

# 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

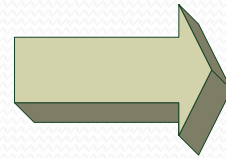
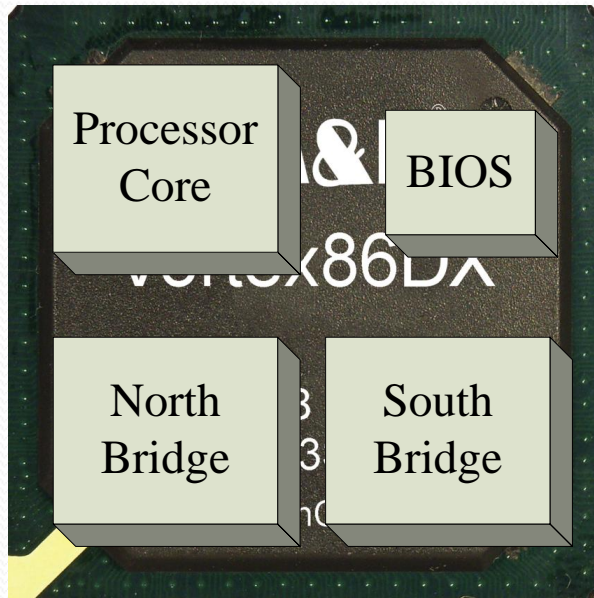


- Feb. 2007
- 486 – 300MHz
- 0.13 um process



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

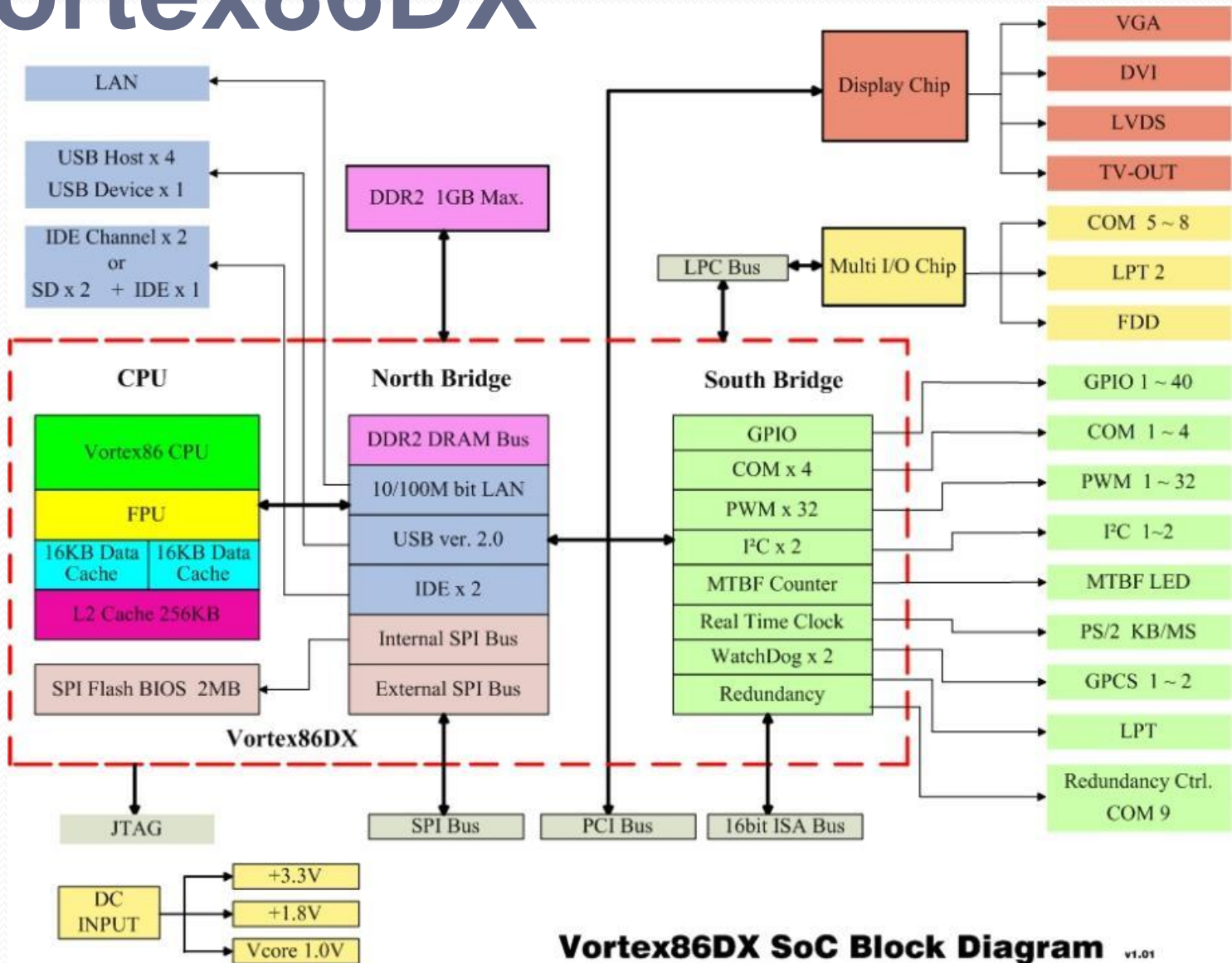
# Vortex86DX



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

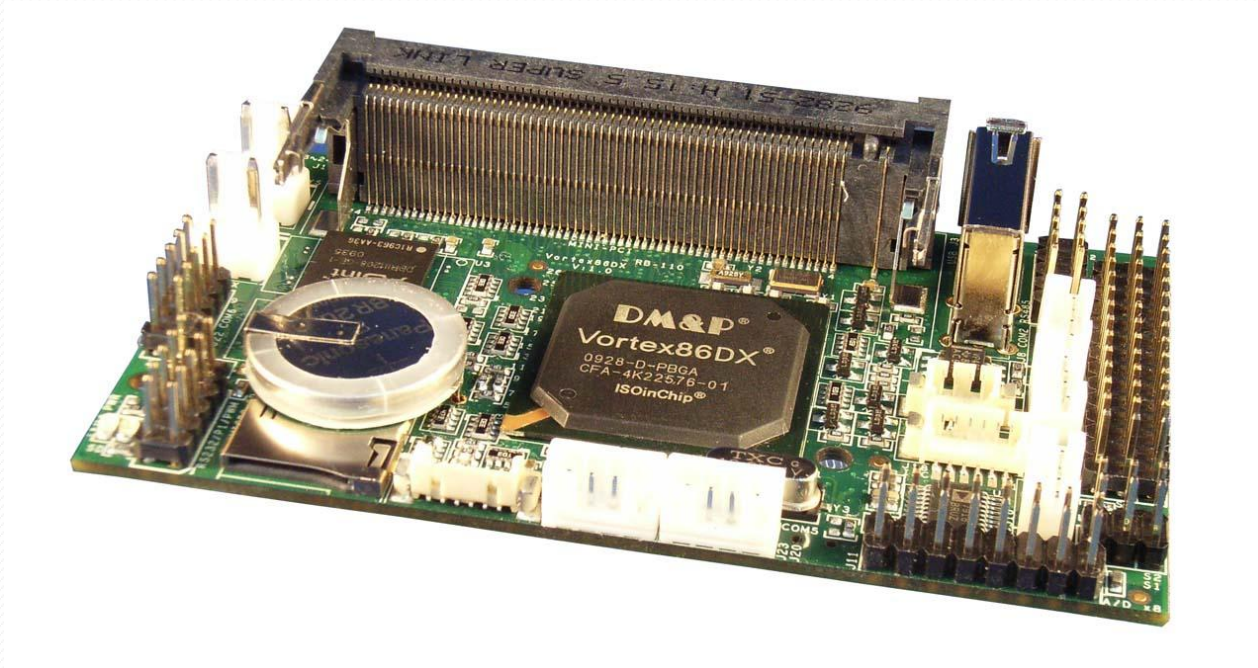


# OVERVIEW



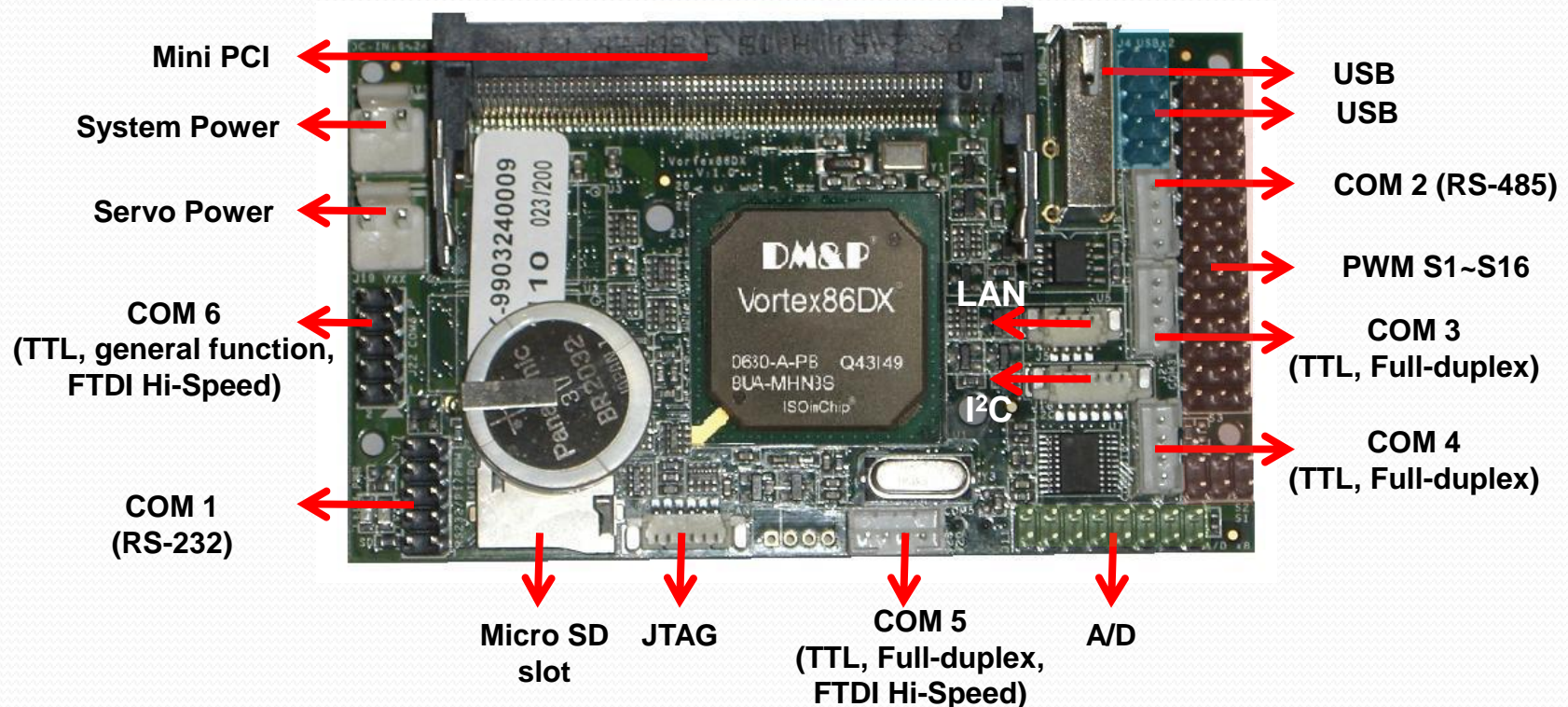
# RoBoard RB-110

- 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



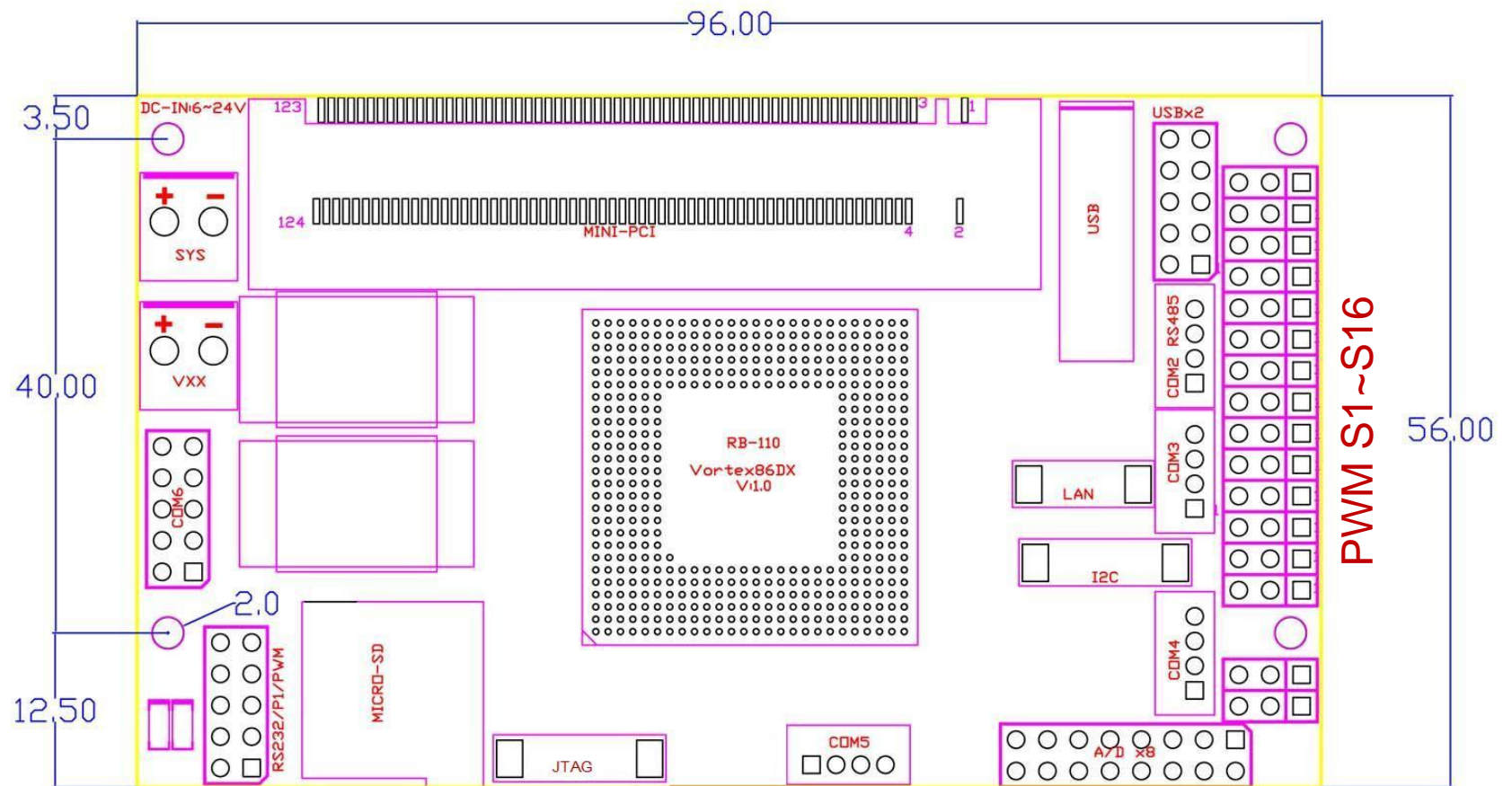
1. 1000MHz, 256MB DDR2
2. PC compatible
3. Build in PWM/GPIO 16Ch
4. USB v2.0 ports × 3
5. TTL COM ports × 2
6. RS-232 port × 1
7. RS-485 port × 1
8. FTDI Hi-Speed COM port × 1
9. FTDI general serial port (COM, SPI, ...) × 1
10. I<sup>2</sup>C Bus
11. Power consumption 5V@400mA (2W)
12. DC 6V-24V



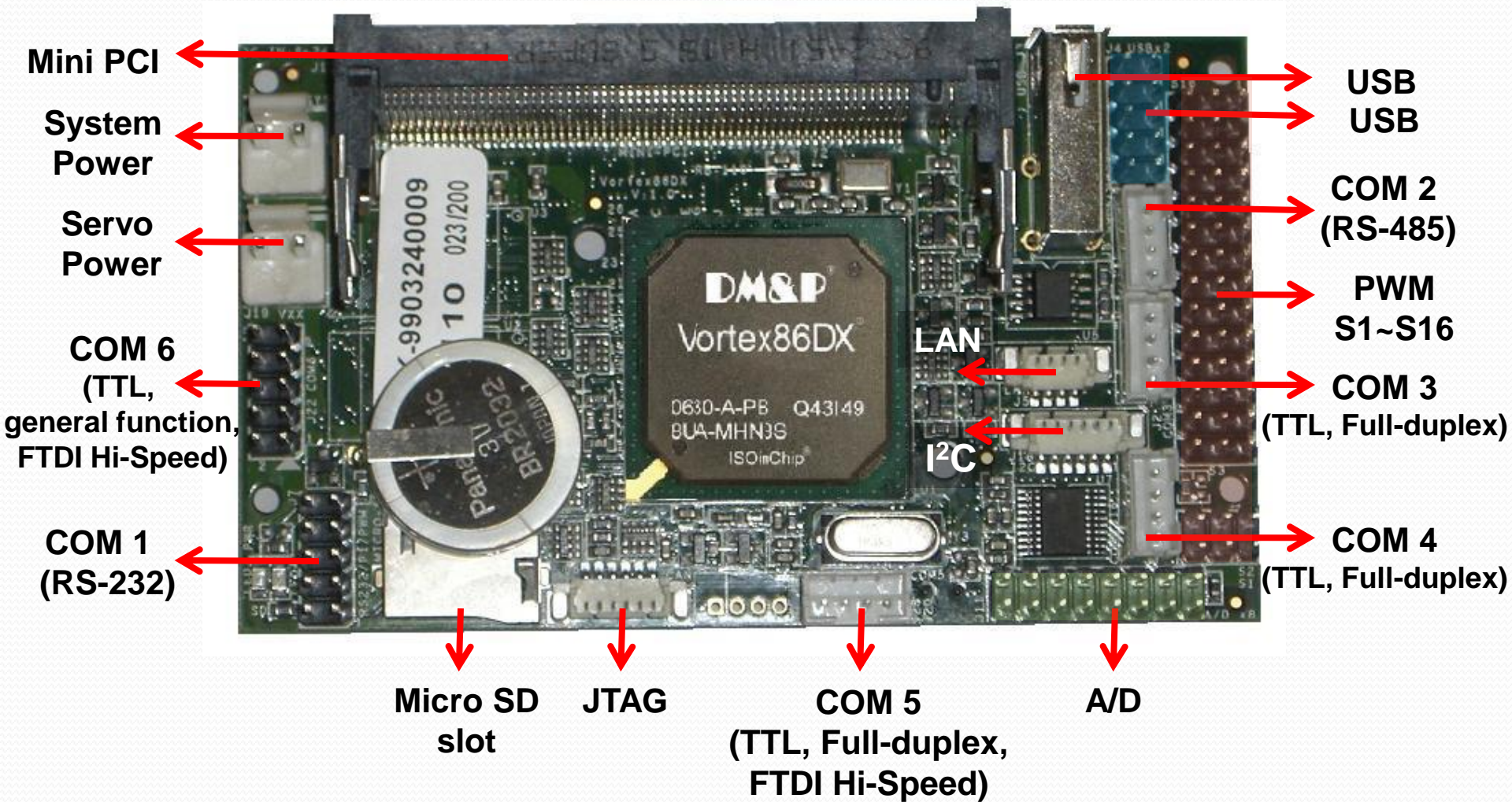


# **HARDWARE INTRODUCTION**

# Locations



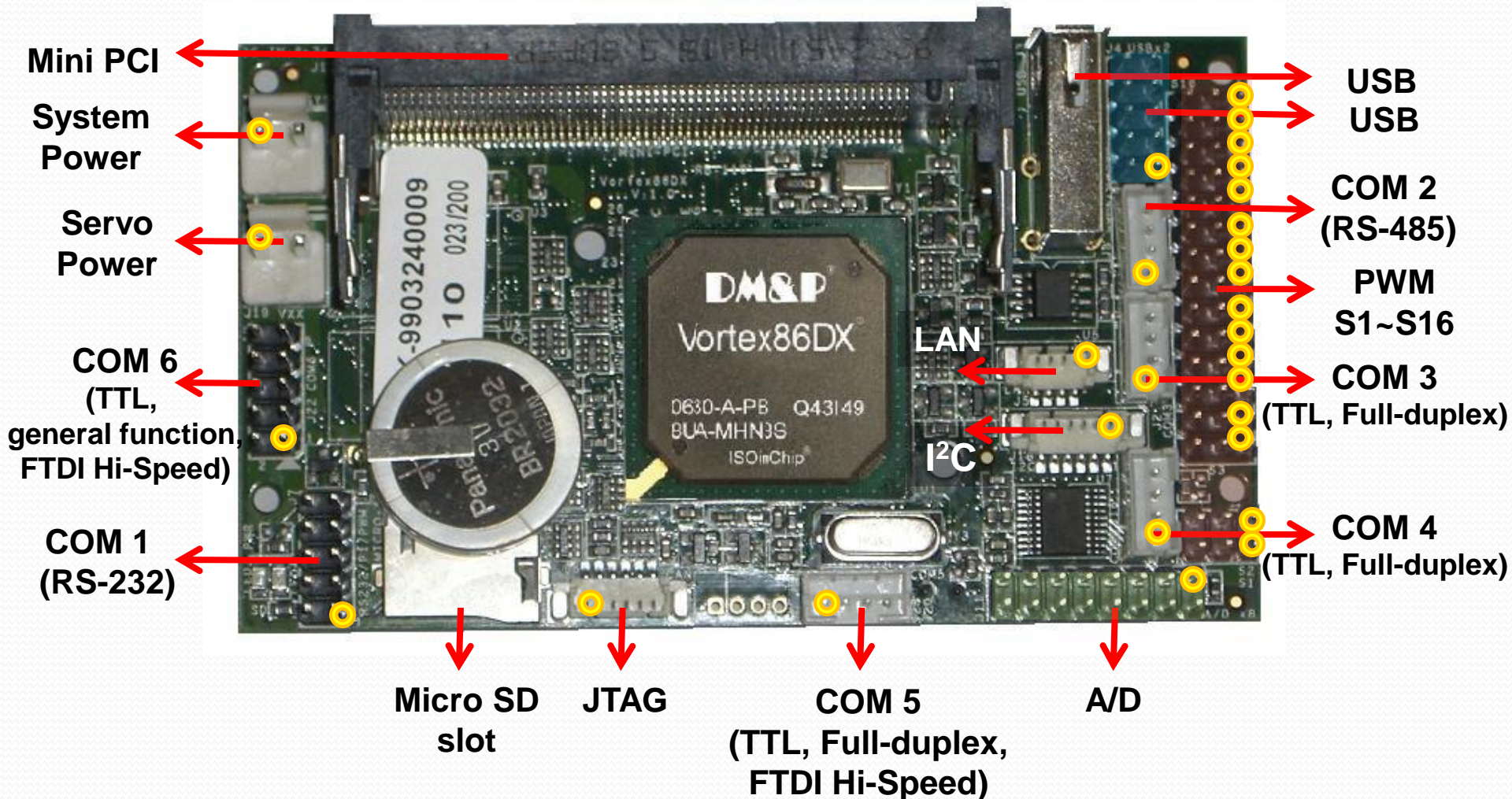
# Locations





# Pin 1 Location

⊙: Pin 1



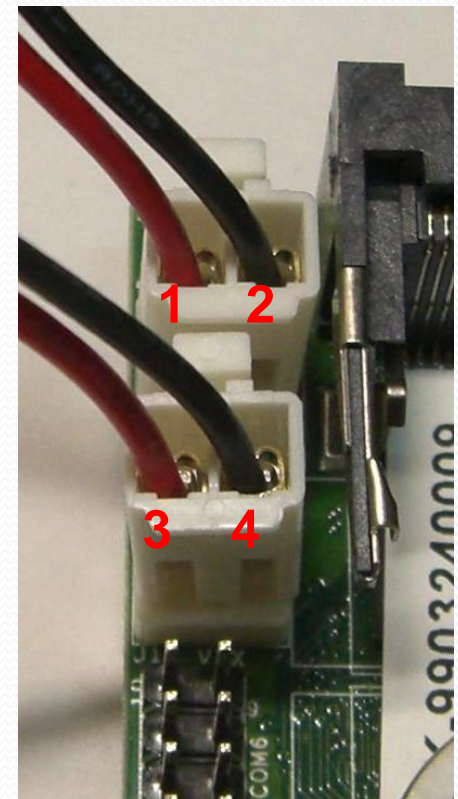
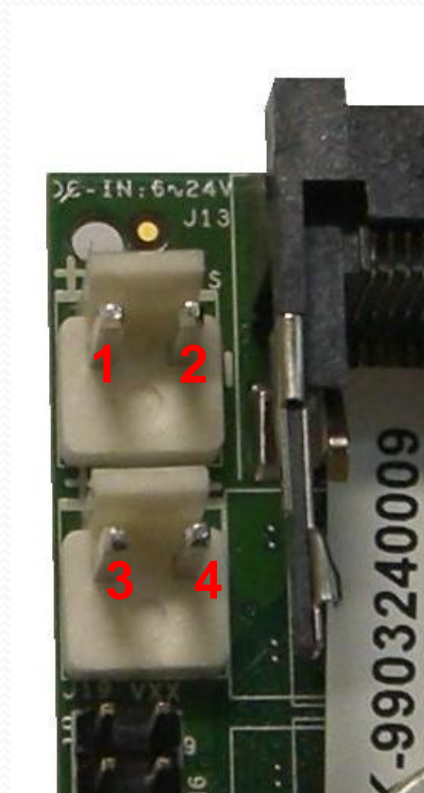
# Power connector

## System Power Connector

Pin #	Signal Name
1	System power
2	GND

## Servo Power Connector

Pin #	Signal Name
3	Vxx
4	GND



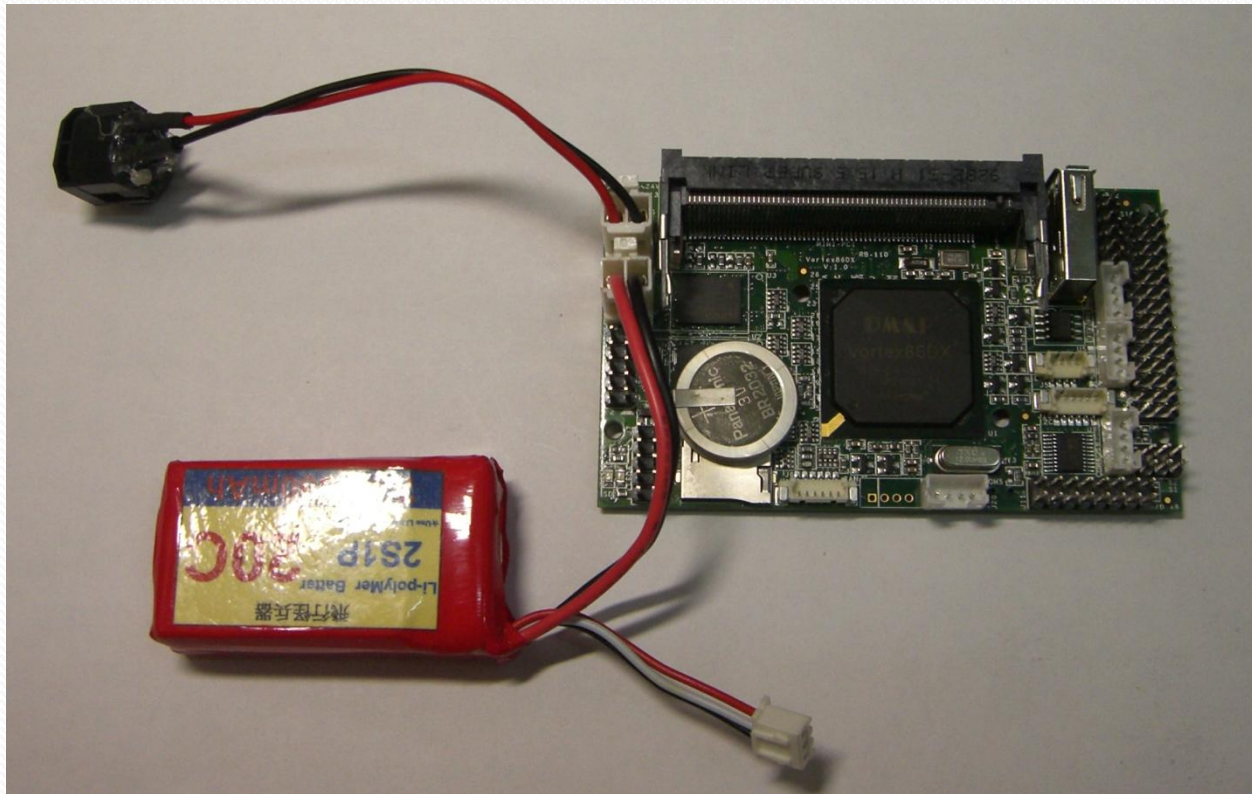


# Power connector

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

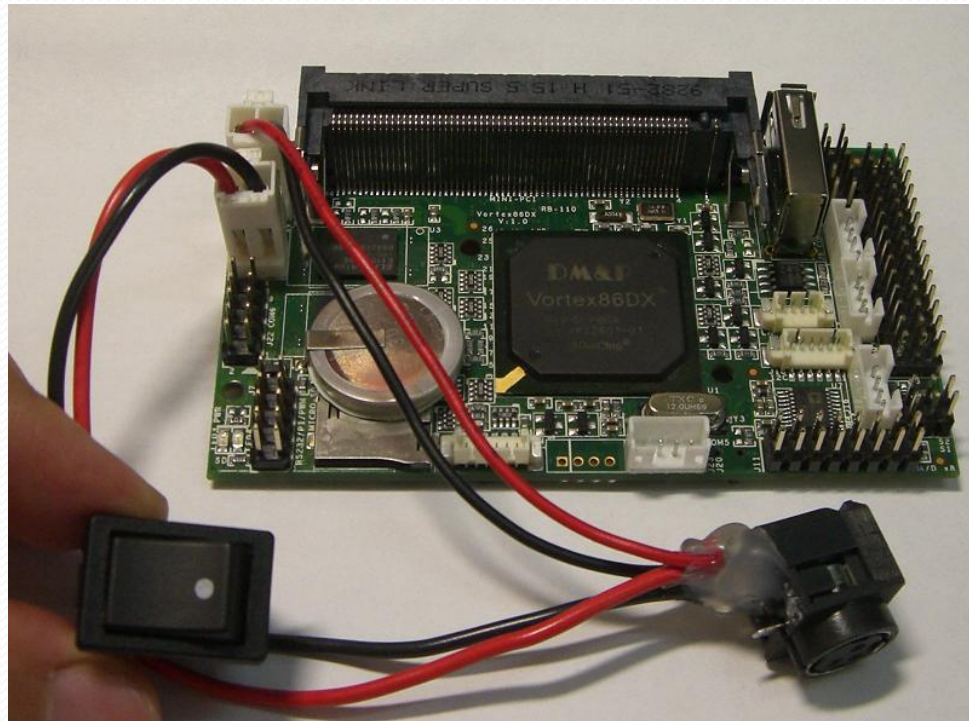
# Power connector

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



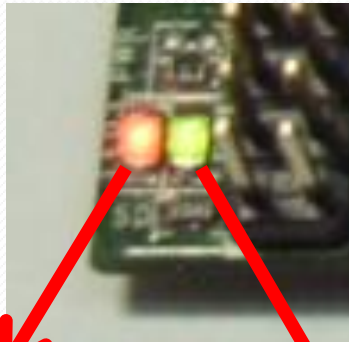
# Power connector

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



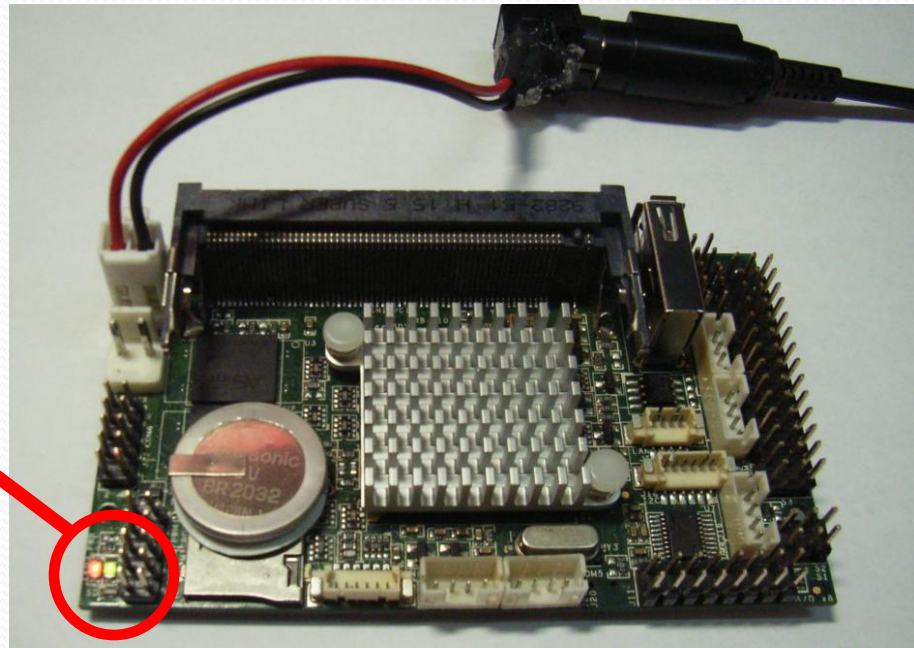
# Power connector

After connecting the Power/HD LED will light



Power LED

Hard Disk LED  
(Micro SD card)



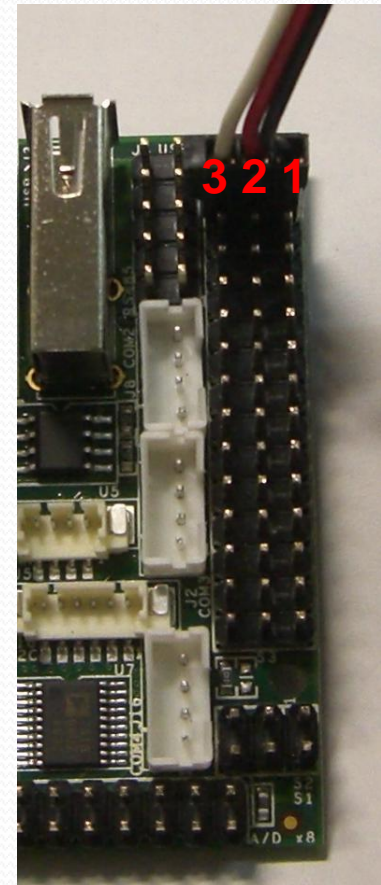
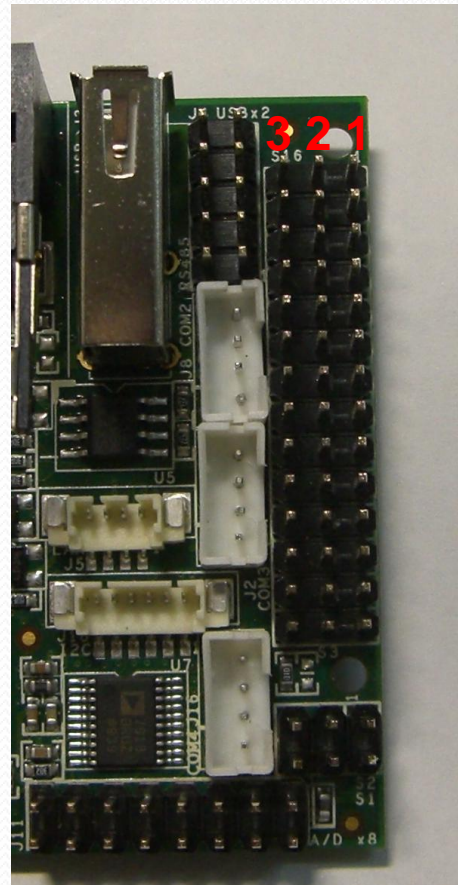
# Hard Disk: MicroSD

- As a hard disk, the MicroSD's speed affects RoBoard's performance dramatically.
  - A low-class MicroSD can make RoBoard boot/run very slowly.
- **Suggestions**
  - The speed of MicroSD should be at least **Class 6**.
  - Use MicroSD from credible manufacturers (e.g., SanDisk, Toshiba, ...)



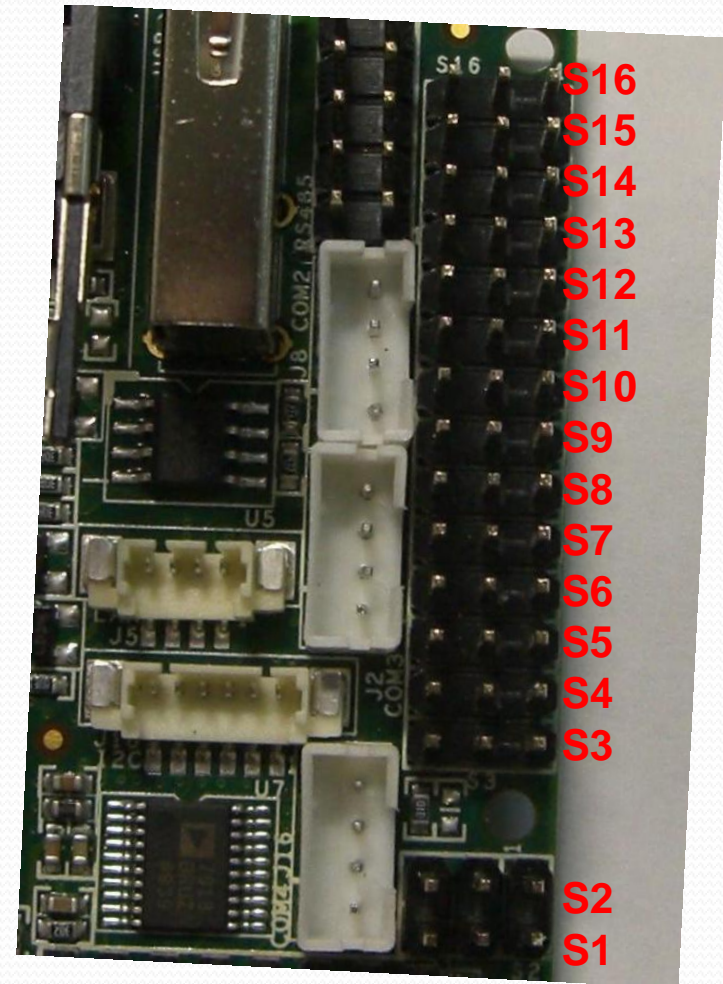
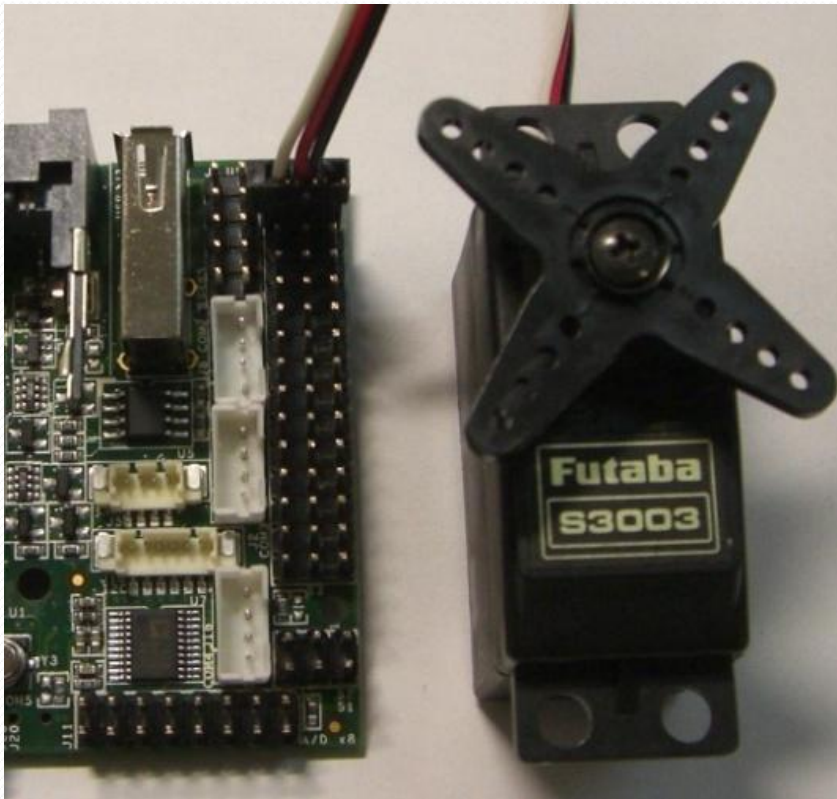
# PWM 16ch

Pin #	Signal Name
1	GND
2	Vxx
3	GPXX



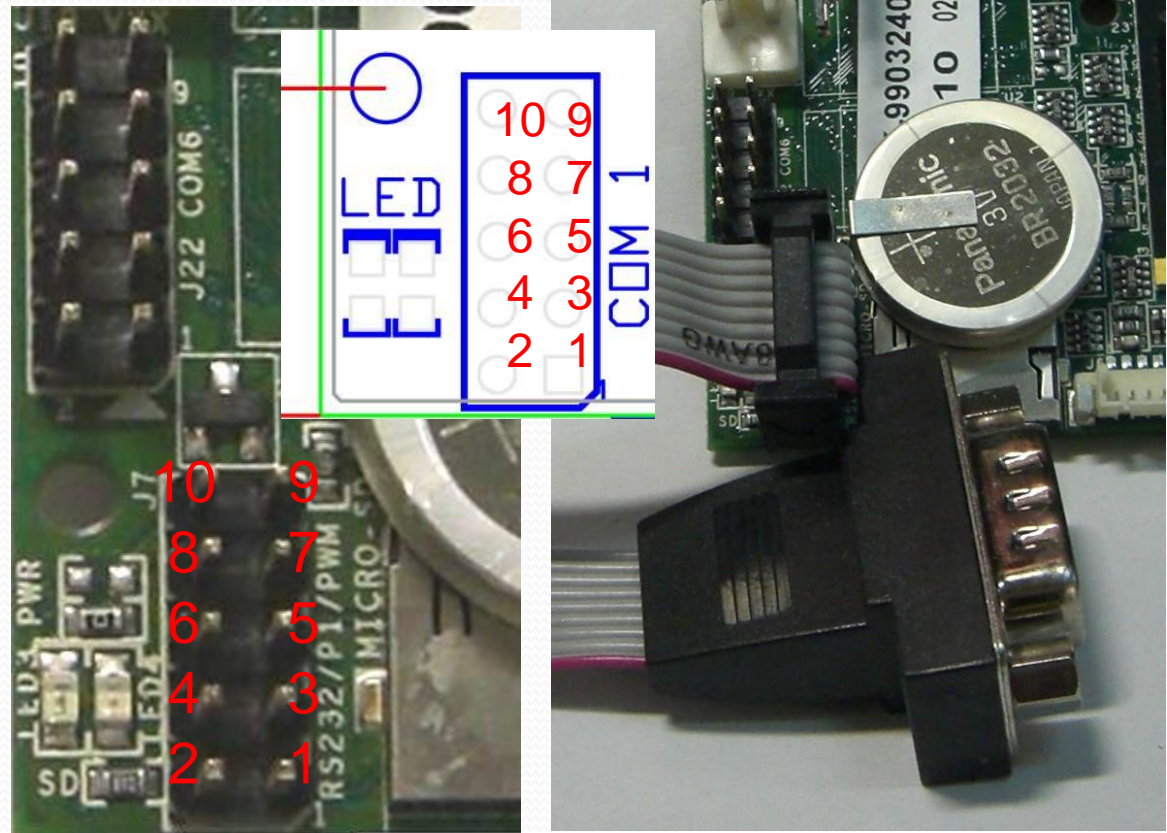
# PWM 16ch

## Connection Example



# COM 1 / RS-232

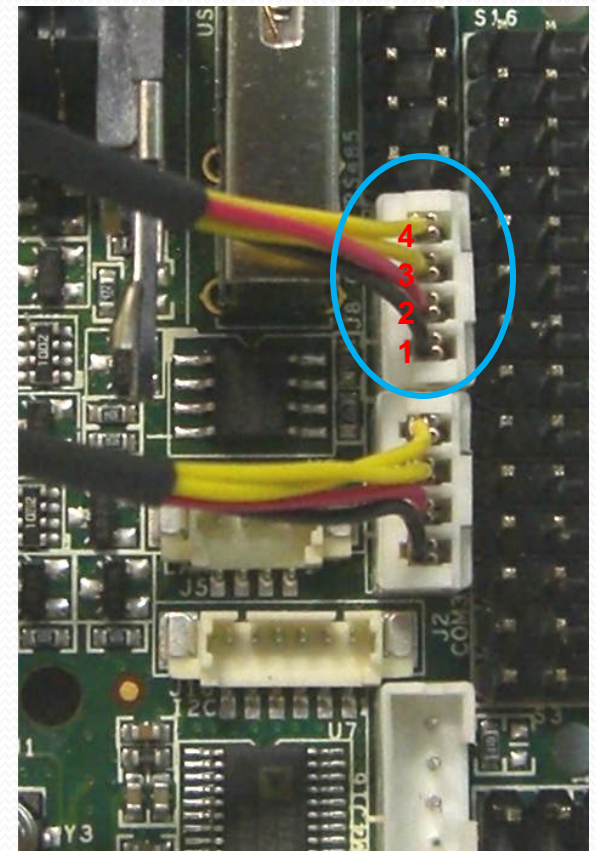
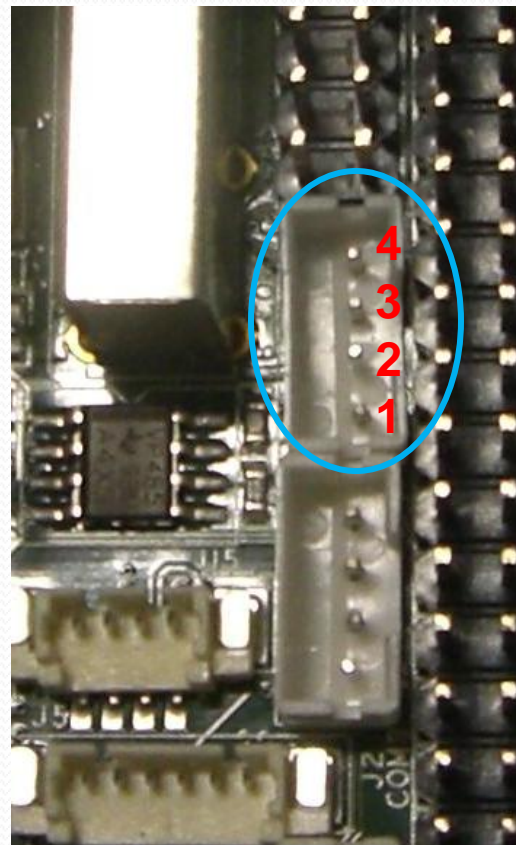
Pin #	Signal Name	Pin #	Signal Name
1	DCD1	2	RXD1
3	TXD1	4	DTR1
5	GND	6	DSR1
7	RTS1	8	CTS1
9	RI1	10	VCC (5V)





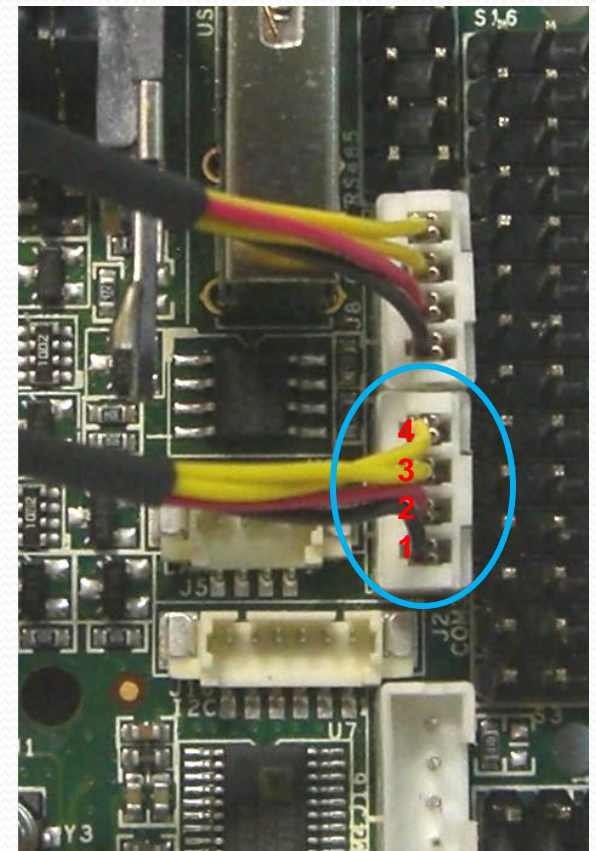
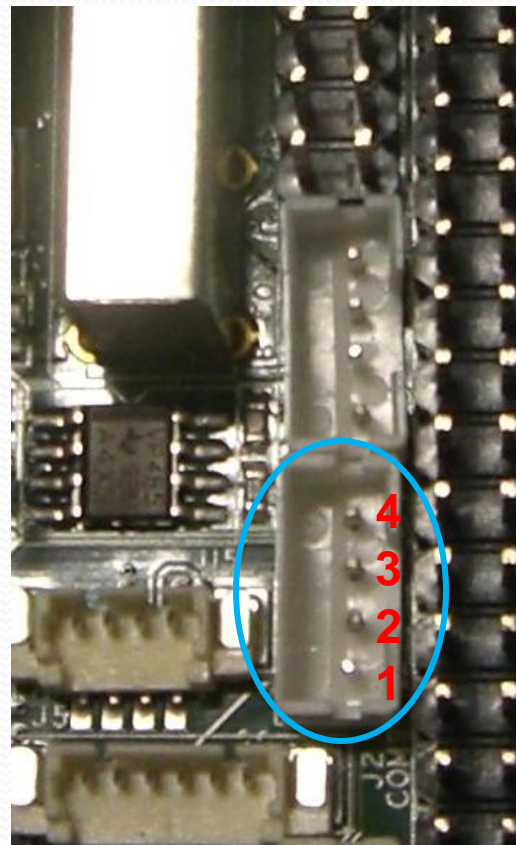
# COM 2 / RS-485

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



# COM 3 / Full Duplex TTL

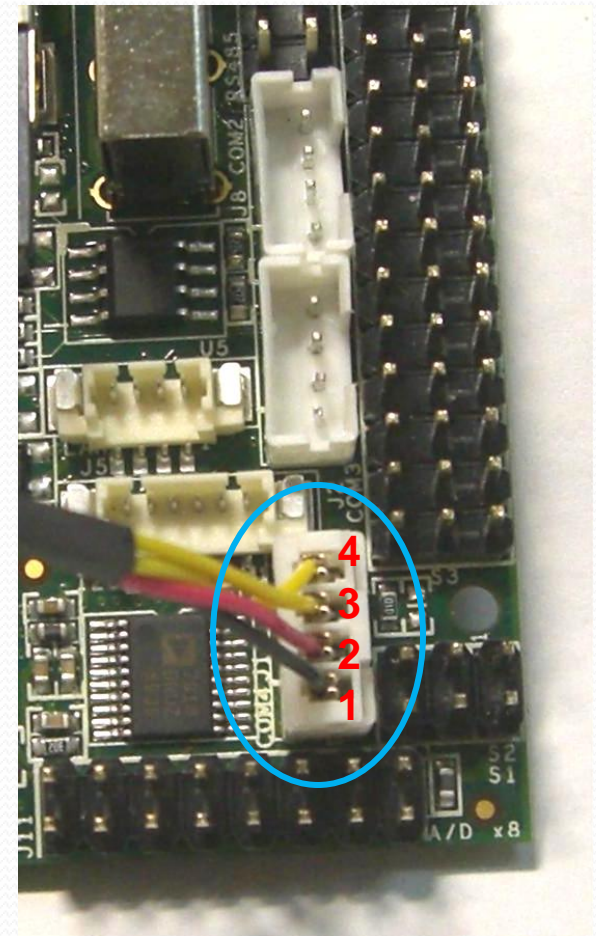
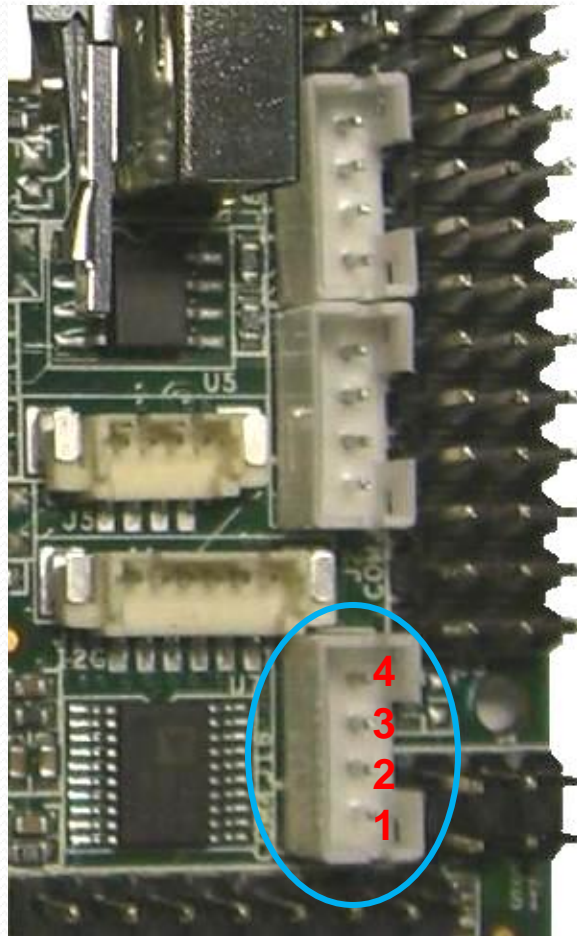
Pin #	Signal Name	Line Color
1	GND	Black
2	Vxx	Red
3	TXD3	Other
4	RXD3	Other





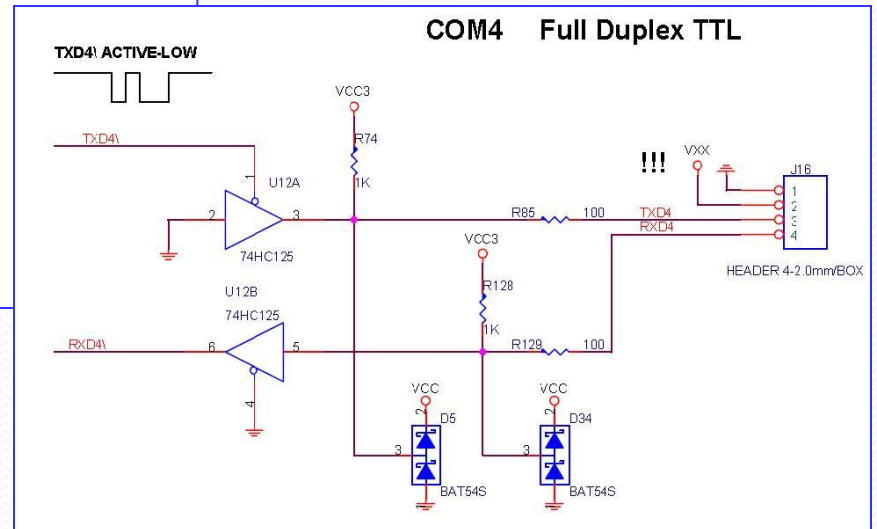
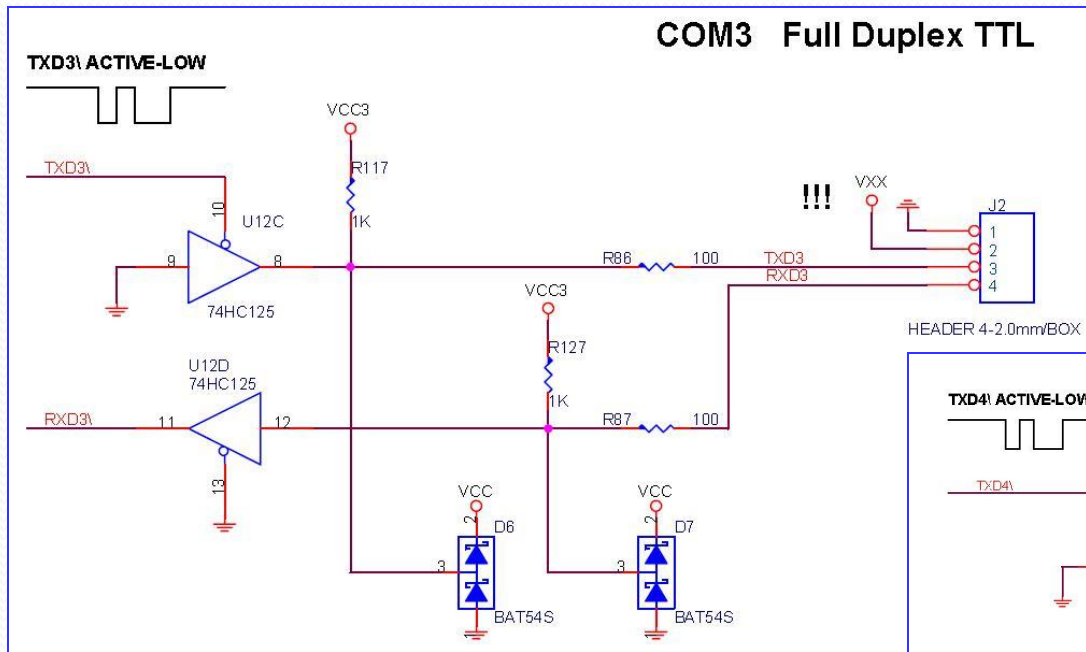
# COM 4 / Full Duplex TTL

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

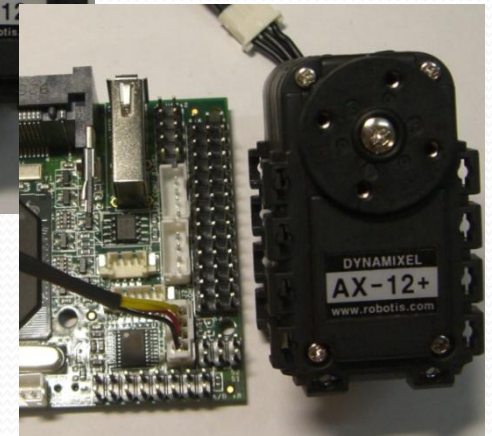
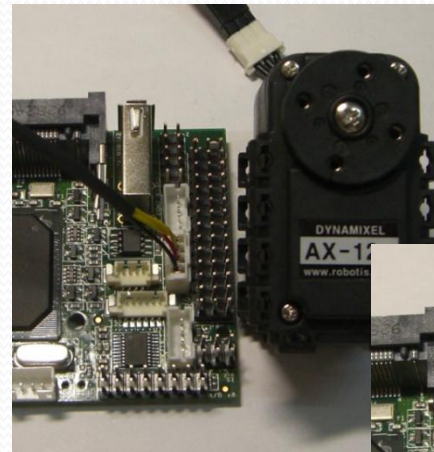
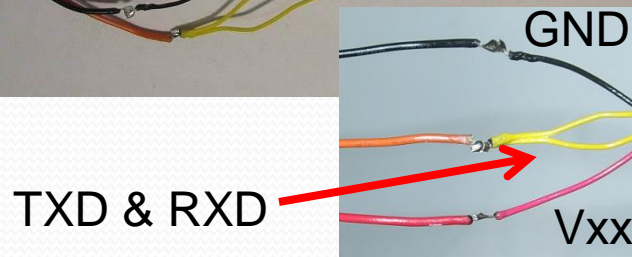
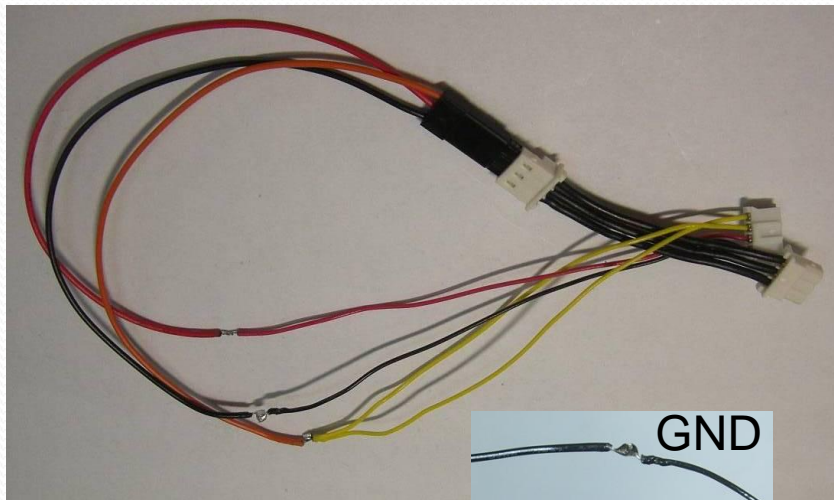
- COM3 & COM4 are buffered:



# Use COM 3/4 as Half-Duplex TTL

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

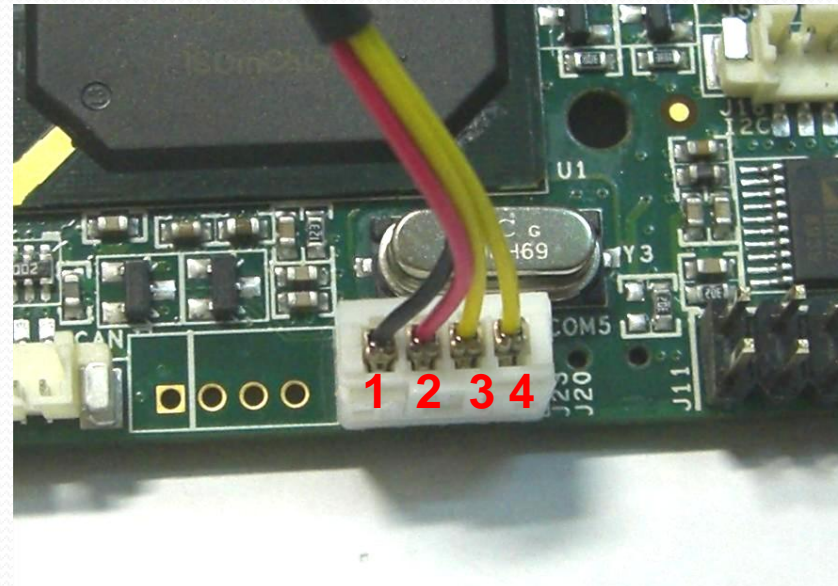
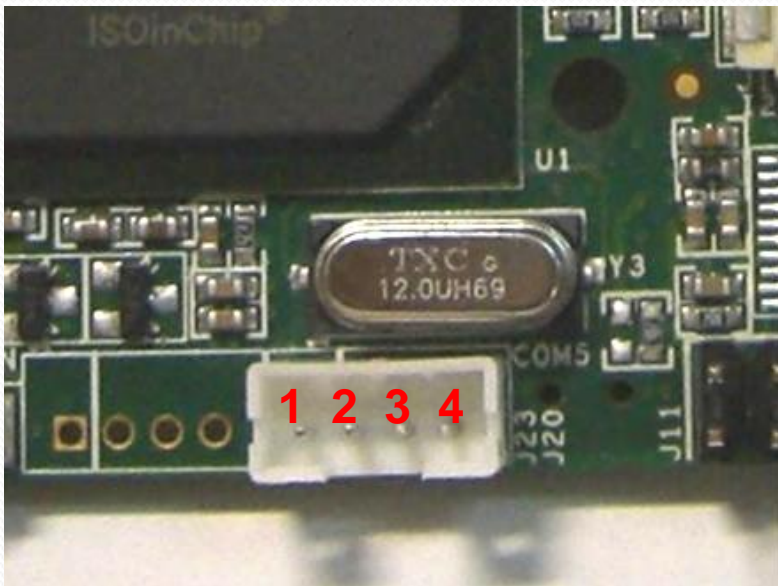
Ex. connect COM3/4 to DYNAMIXEL AX-12+





# COM 5 / Full Duplex TTL / FTDI Hi-Speed

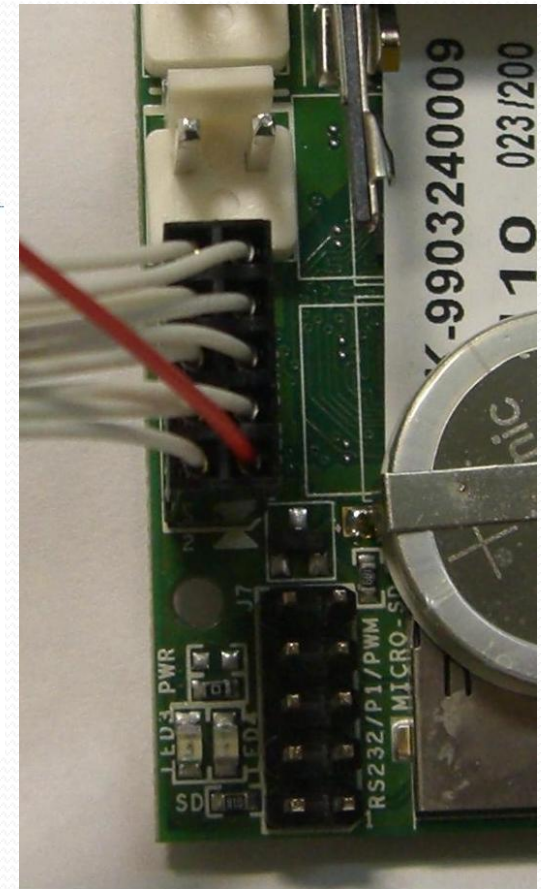
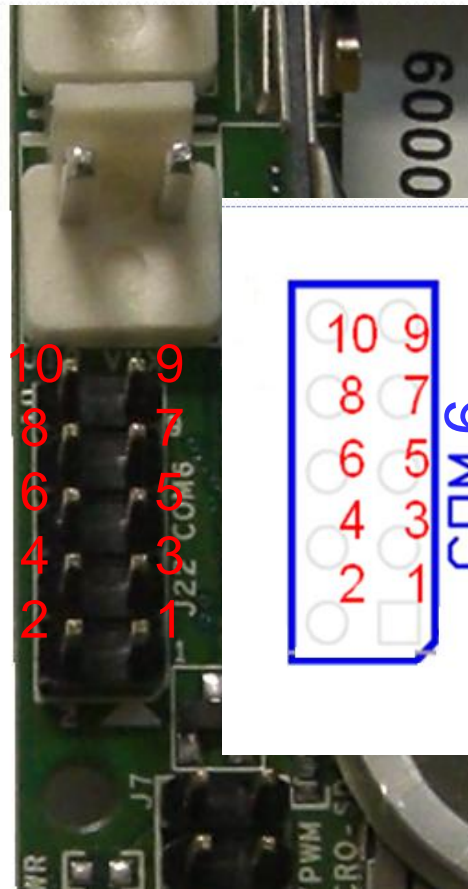
Pin #	Signal Name	Pin #	Signal Name	Pin #	Signal Name	Pin #	Signal Name
1	GND	2	Vxx	3	TXD5	4	RXD5



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



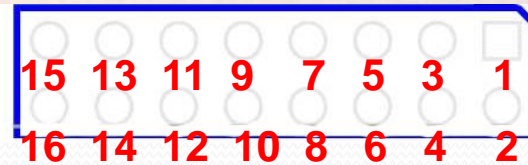
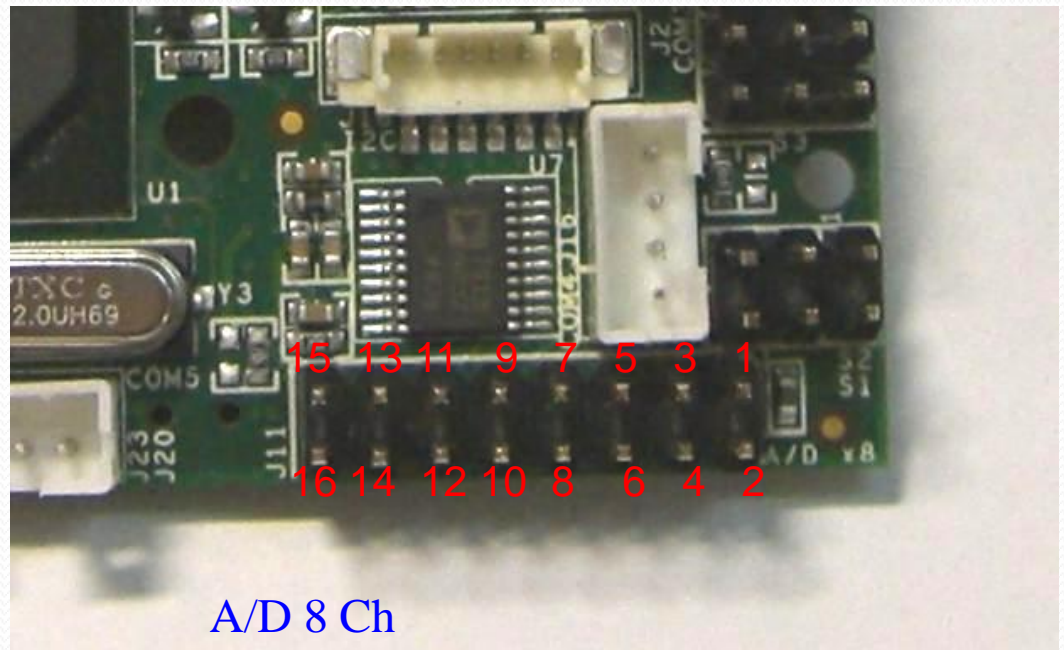


# COM 6 / TTL / FTDI General Serial Port

- 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](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>

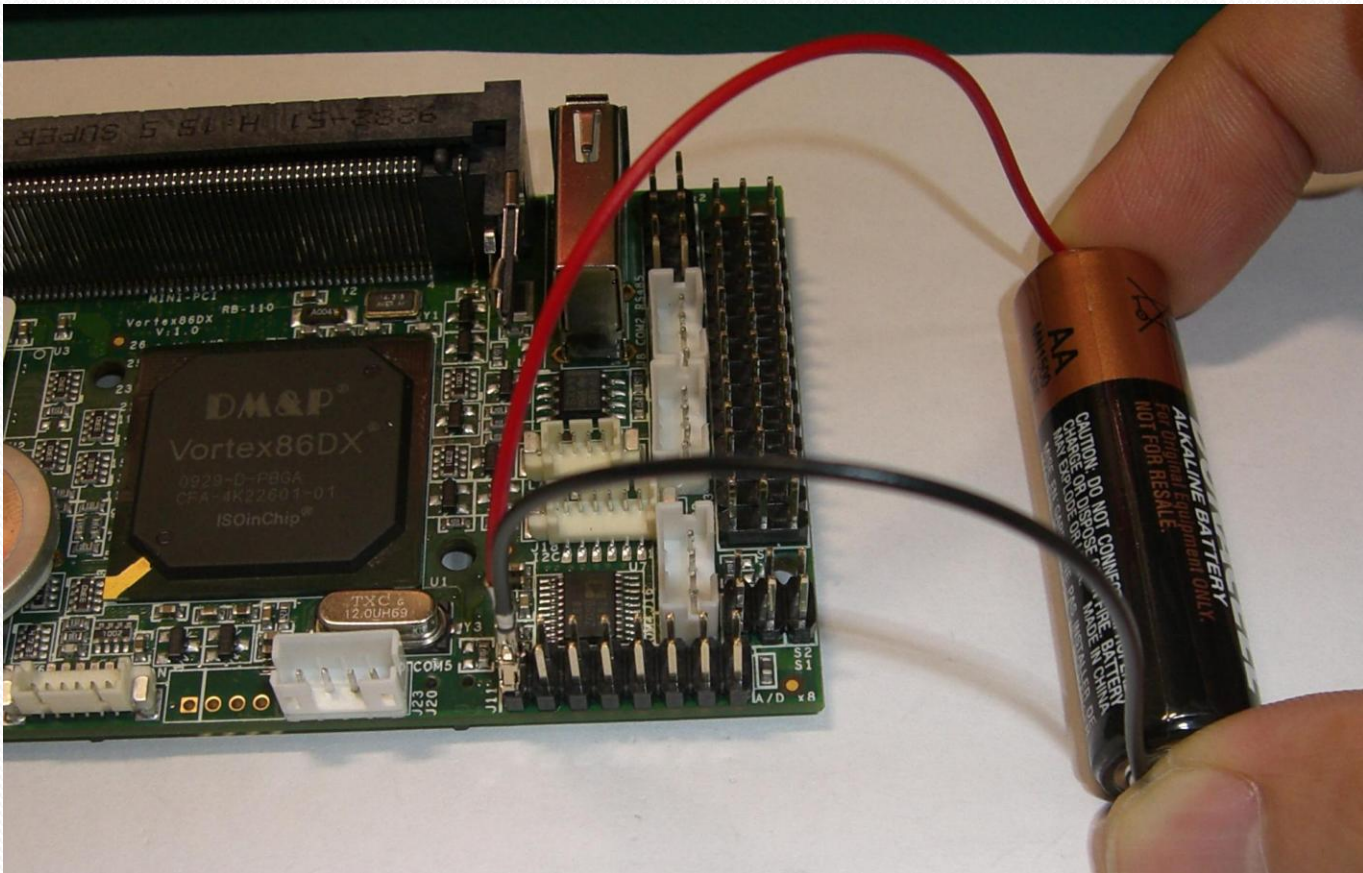
# A/D 8 Ch

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



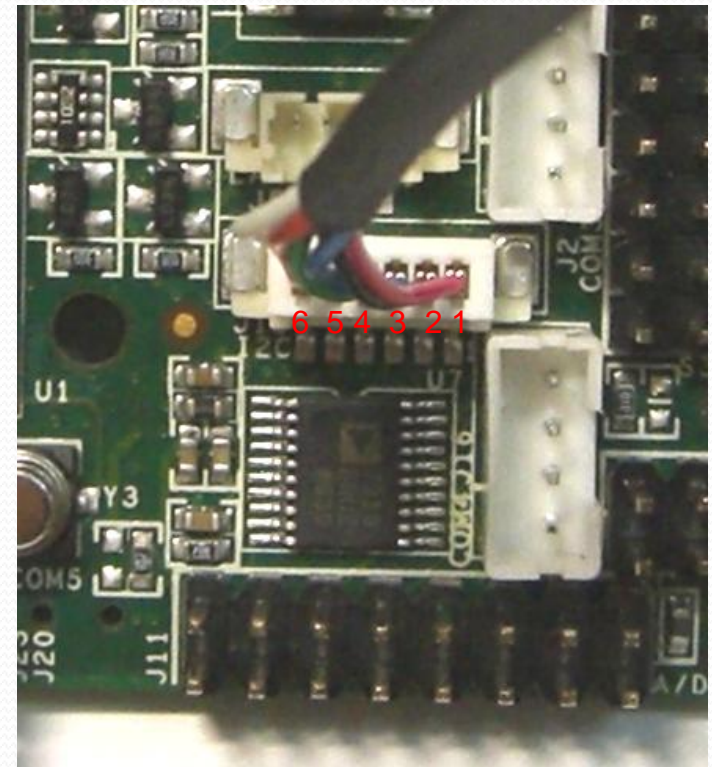
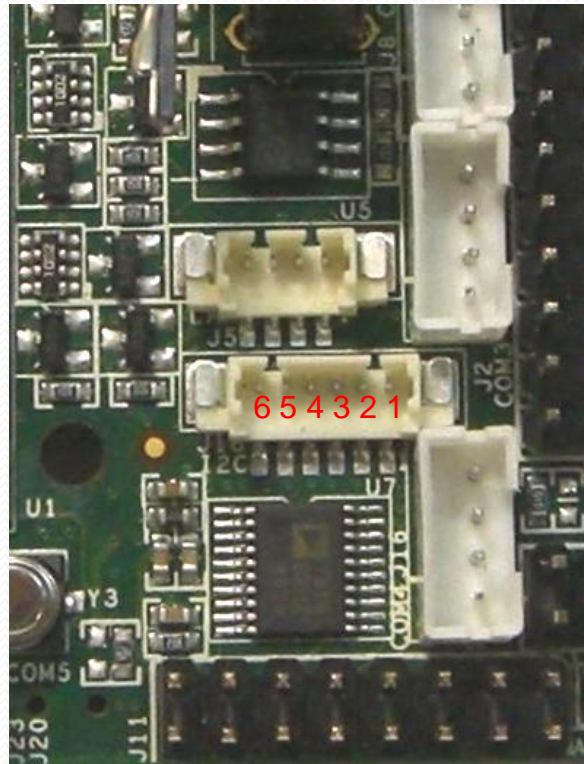
# A/D 8 Ch

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



# I<sup>2</sup>C

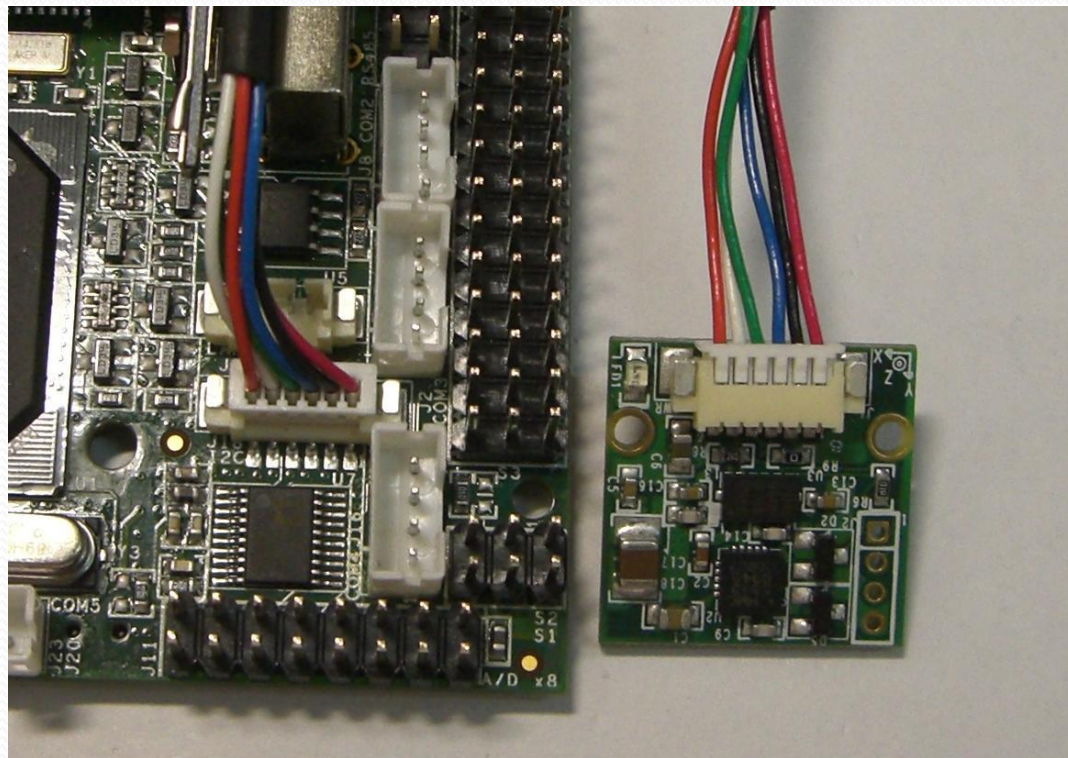
Pin #	Signal Name
1	VCC (5V)
2	GND
3	I2C0_SCL
4	I2C0_SDA
5	~Reset
6	VCC3 (3.3V)





# I<sup>2</sup>C

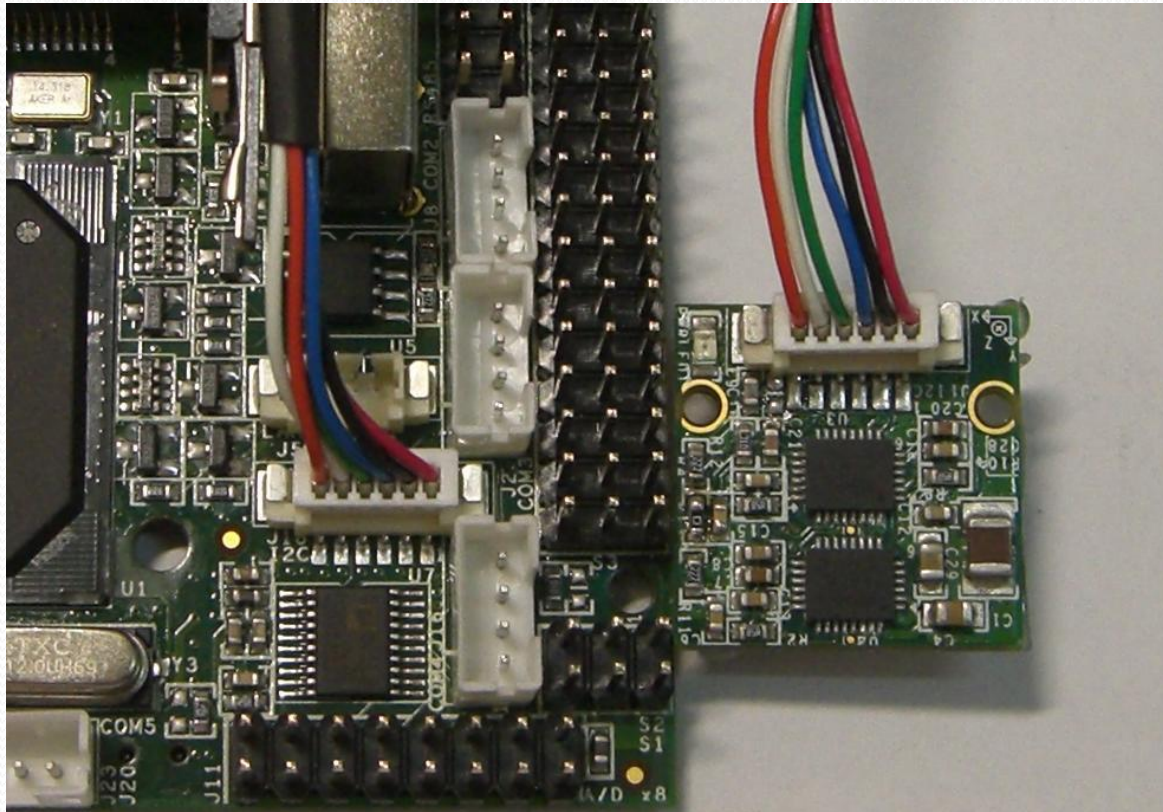
**Connection Example :**  
Connect to DMP RM-G144 6-Axis Magnetic  
Compass & Accelerometer





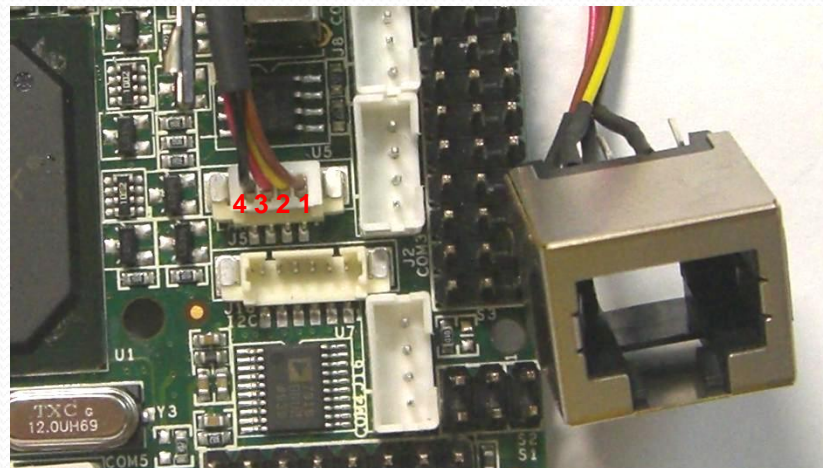
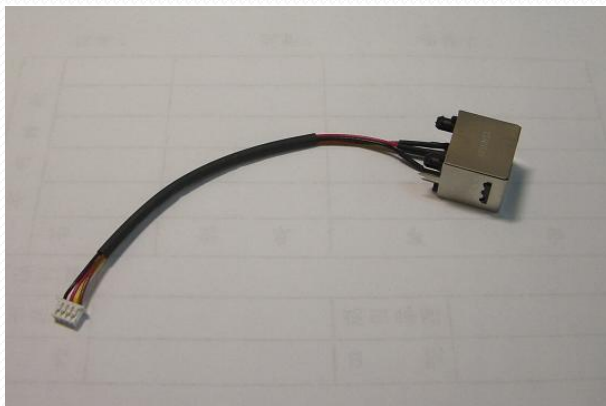
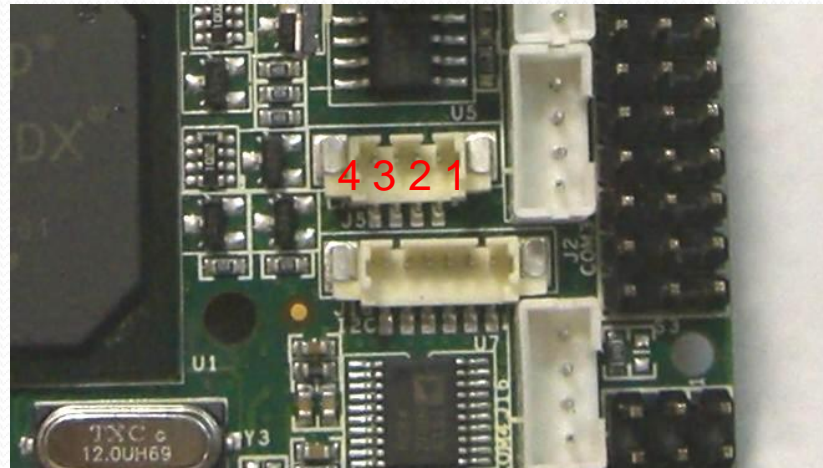
# I<sup>2</sup>C

**Connection Example :**  
Connect to DMP RM-G145 3-Axis Gyro



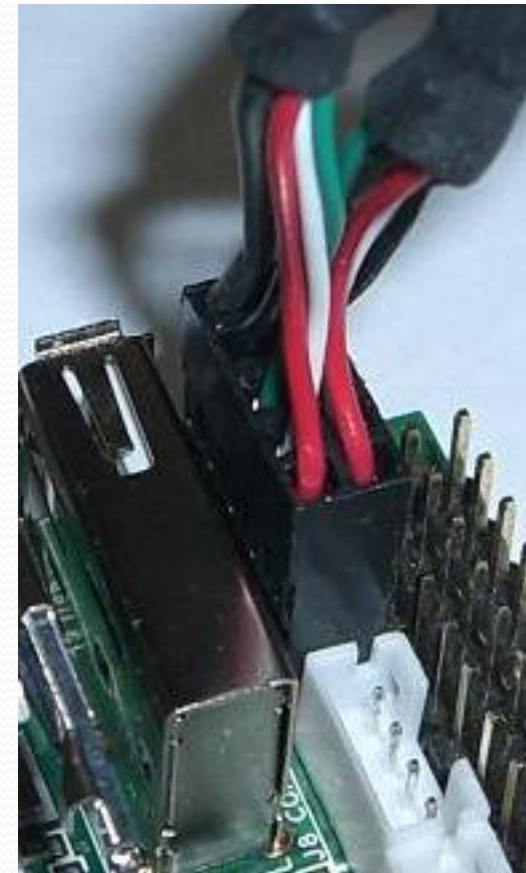
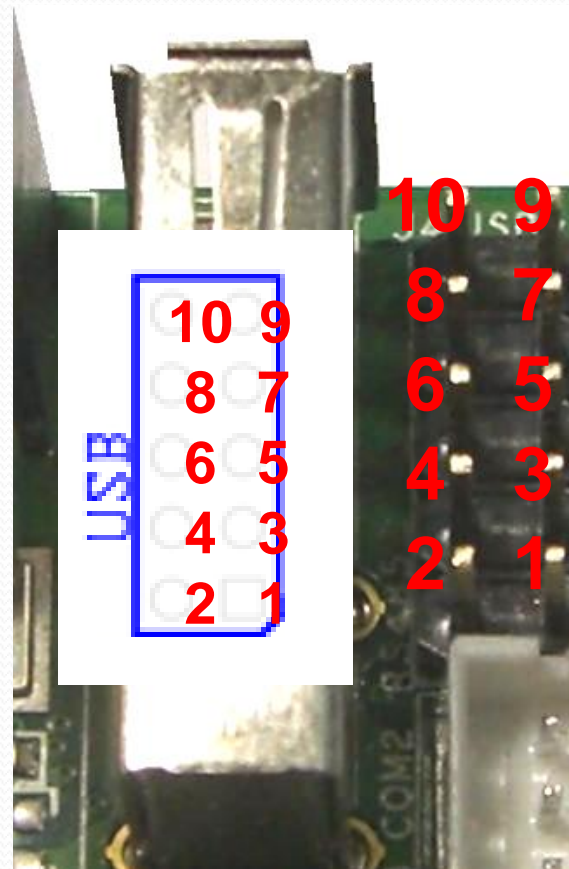
# LAN connector

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



# USB

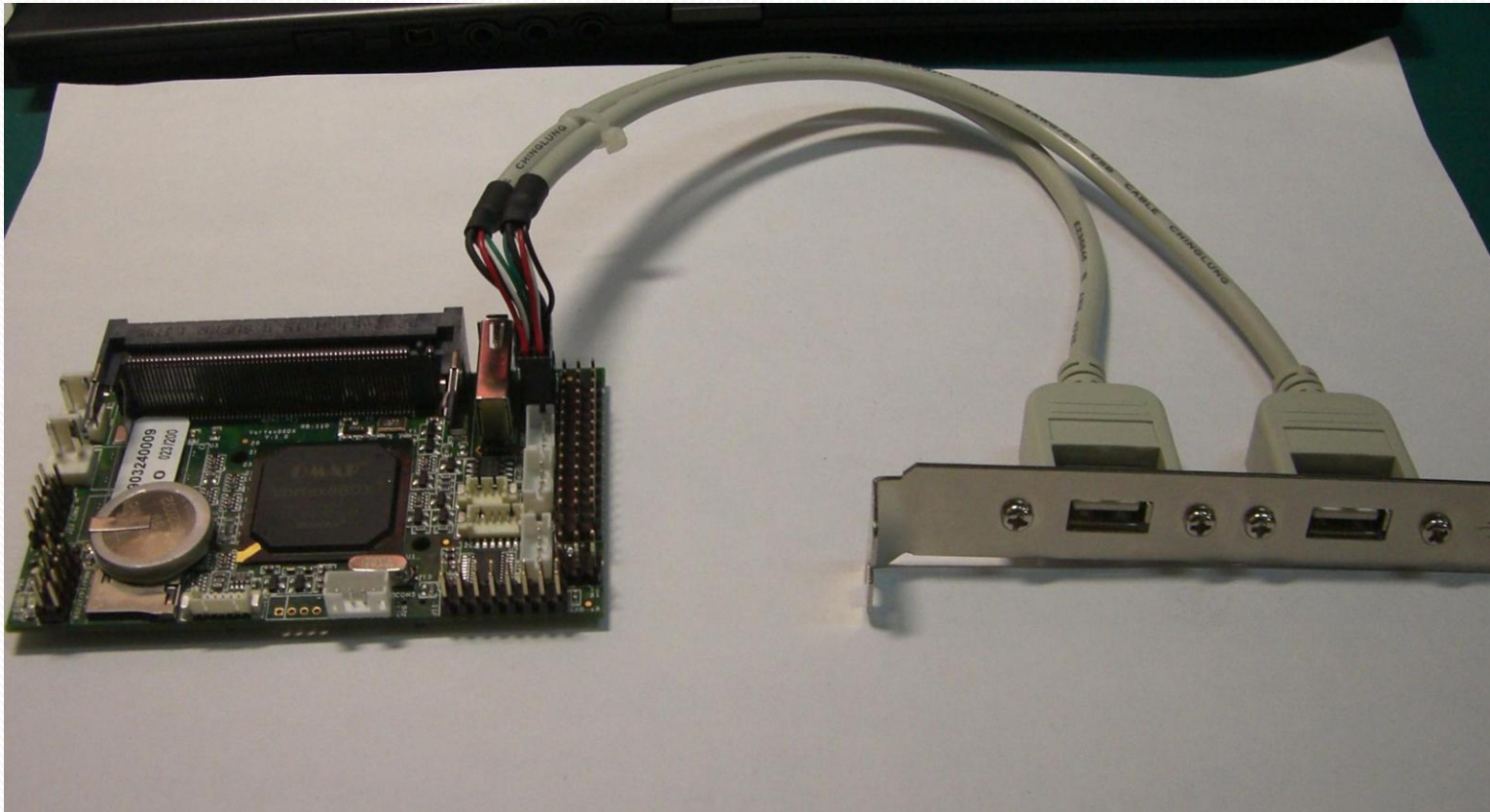
Pin #	Signal Name	Pin #	Signal Name
1	VCC	2	VCC
3	LUSBD0-	4	LUSBD1-
5	LUSBD0+	6	LUSBD1+
7	GND	8	GND
9	GGND	10	GGND





# USB

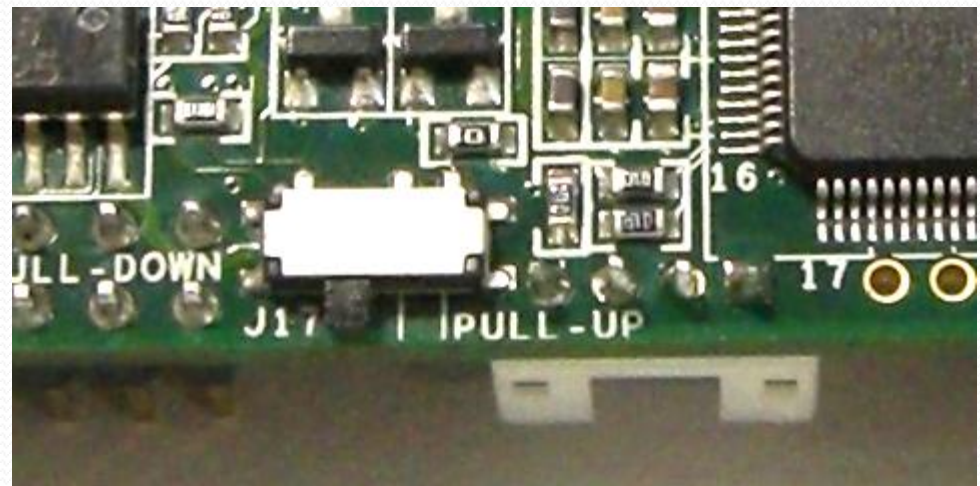
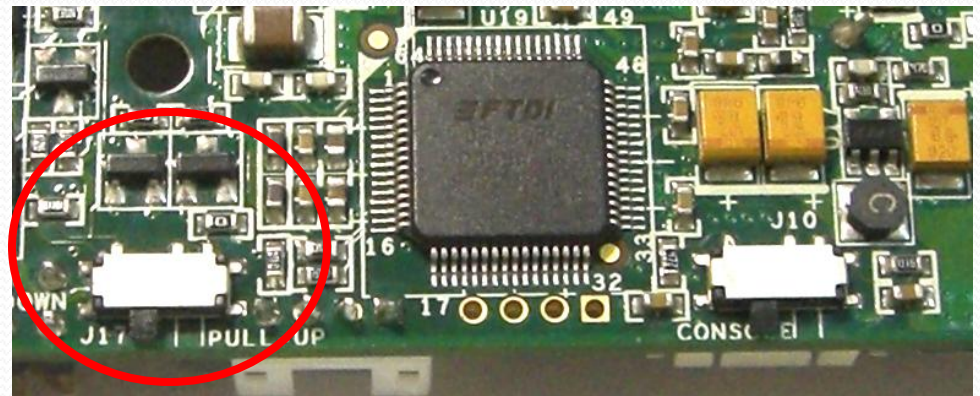
## Connection Example





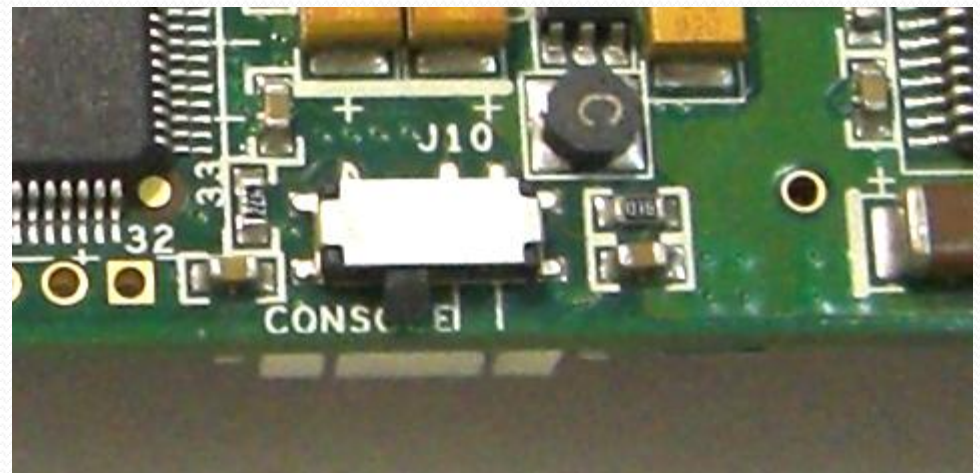
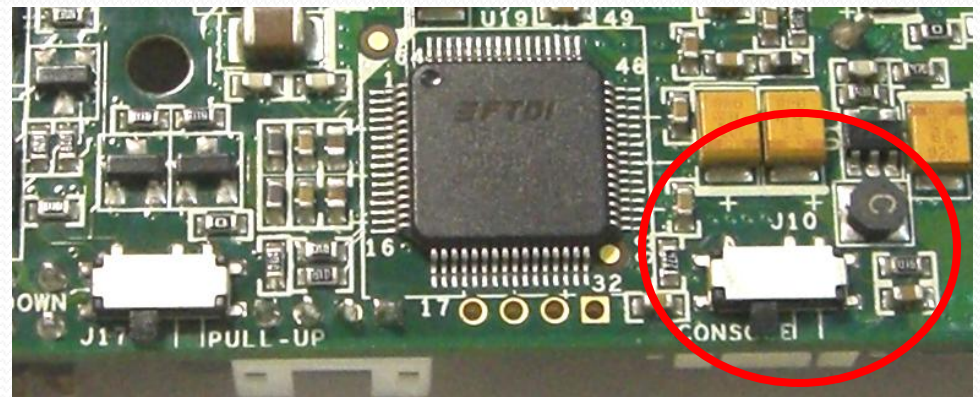
# PWM Initial pull up/down switch

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



# Console Redirection switch

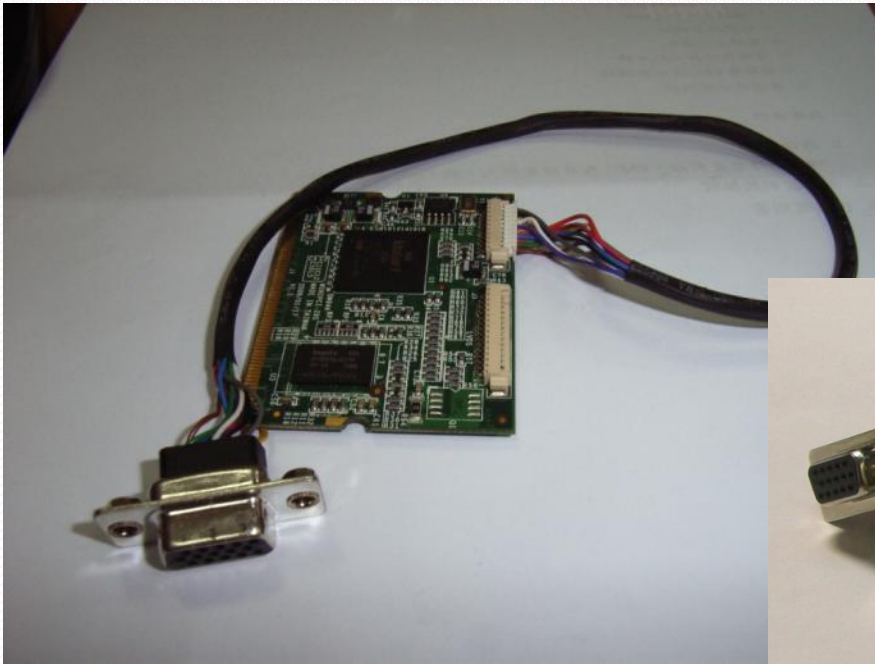
Pin	Signal Name
Left	Console Redirection enable
Right	Console Redirection disable



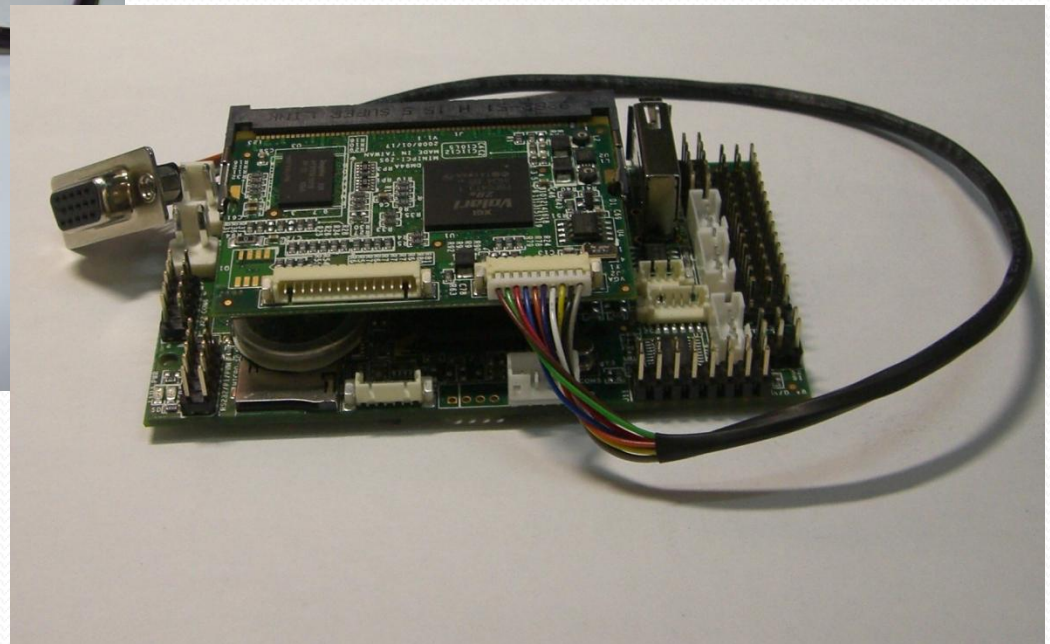


**ACCESSORY**

# Mini VGA Card



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

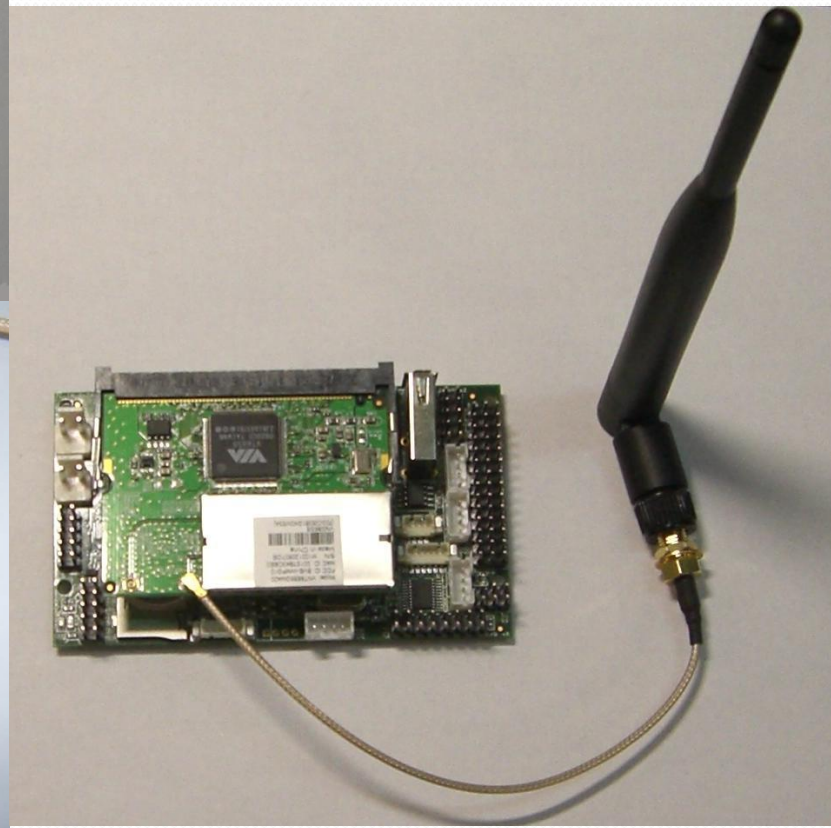




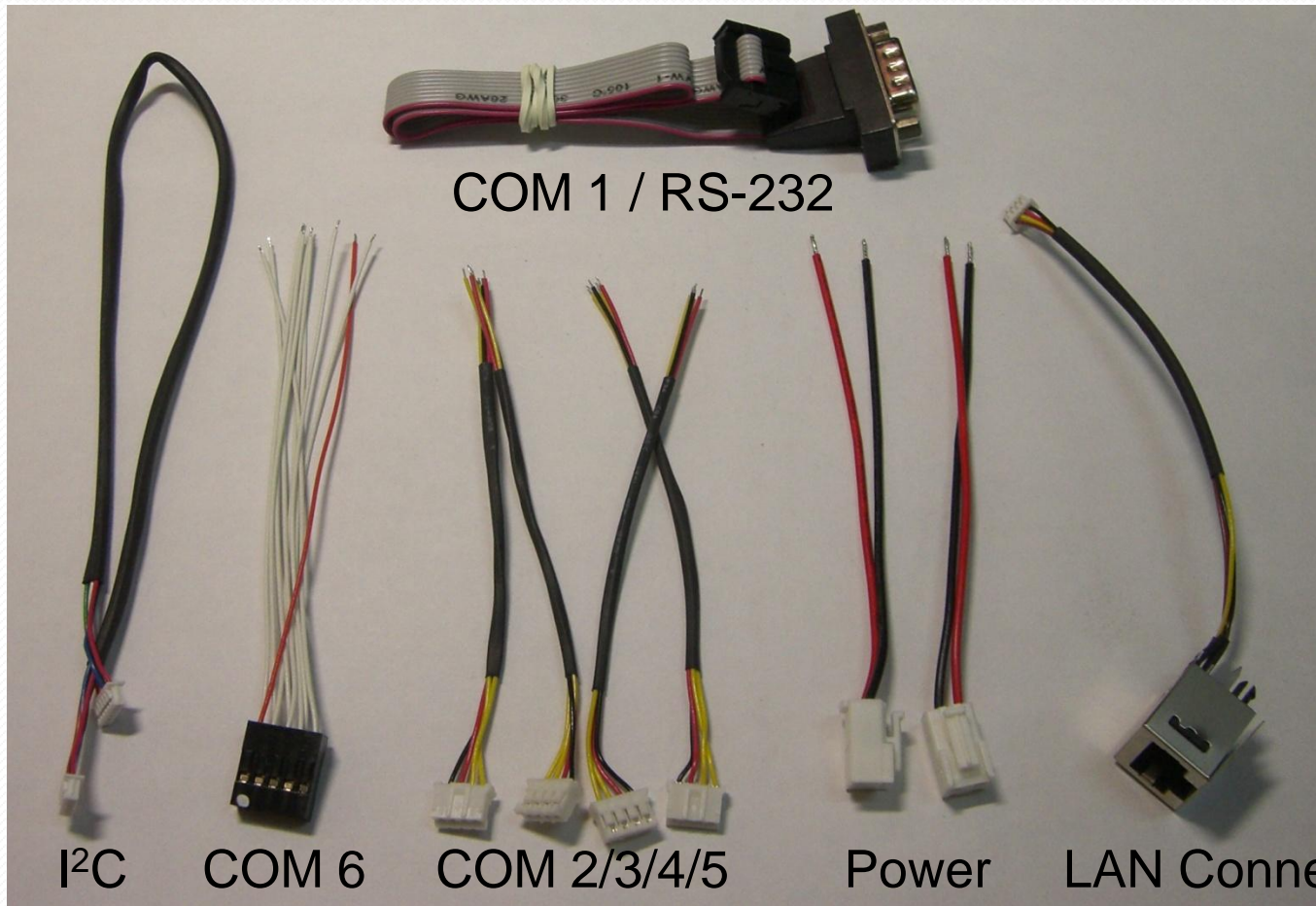
# Mini PCI Wireless Card



- VIA VT6655 Chipset
- 802.11b/g



# RoBoard RB-110 Cable set

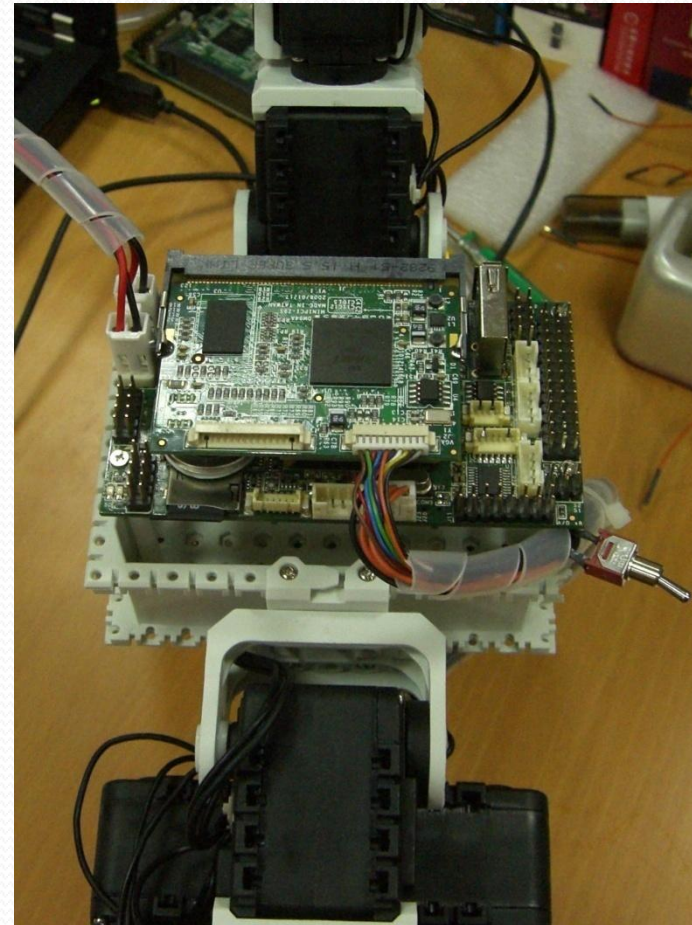
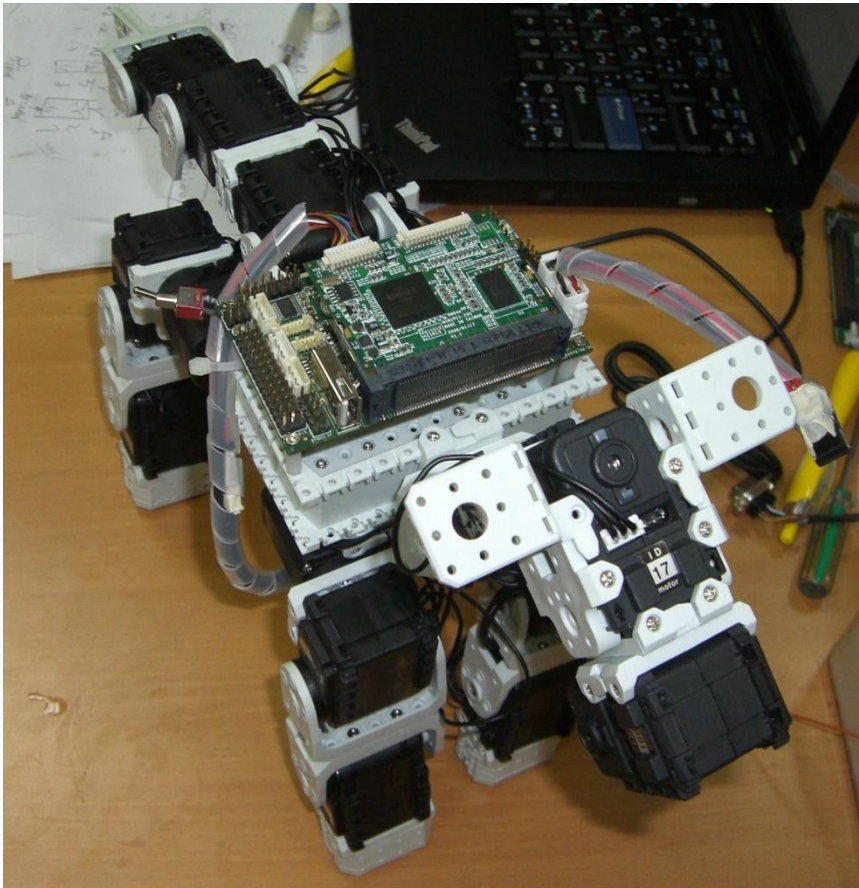




# APPLICATION



# Use RB-110 to Control Bioloid





# The heart of Robotics

**THANK YOU**

[info@roboard.com](mailto:info@roboard.com)  
<http://www.roboard.com>