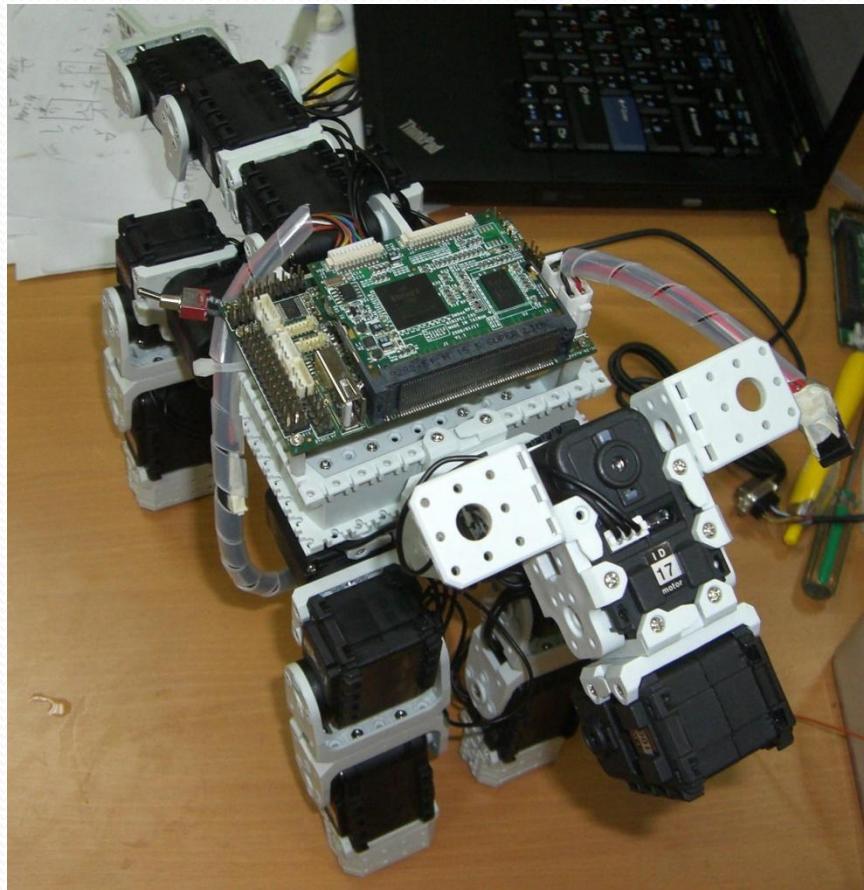


RoBoard RB-110 Cable set



APPLICATION

Use RB-110 to Control Bioloid



The heart of Robotics

THANK YOU

info@roboard.com

<http://www.roboard.com>