

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

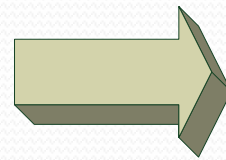
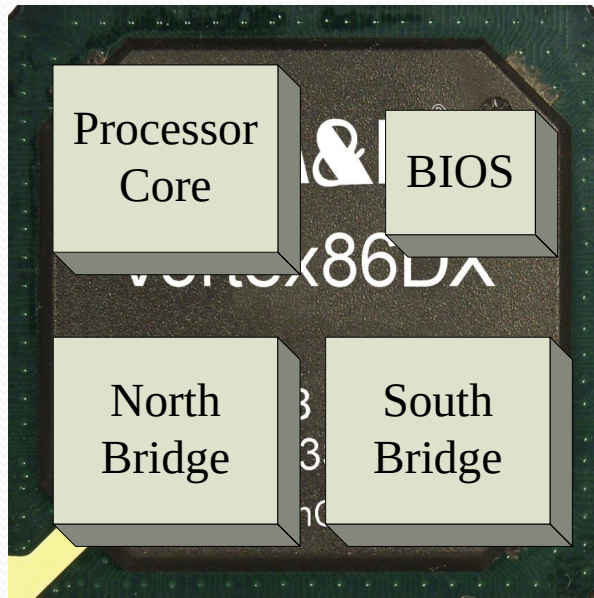


- Feb. 2007
- 486 – 300MHz
- 0.13 um process



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

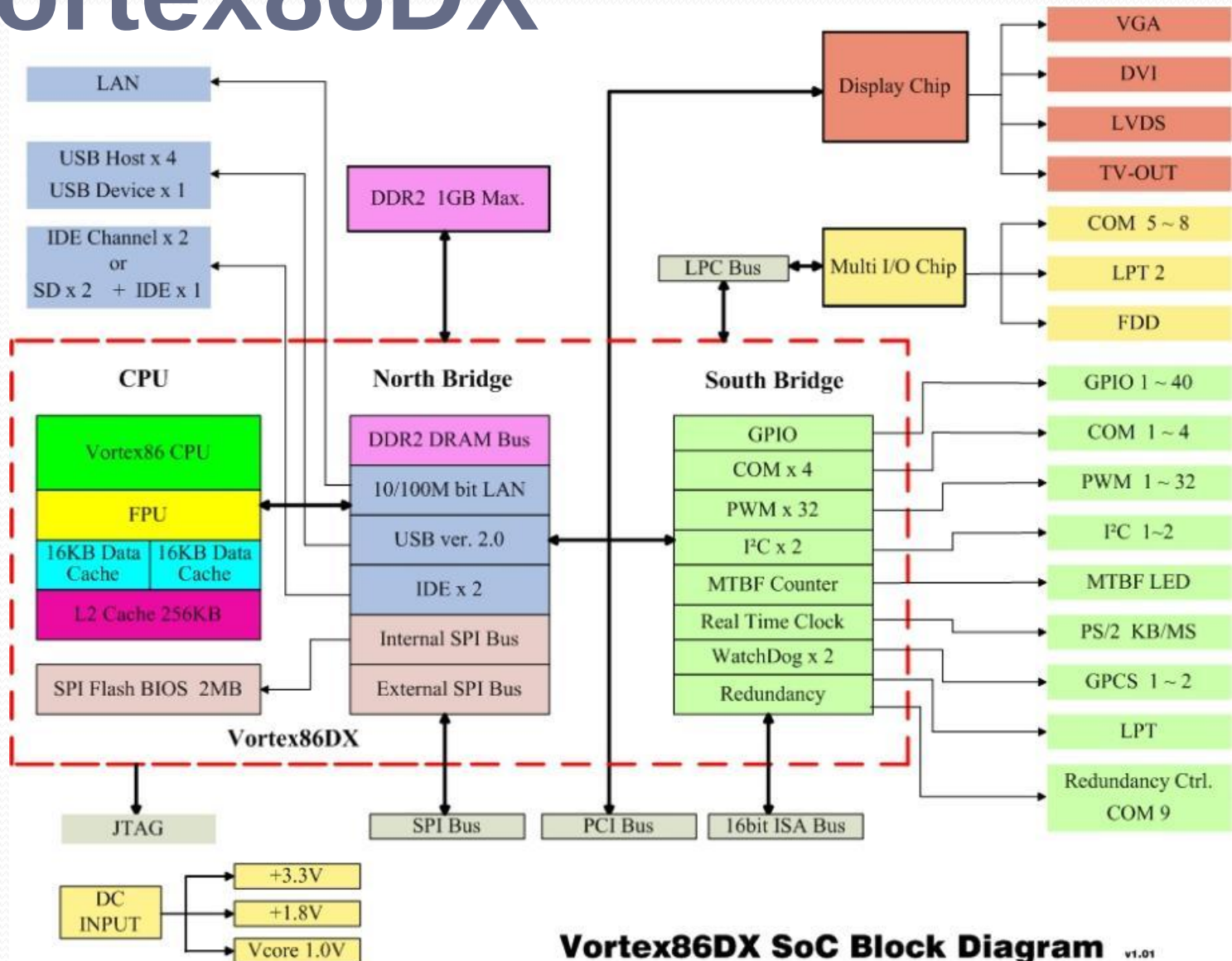
Vortex86DX

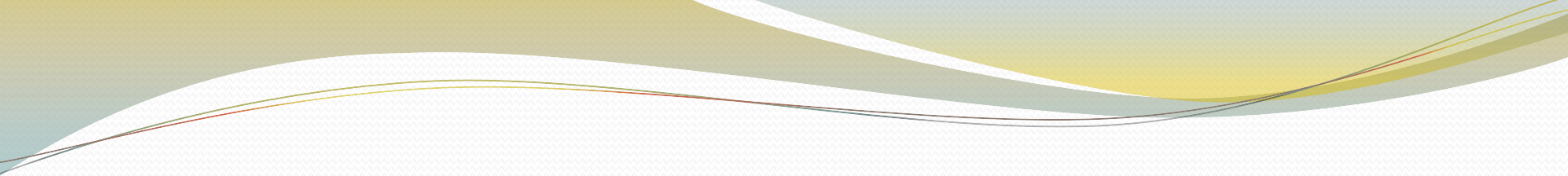


4 in 1 SoC

- 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



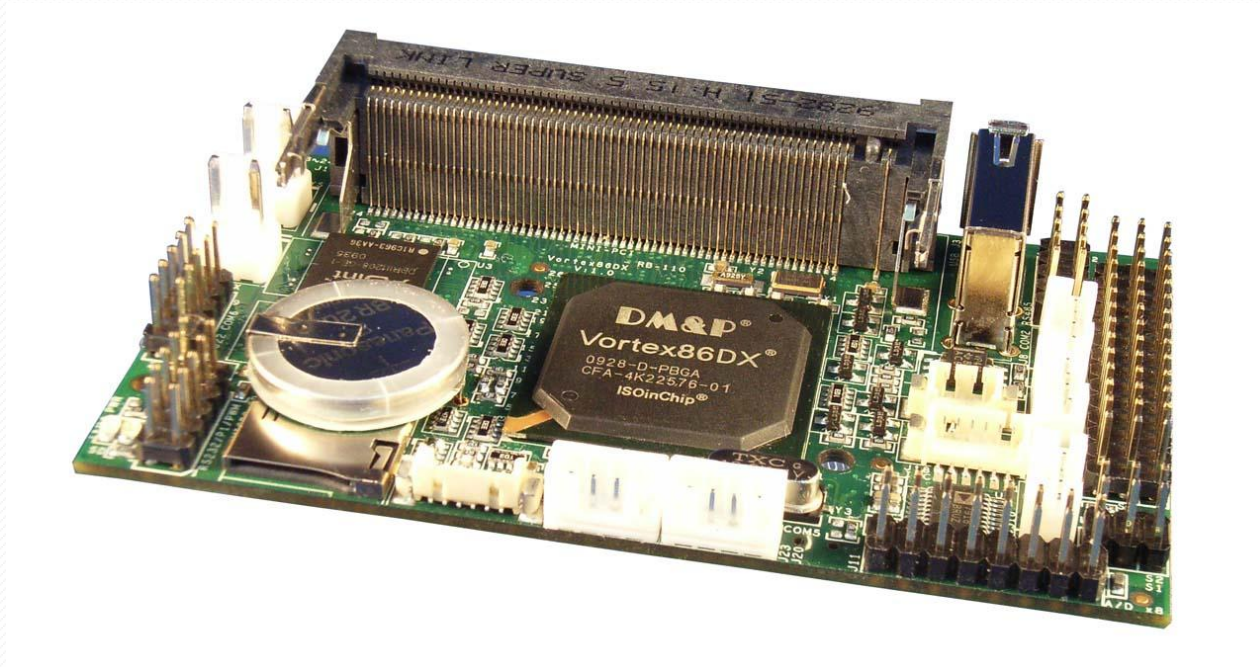


OVERVIEW



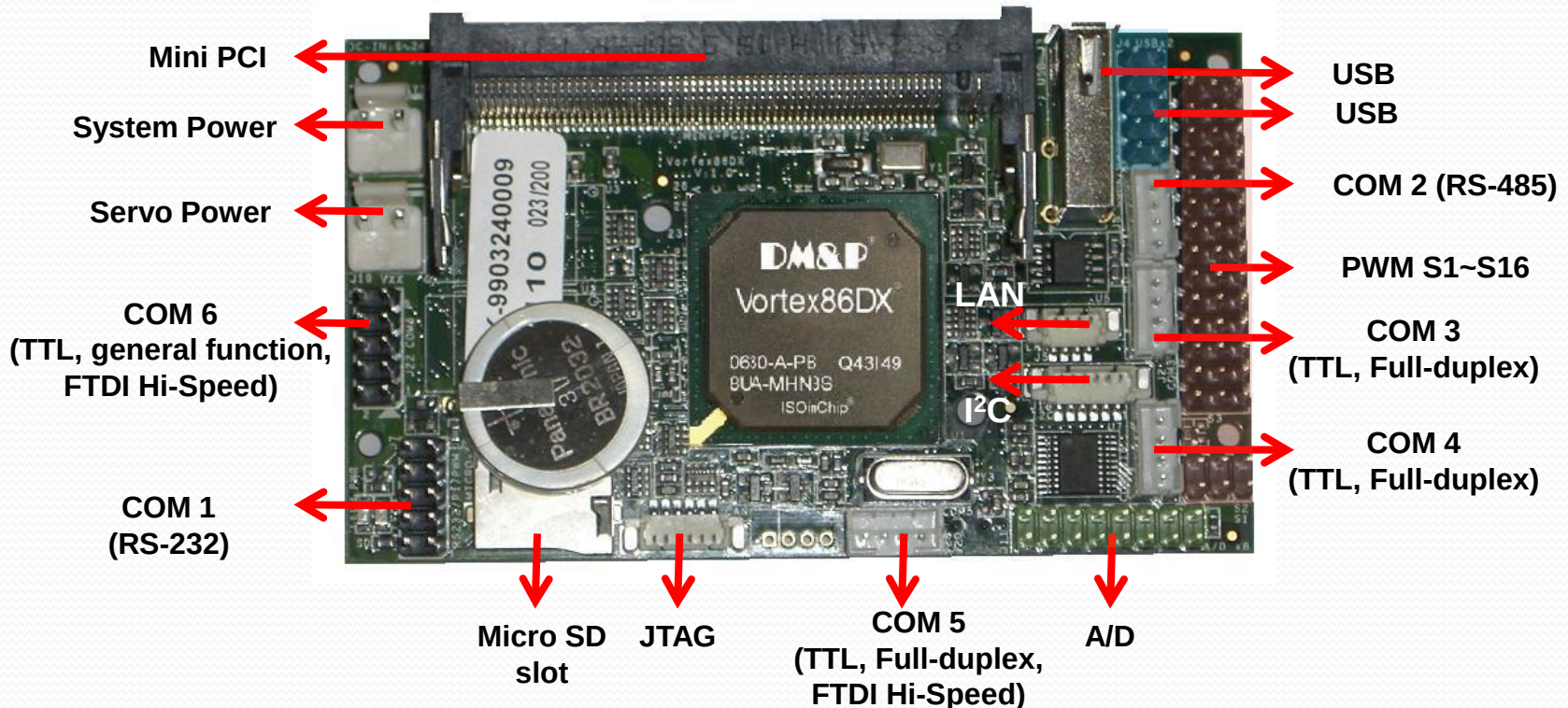
RoBoard RB-110

- 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.)

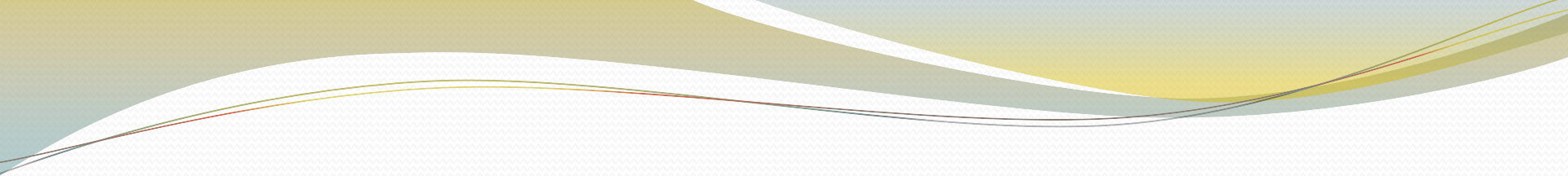


RoBoard RB-110

Size: 96 x 56mm

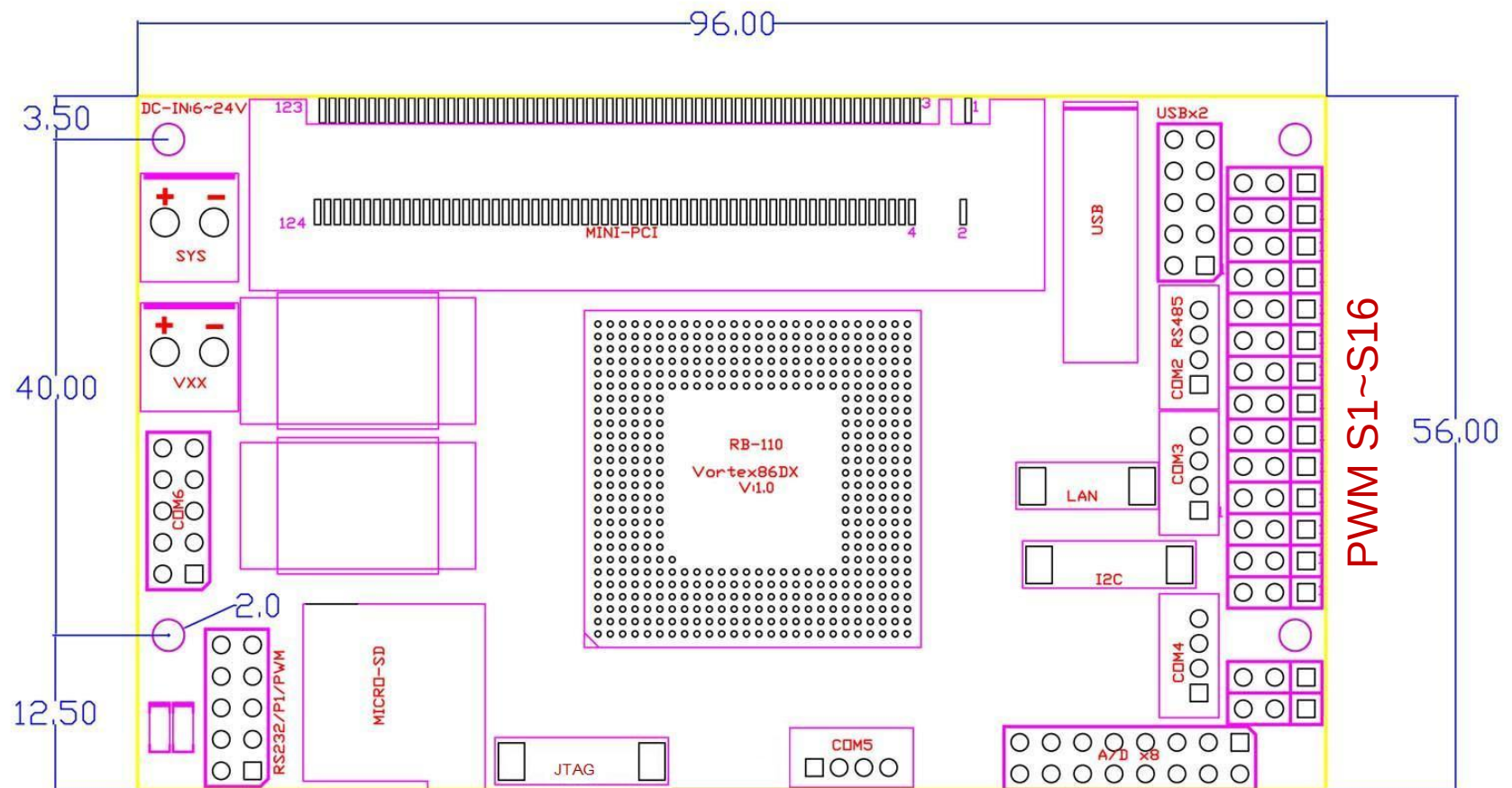


1. 1000MHz, 256MB DDR2
2. PC compatible
3. Build in PWM/GPIO 16Ch
4. USB v2.0 ports × 3
5. TTL COM ports × 2
6. RS-232 port × 1
7. RS-485 port × 1
8. FTDI Hi-Speed COM port × 1
9. FTDI general serial port (COM, SPI, ...) × 1
10. I²C Bus
11. Power consumption 5V@400mA (2W)
12. DC 6V-24V

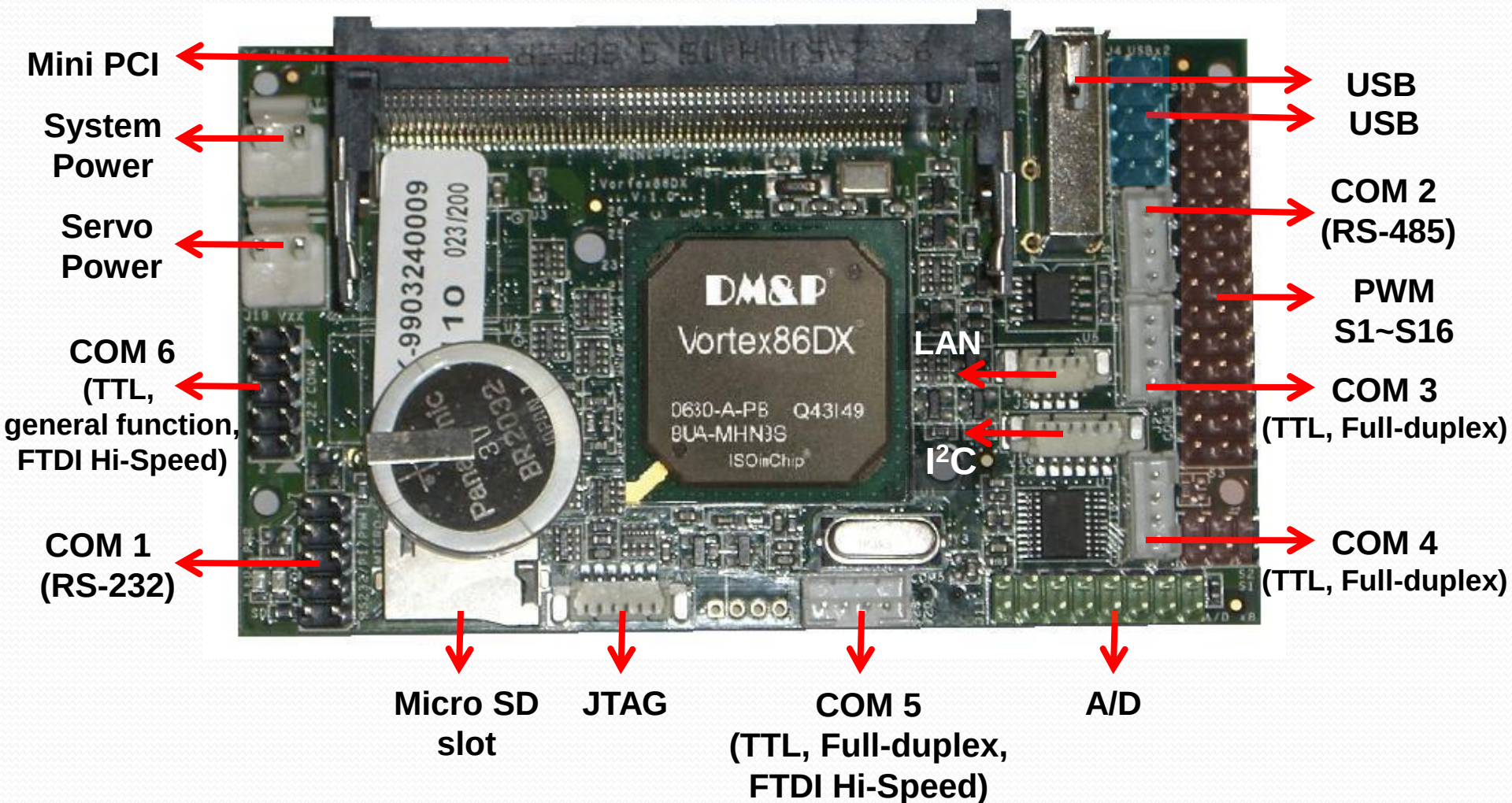


HARDWARE INTRODUCTION

Locations

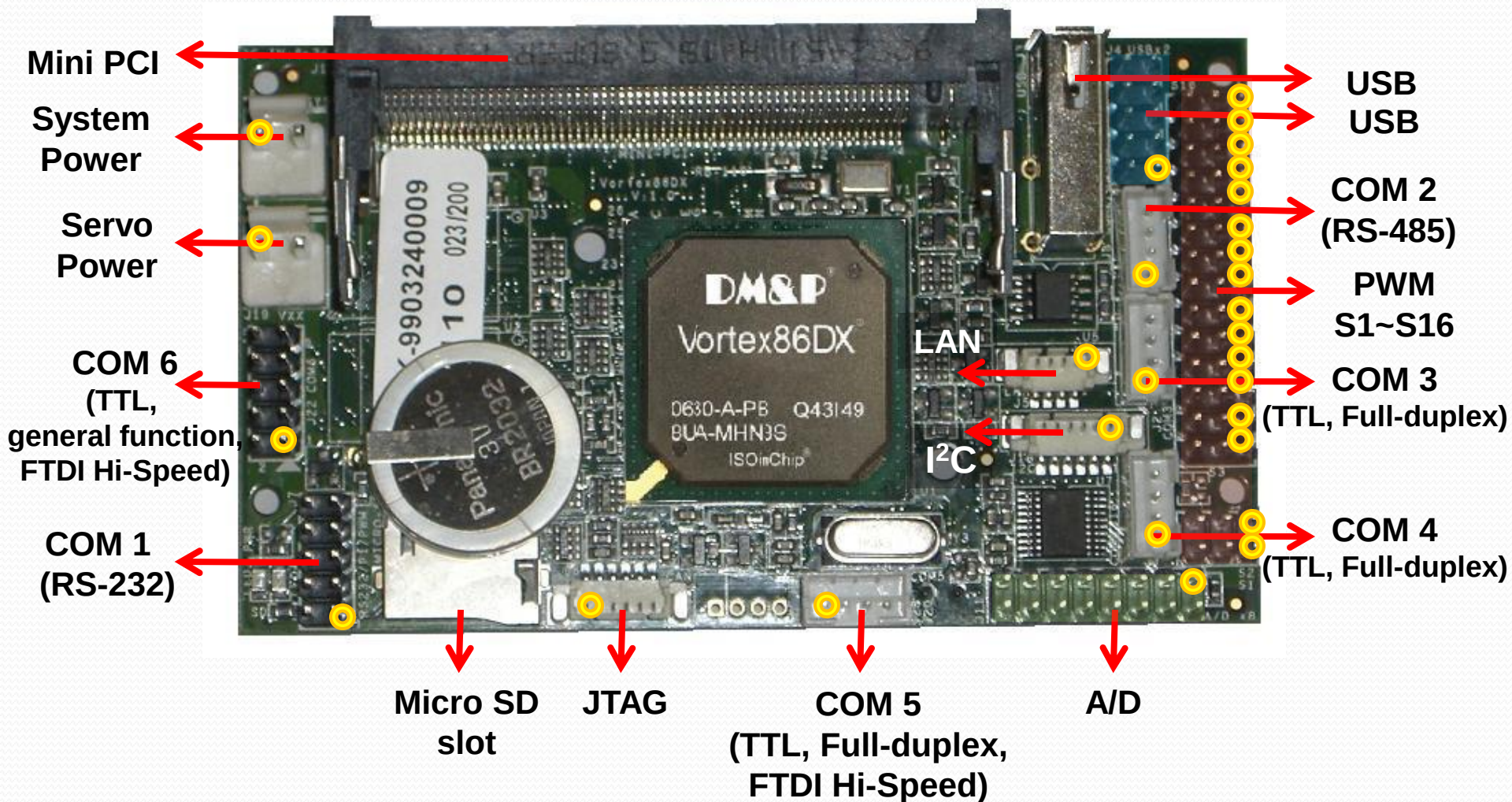


Locations



Pin 1 Location

○: Pin 1



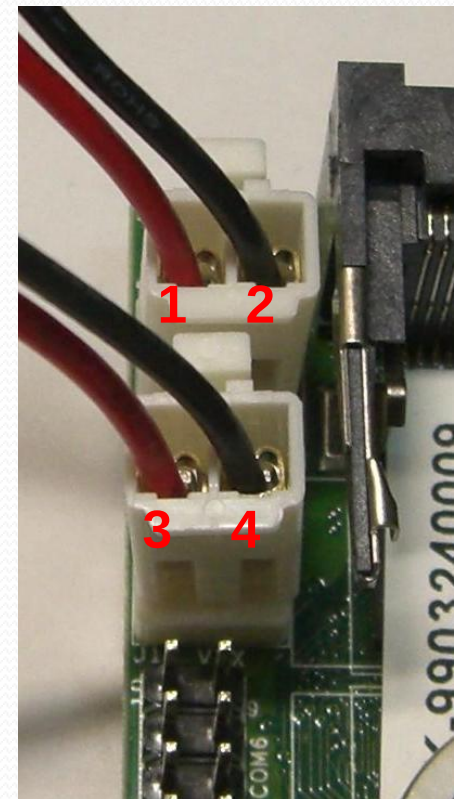
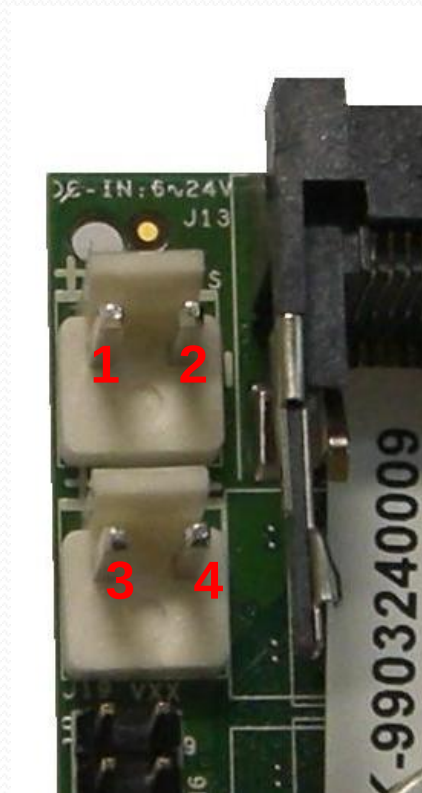
Power connector

System Power Connector

Pin #	Signal Name
1	System power
2	GND

Servo Power Connector

Pin #	Signal Name
3	Vxx
4	GND

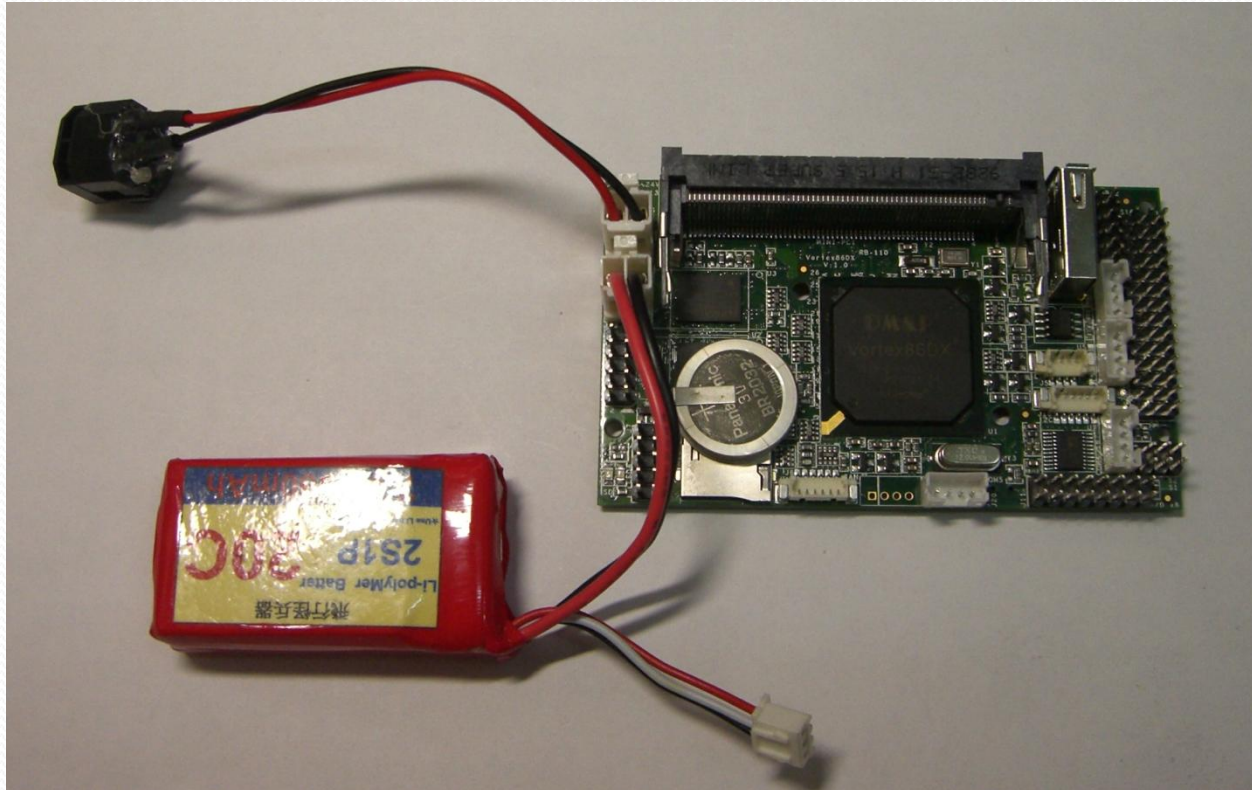


Power connector

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

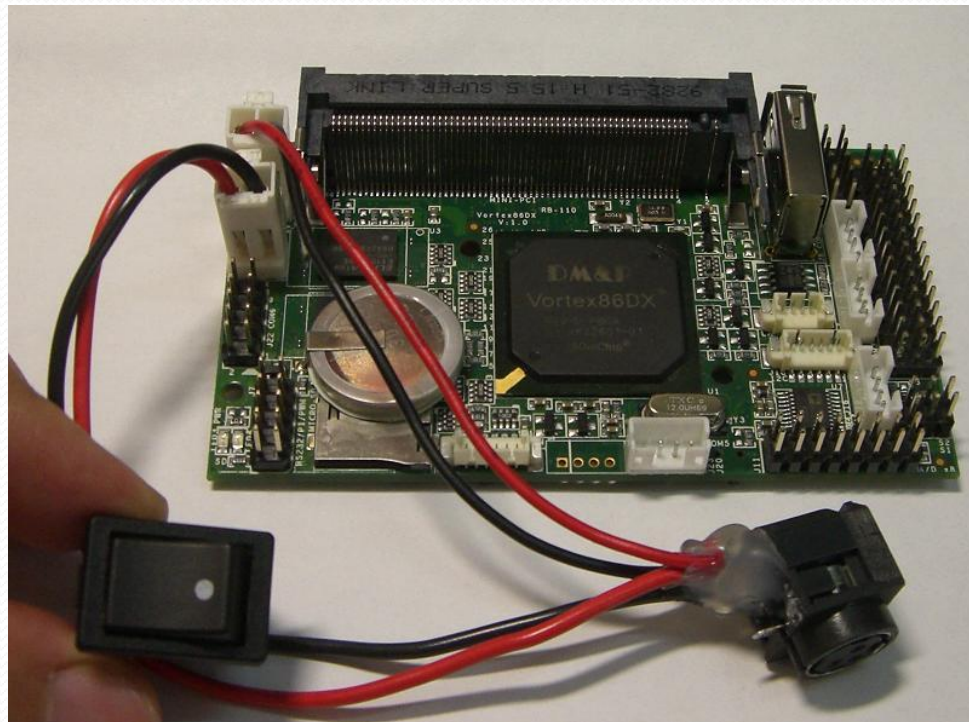
Power connector

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



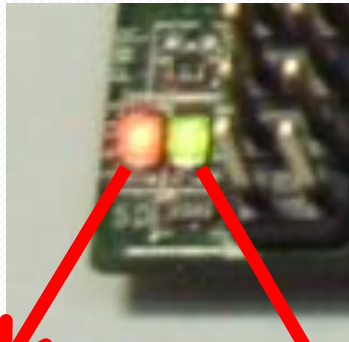
Power connector

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



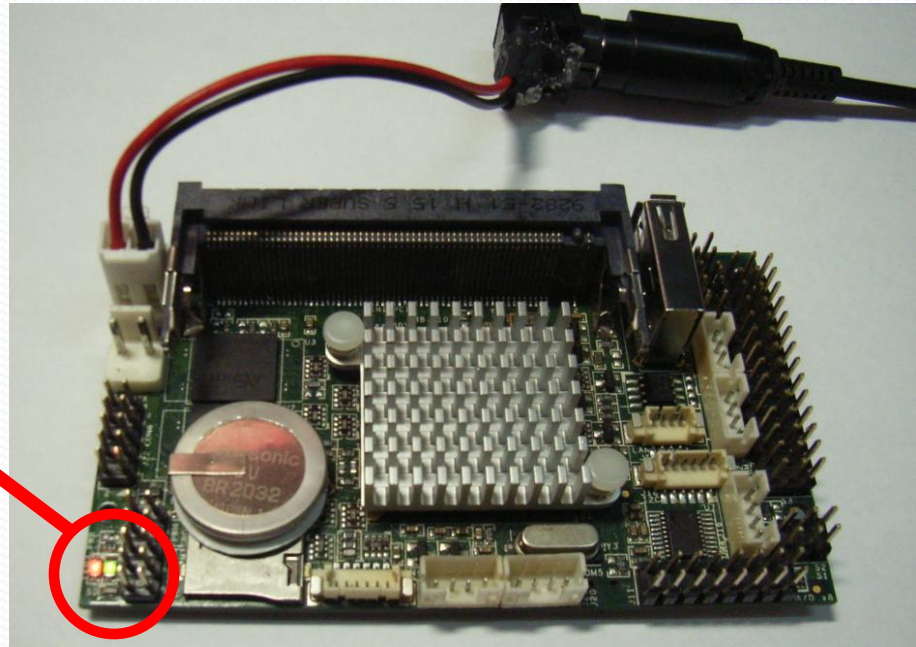
Power connector

After connecting the Power/HD LED will light



Power LED

Hard Disk LED
(Micro SD card)

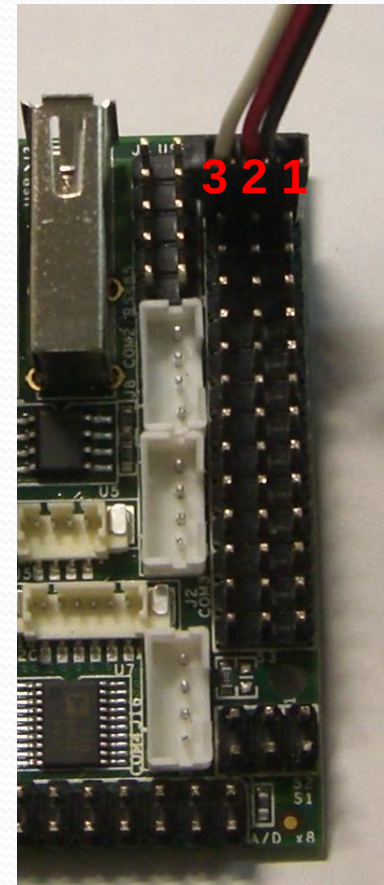
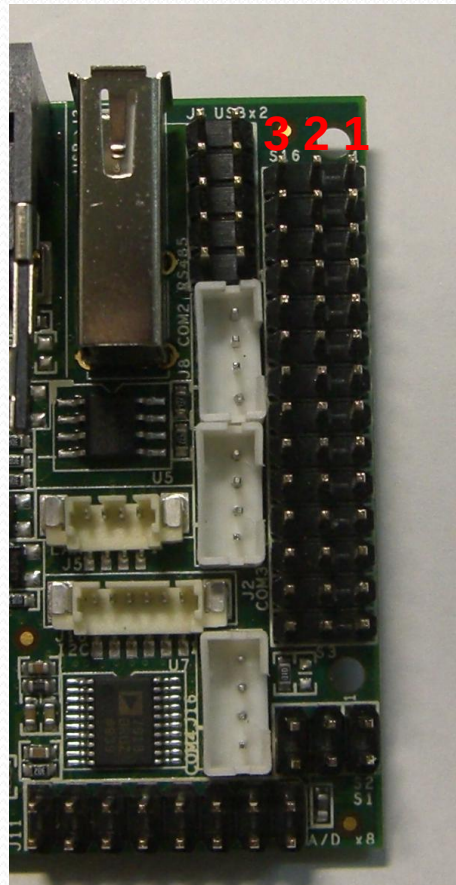


Hard Disk: MicroSD

- 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, ...)

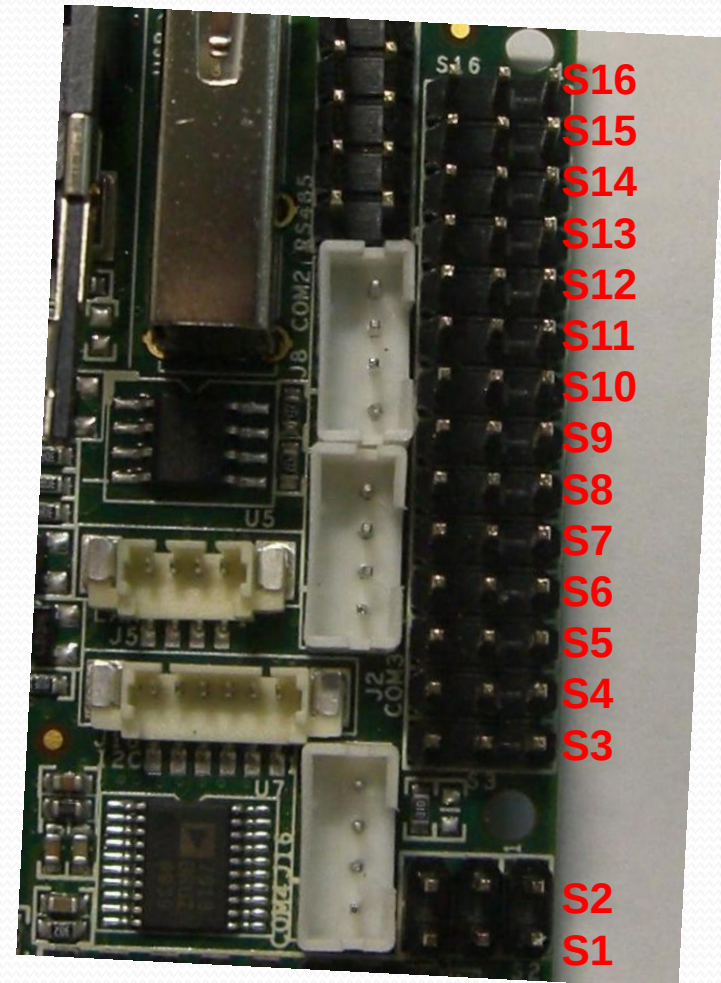
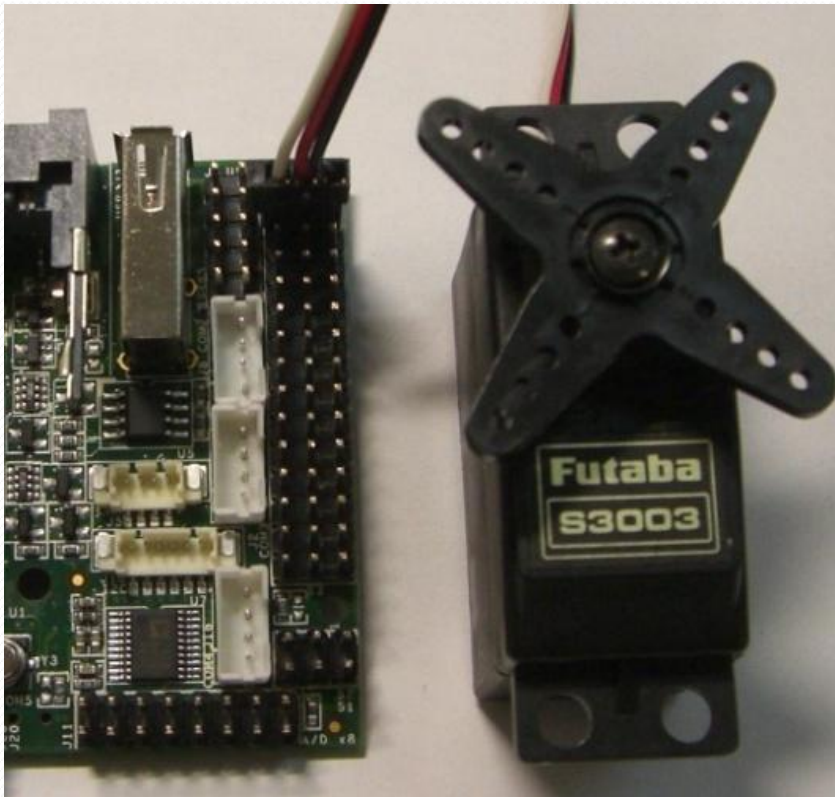
PWM 16ch

Pin #	Signal Name
1	GND
2	Vxx
3	GPXX



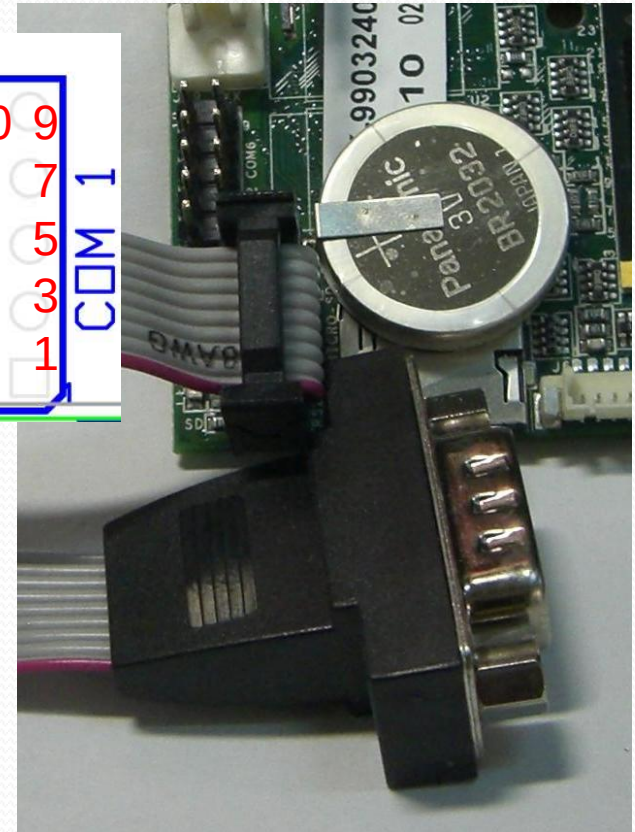
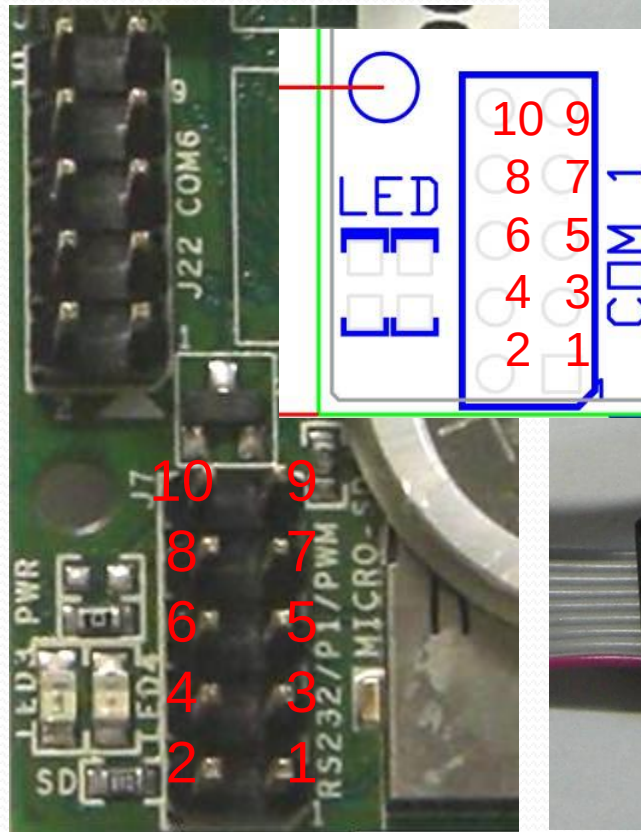
PWM 16ch

Connection Example



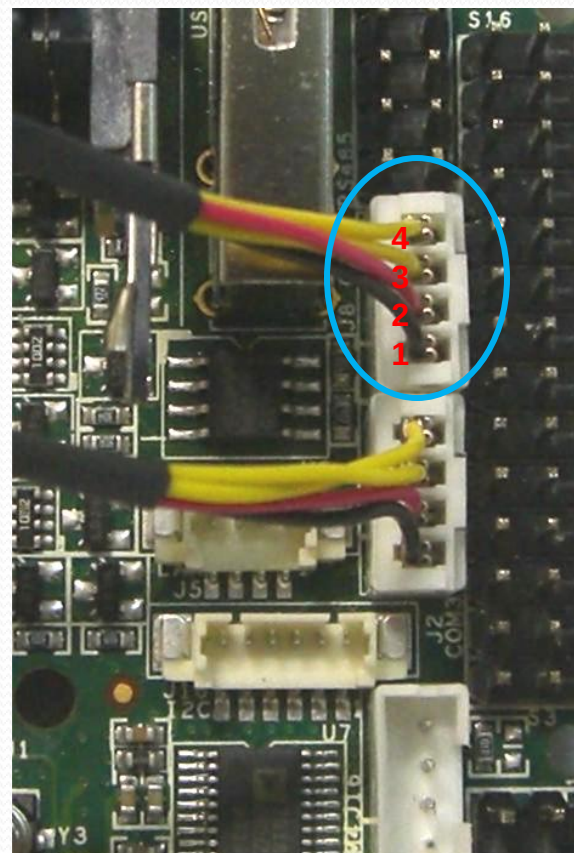
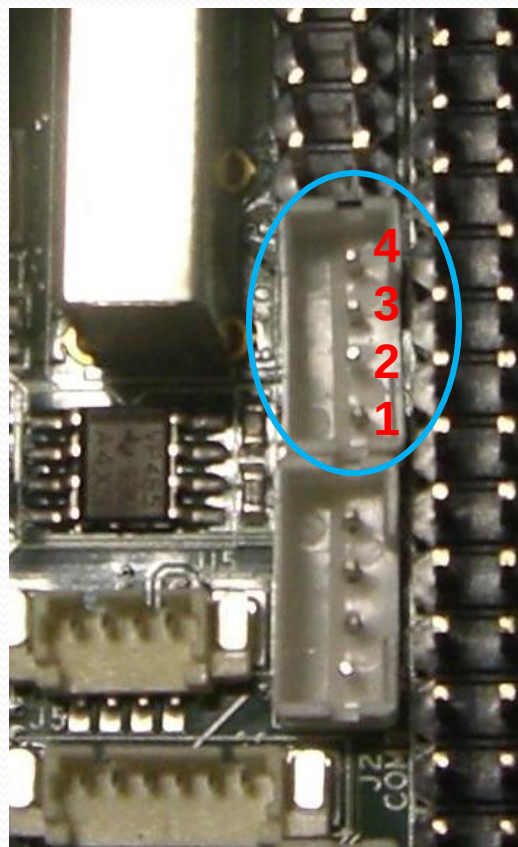
COM 1 / RS-232

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)



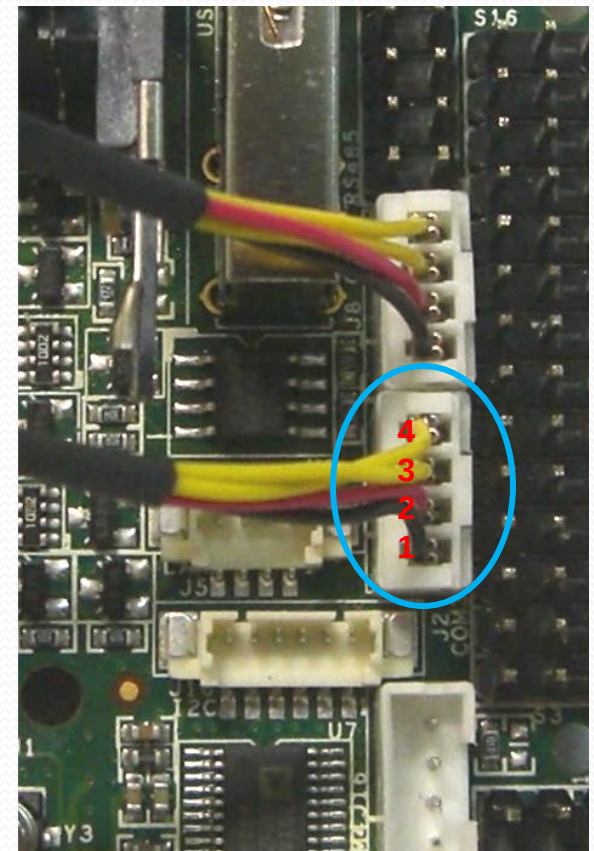
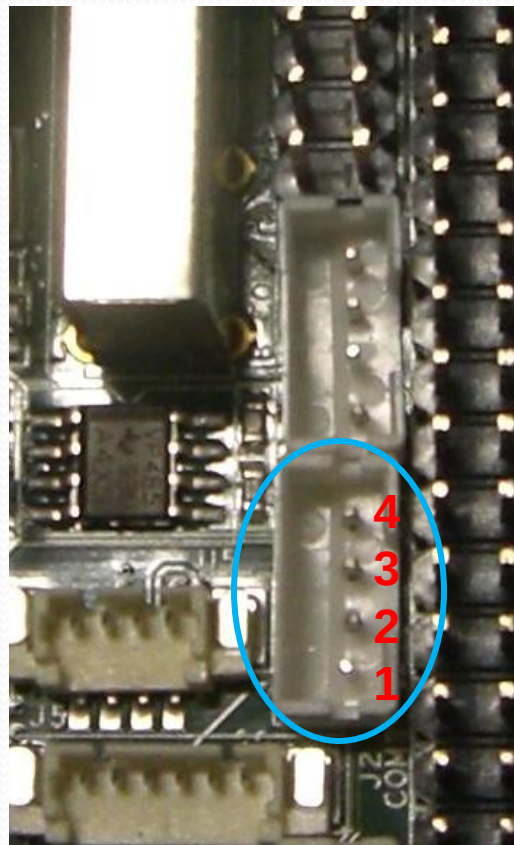
COM 2 / RS-485

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



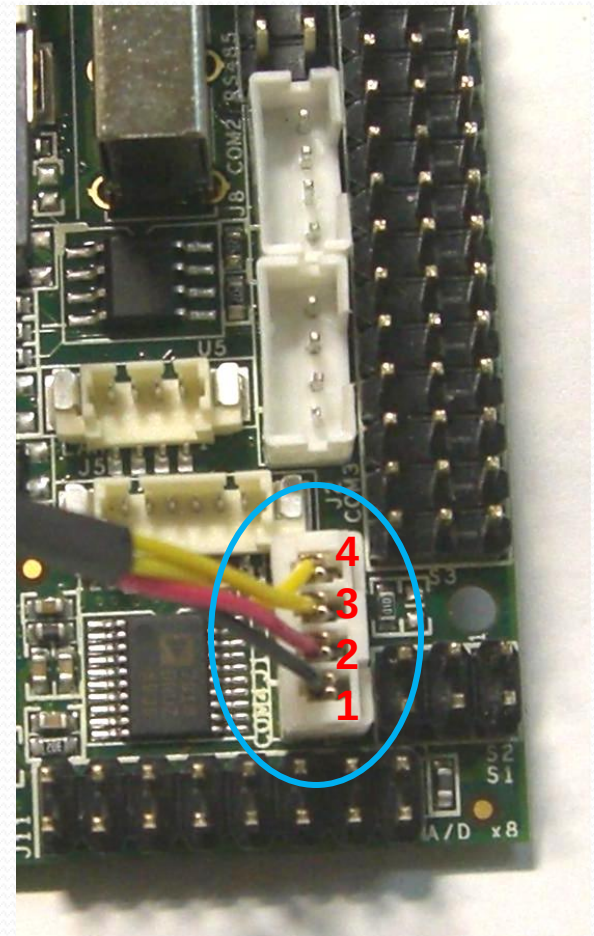
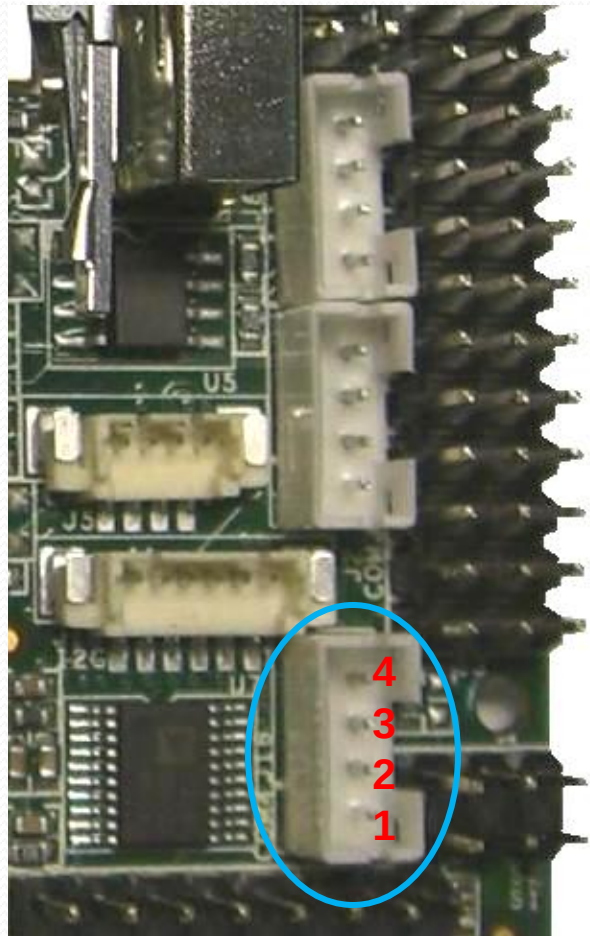
COM 3 / Full Duplex TTL

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



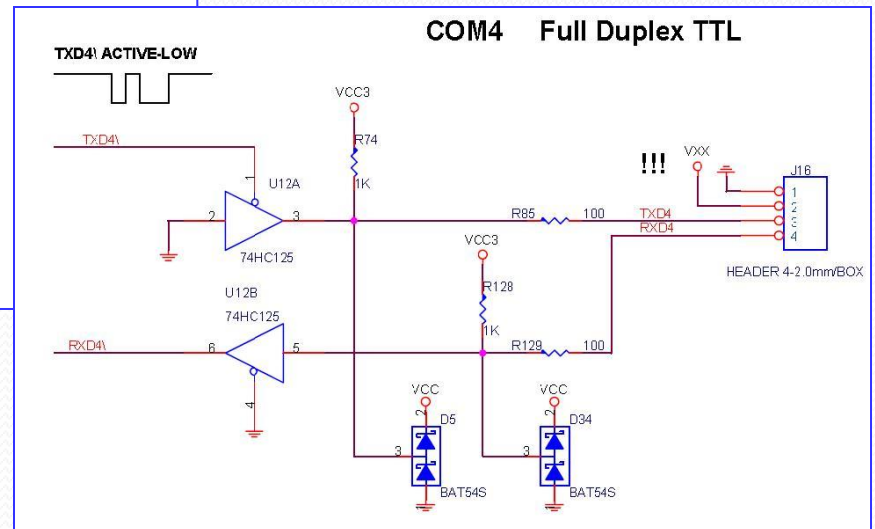
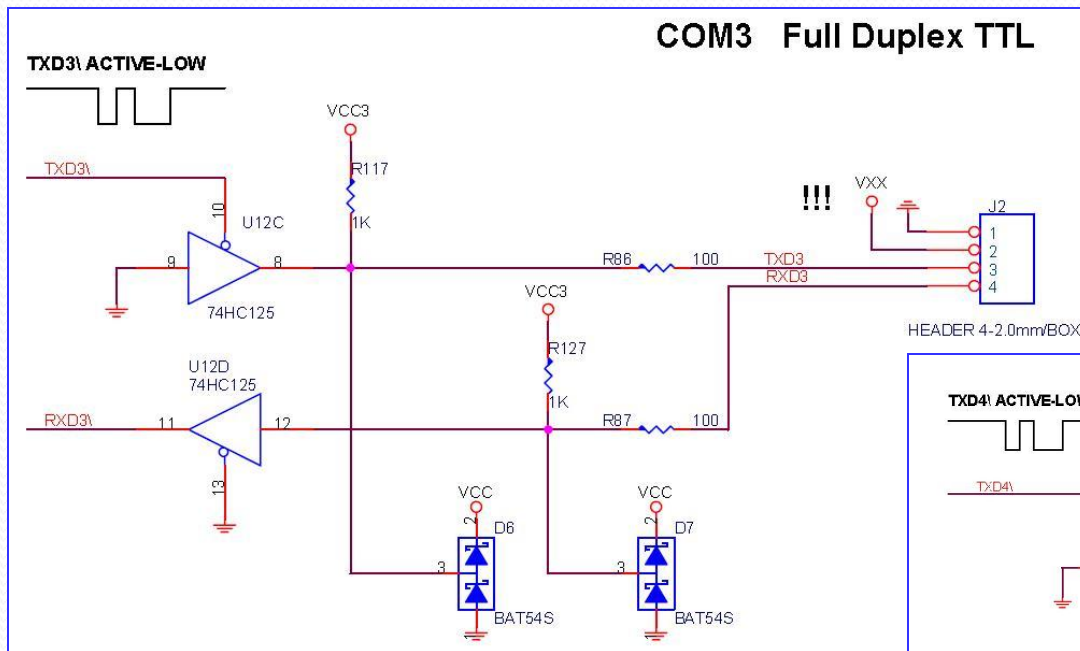
COM 4 / Full Duplex TTL

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

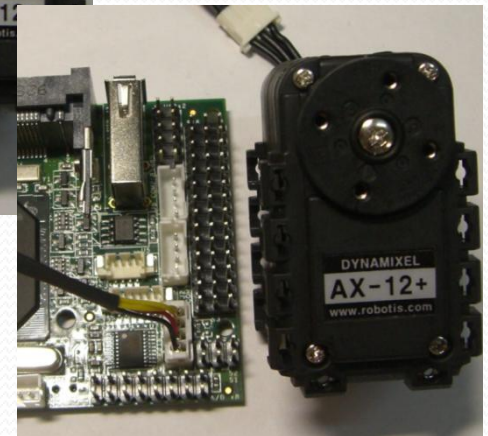
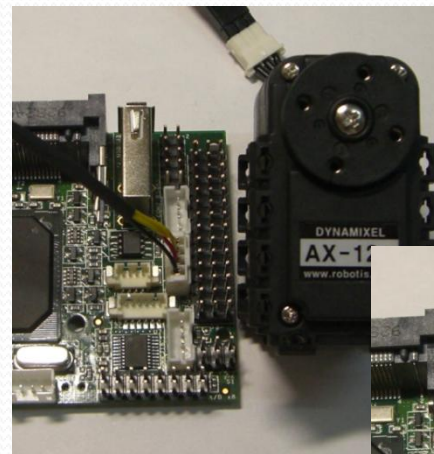
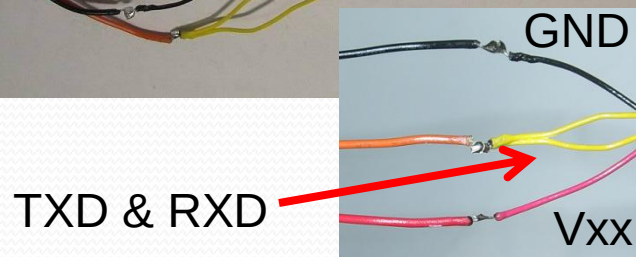
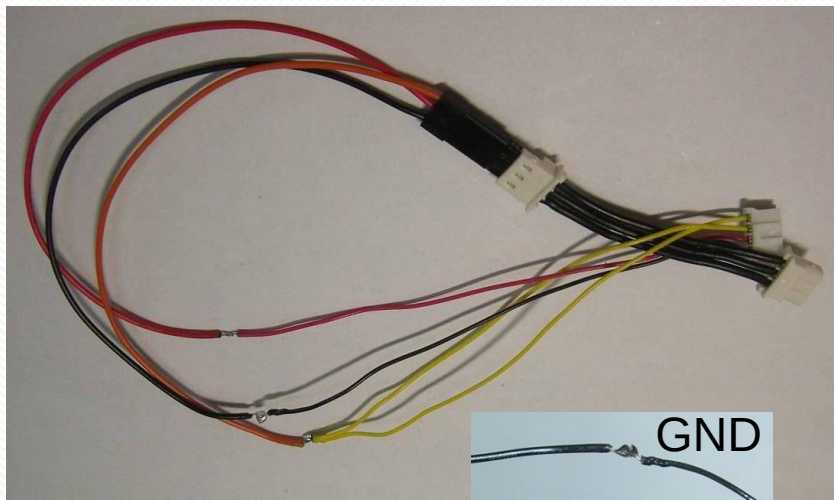
- COM3 & COM4 are buffered:



Use COM 3/4 as Half-Duplex TTL

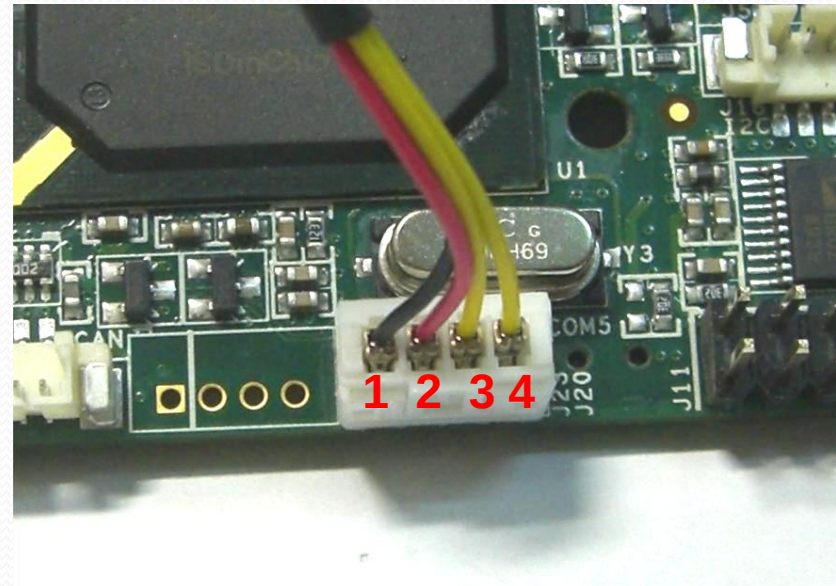
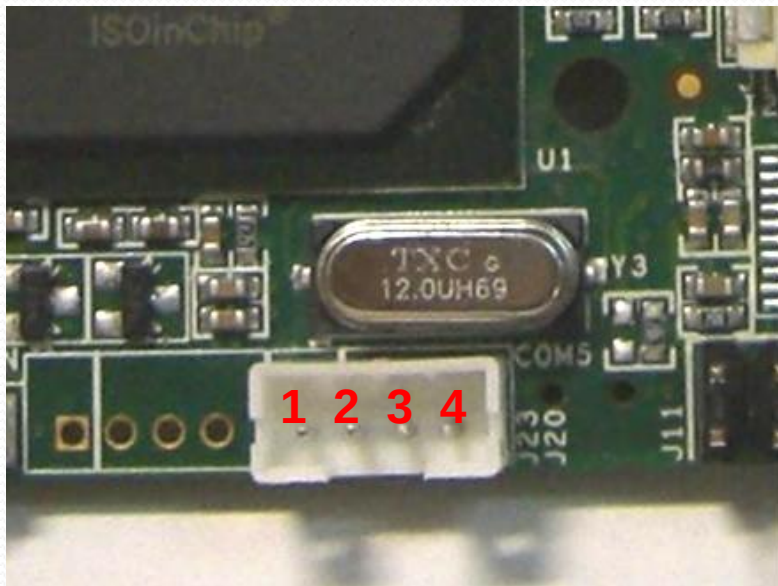
- you can simply short TX & RX to get a half-duplex COM port:

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



COM 5 / Full Duplex TTL / FTDI Hi-Speed

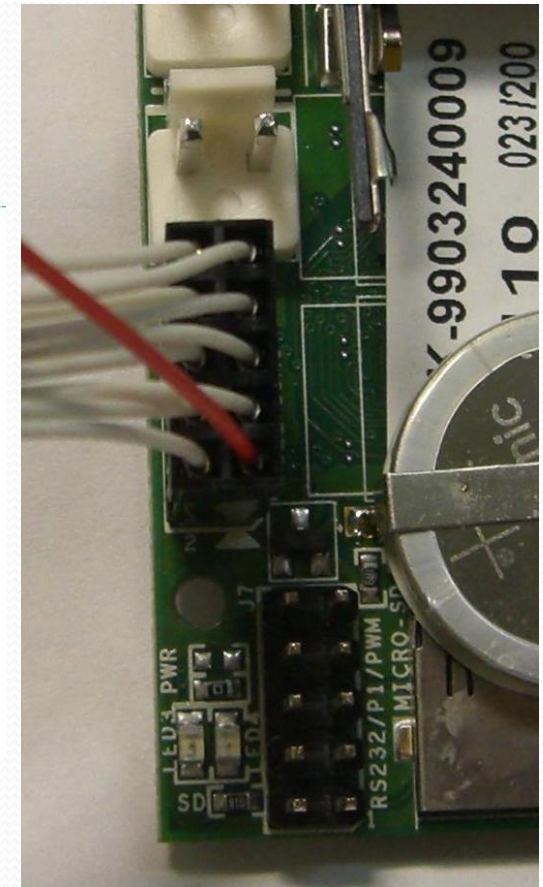
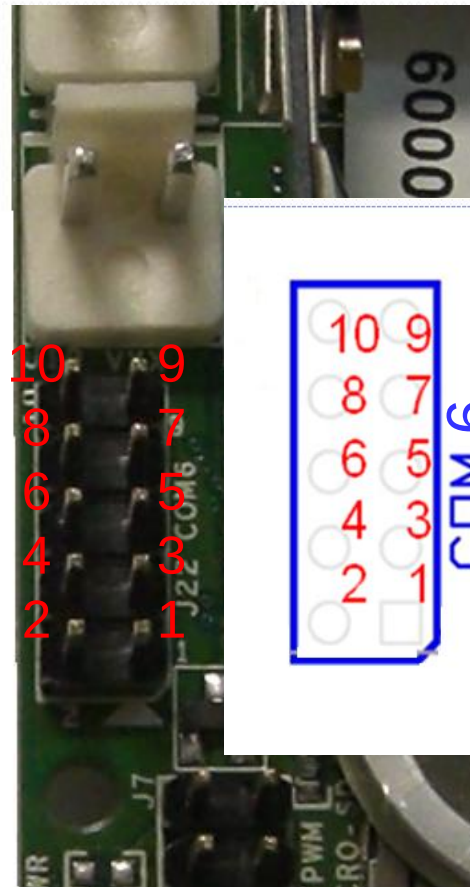
Pin #	Signal Name	Pin #	Signal Name	Pin #	Signal Name	Pin #	Signal Name
1	GND	2	Vxx	3	TXD5	4	RXD5



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

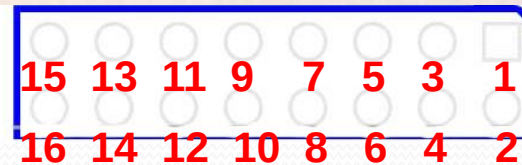
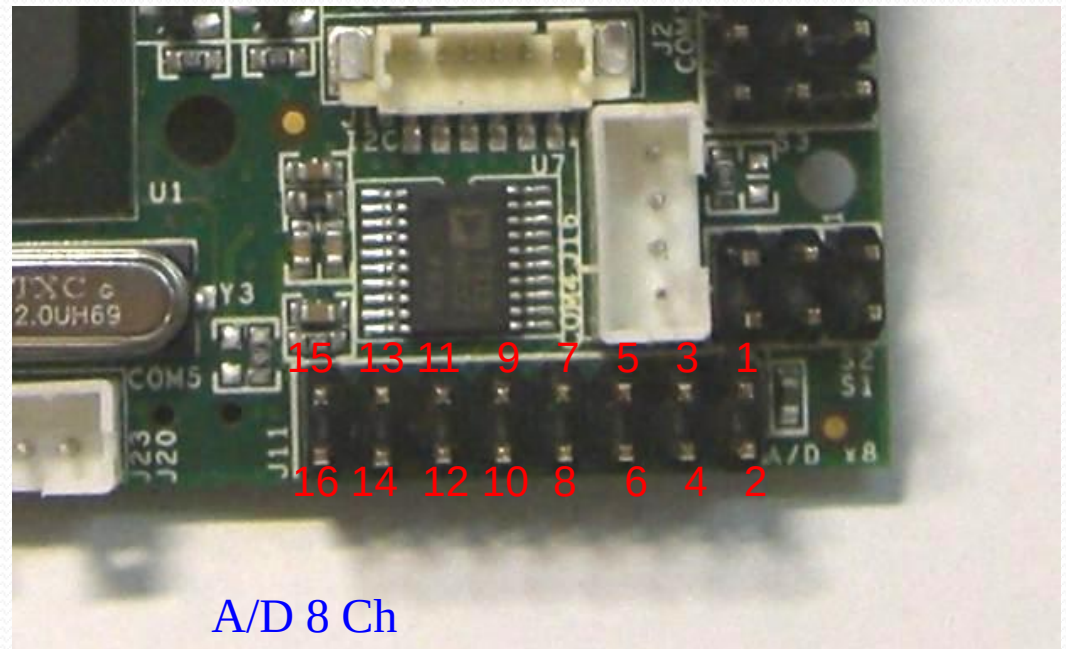


COM 6 / TTL / FTDI General Serial Port

- 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
 - 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>

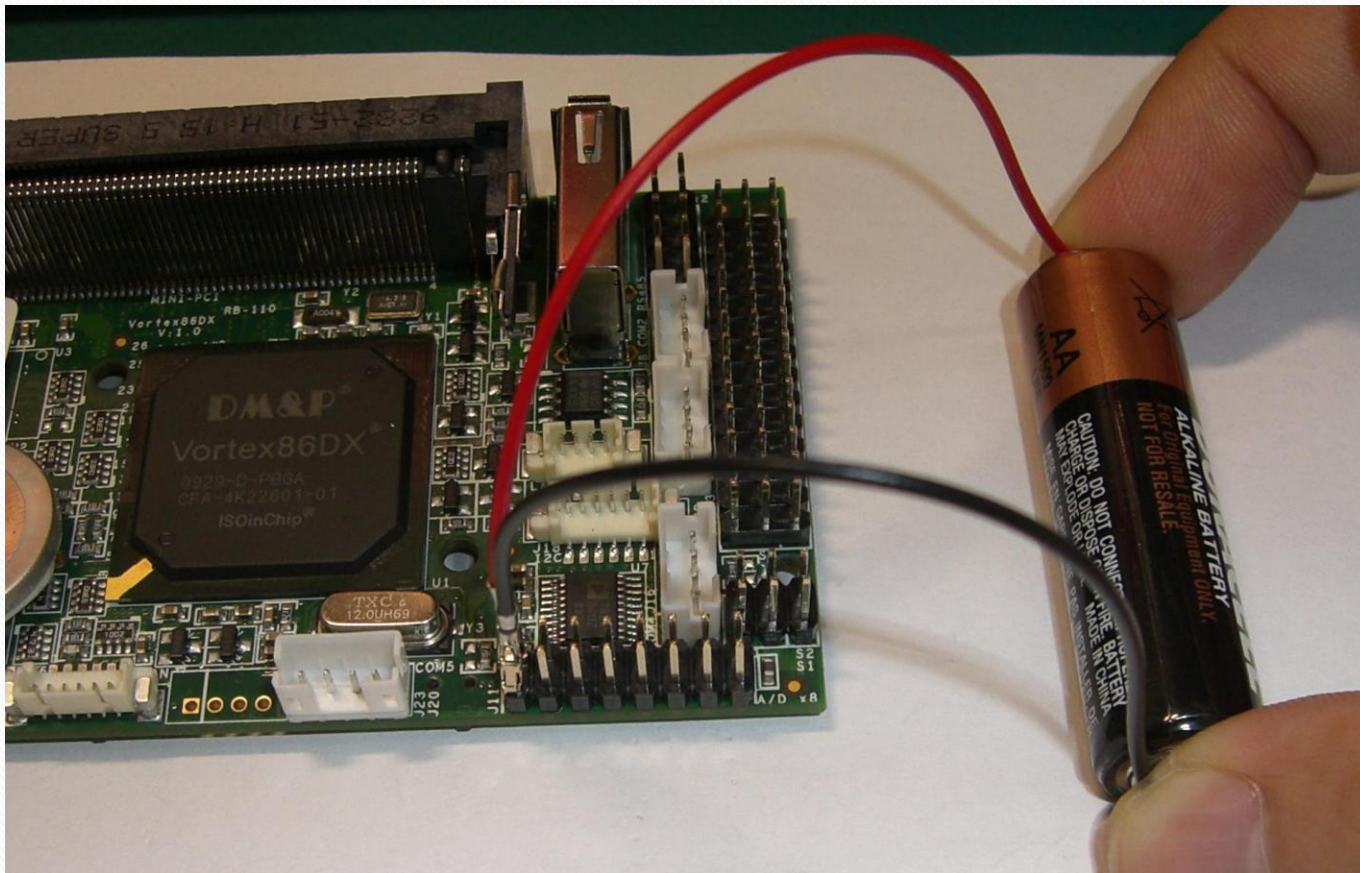
A/D 8 Ch

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



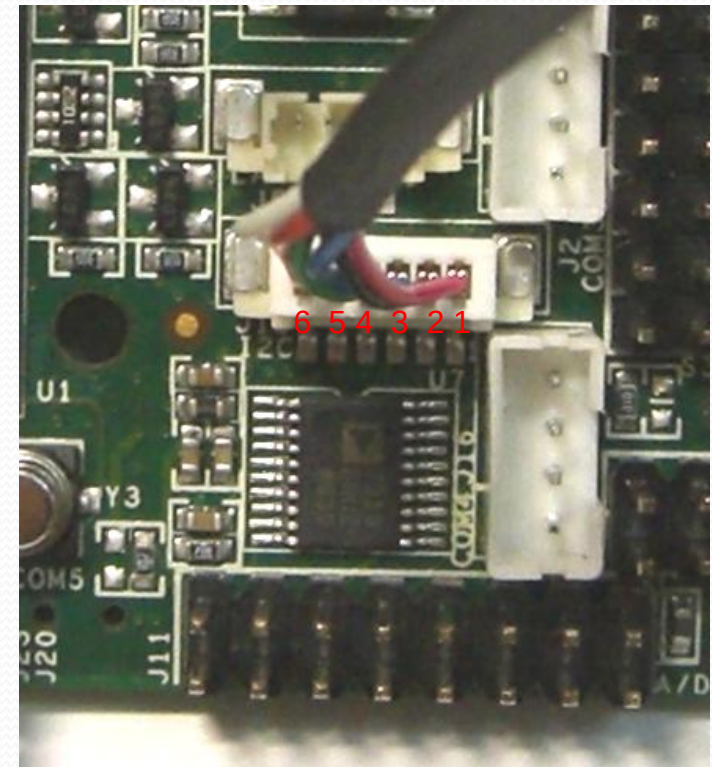
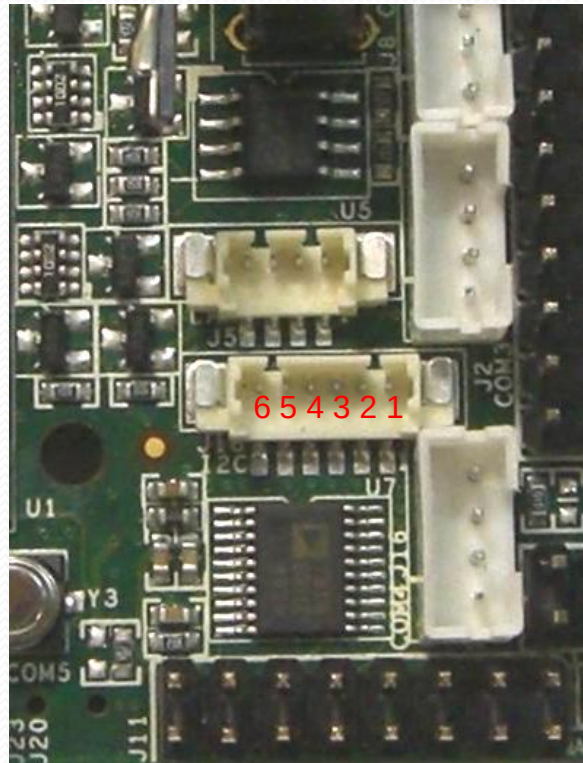
A/D 8 Ch

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



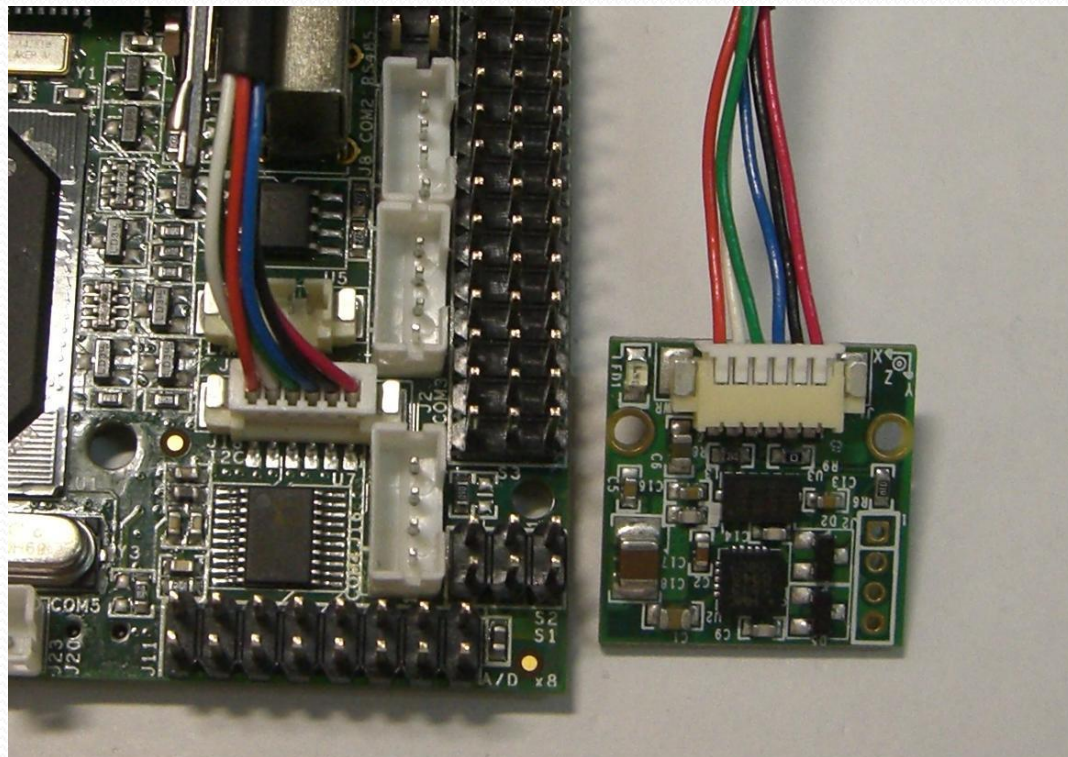
I²C

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



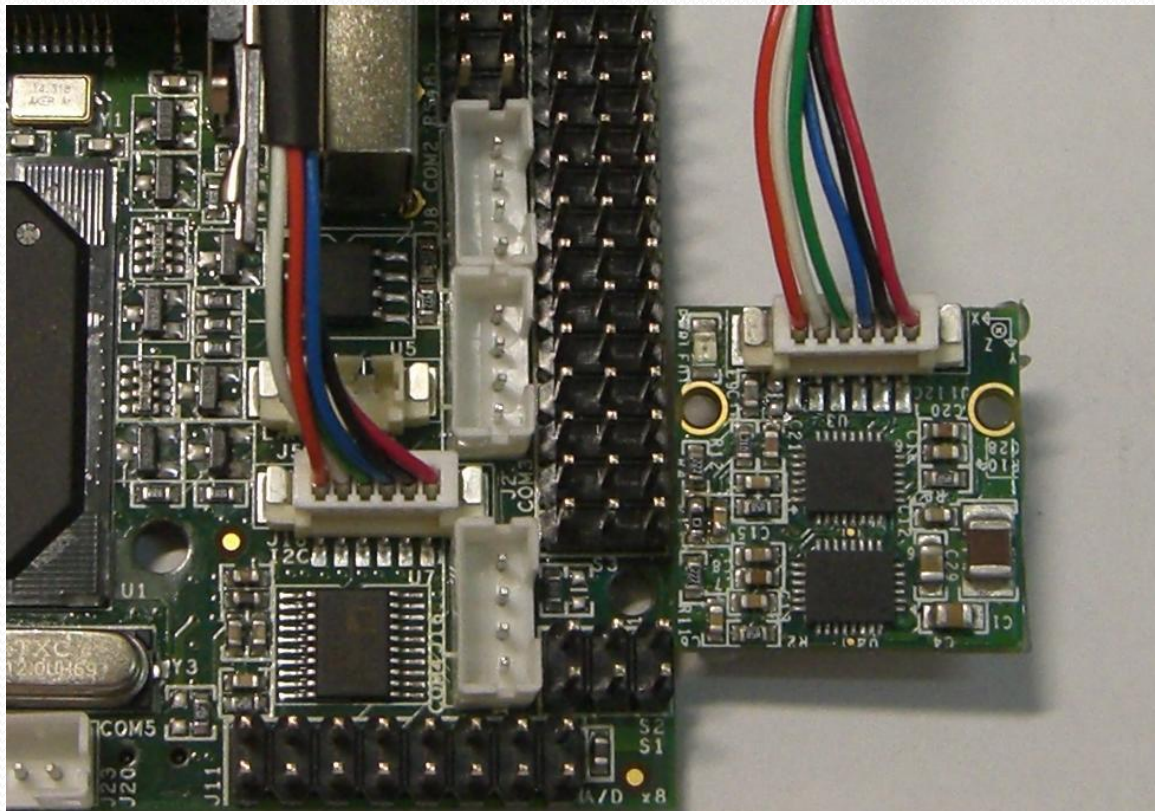
I²C

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



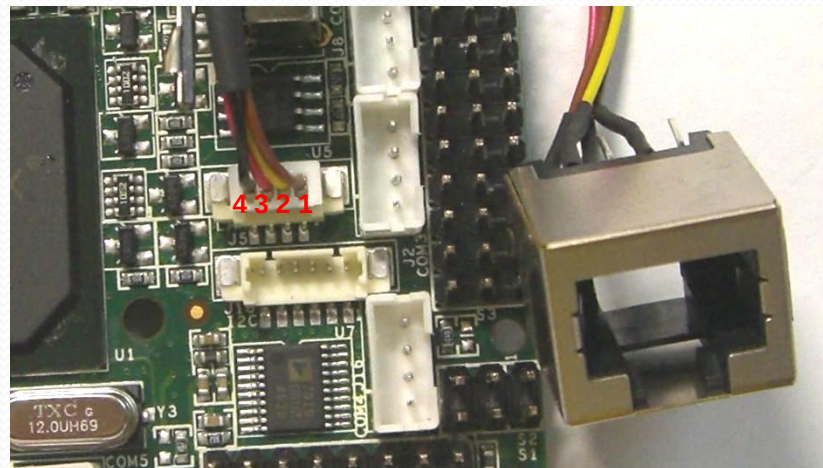
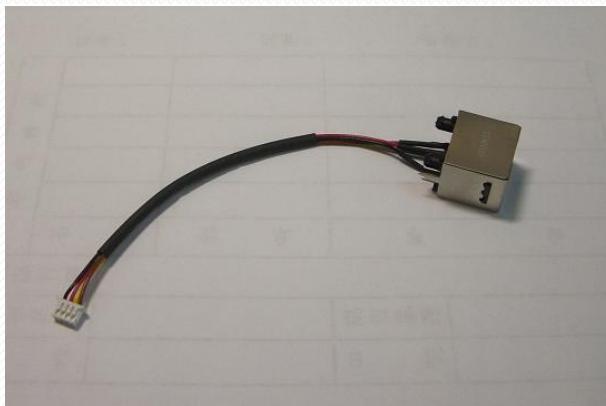
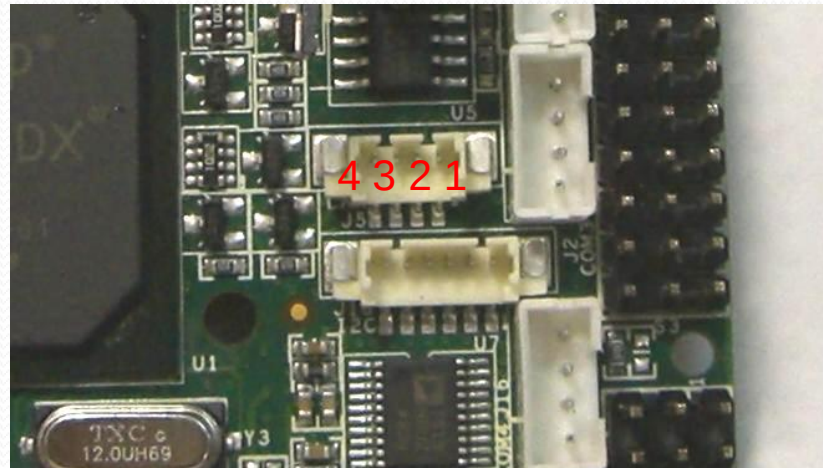
I²C

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



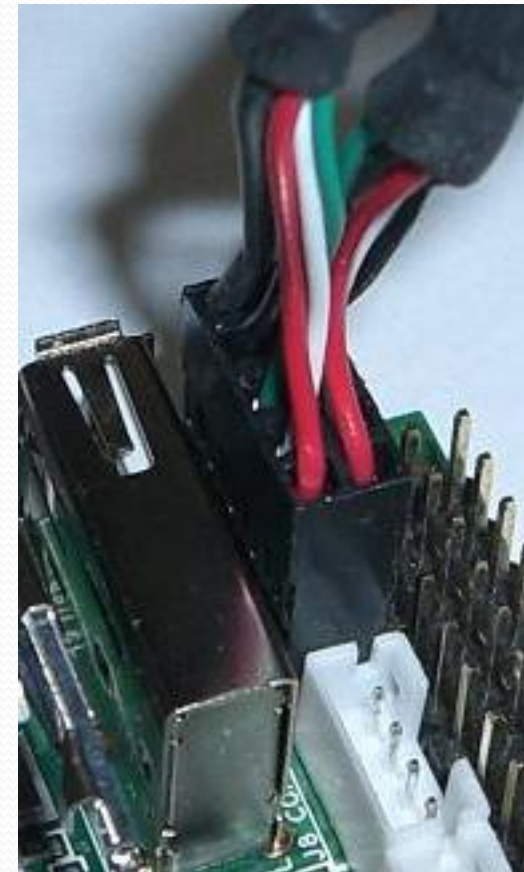
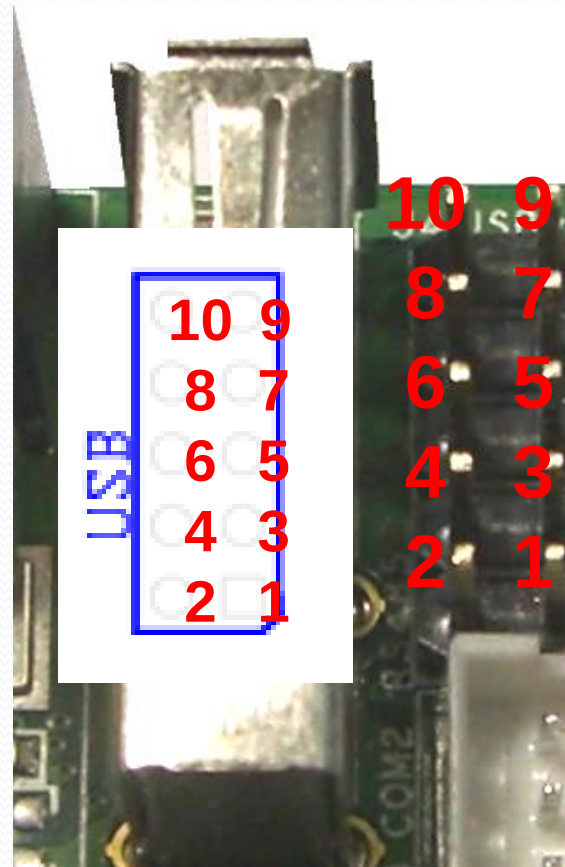
LAN connector

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



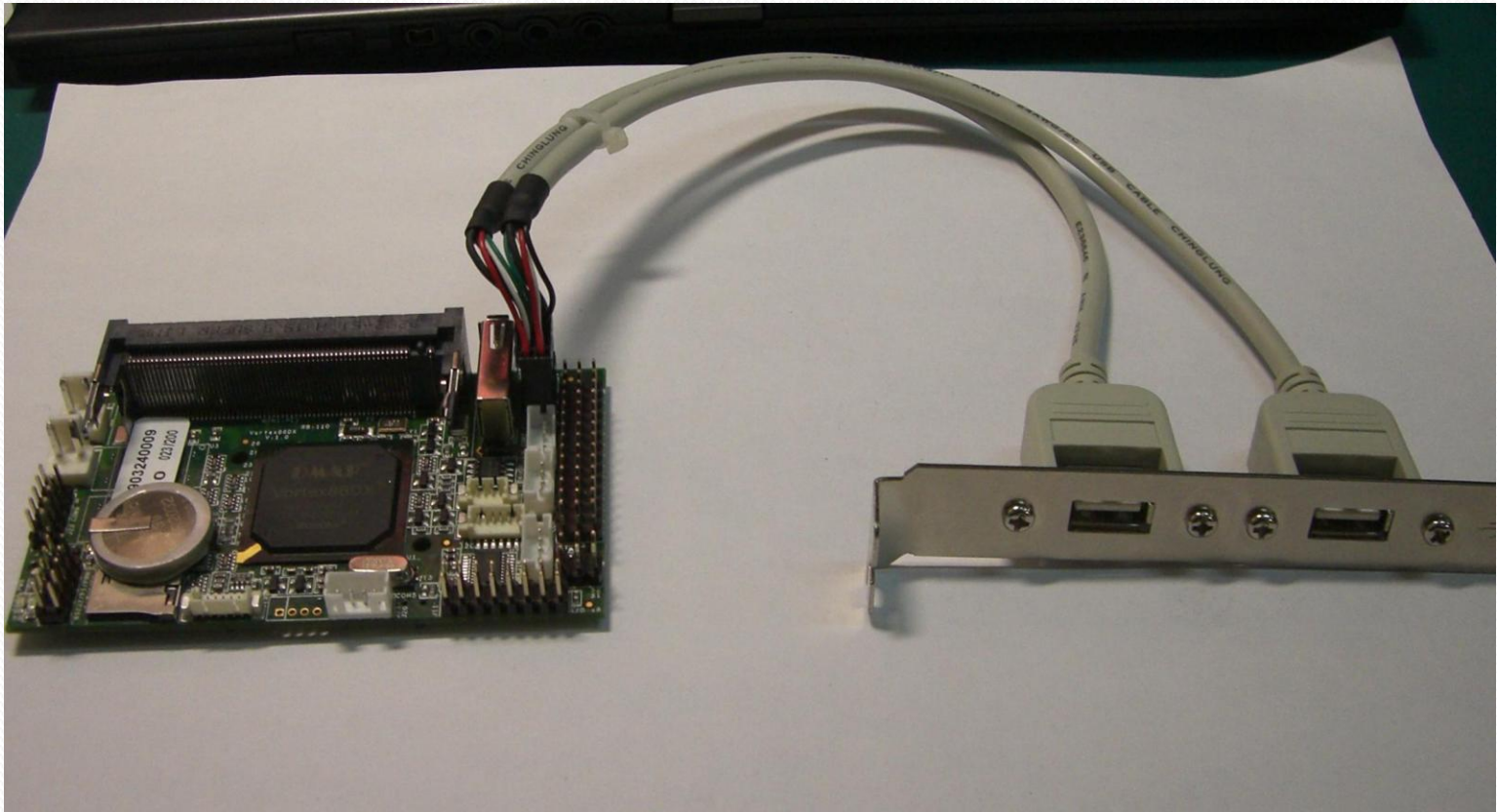
USB

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



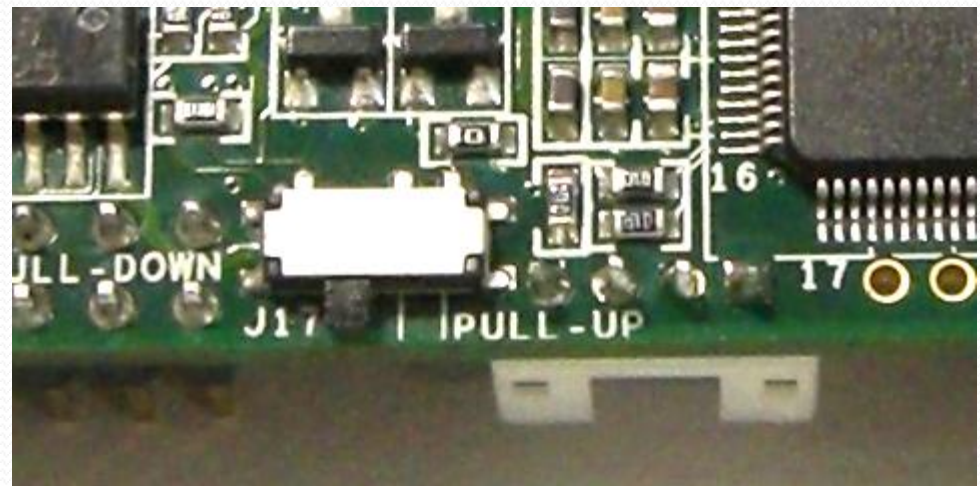
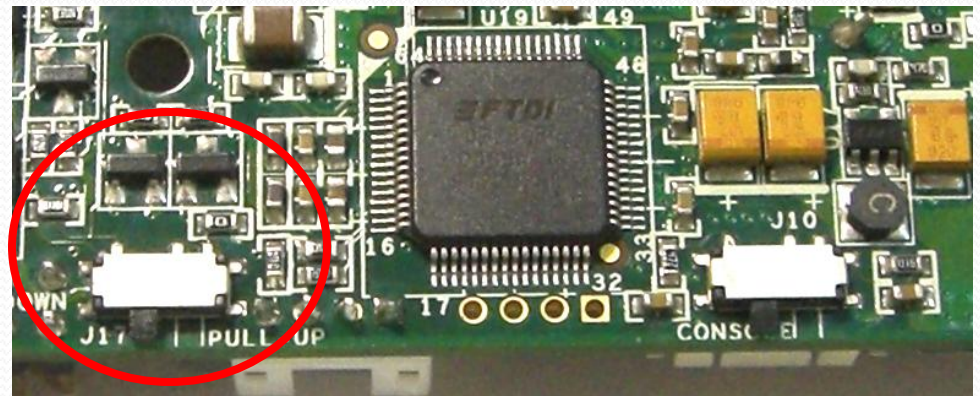
USB

Connection Example



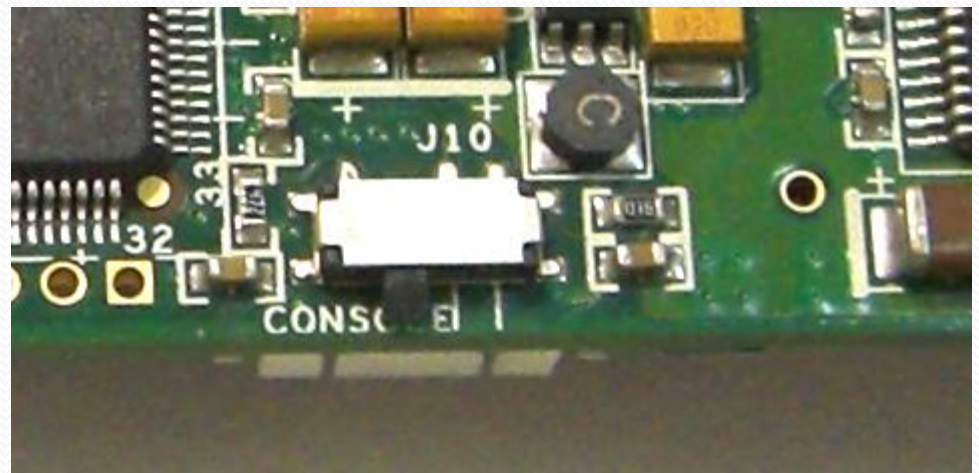
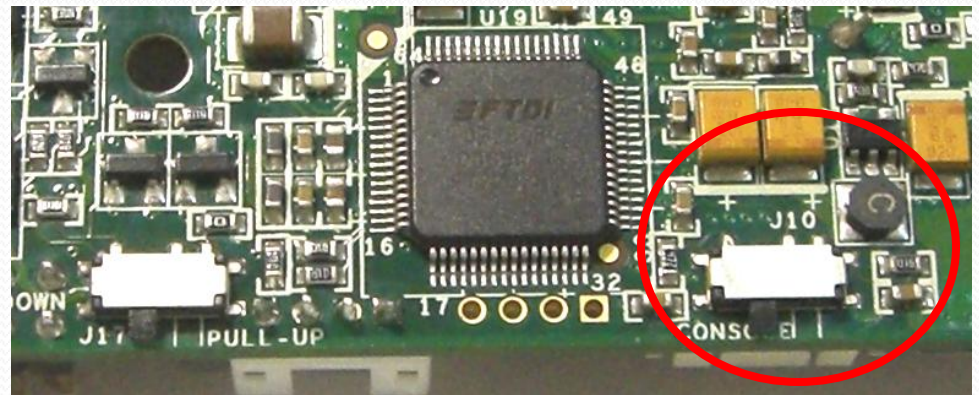
PWM Initial pull up/down switch

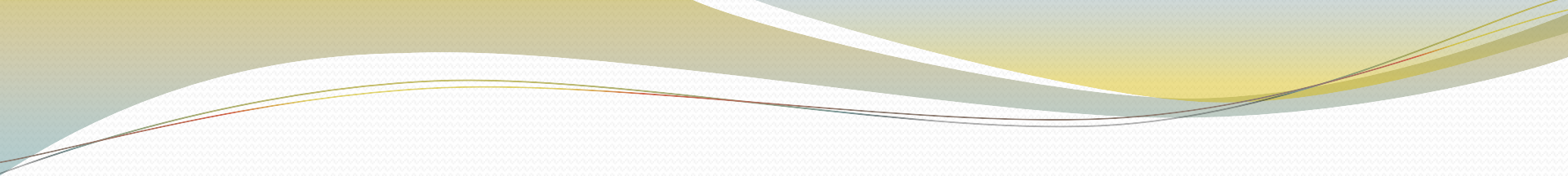
Pin	Signal Name
Left	PWM init Pull Down
Right	PWM init Pull UP



Console Redirection switch

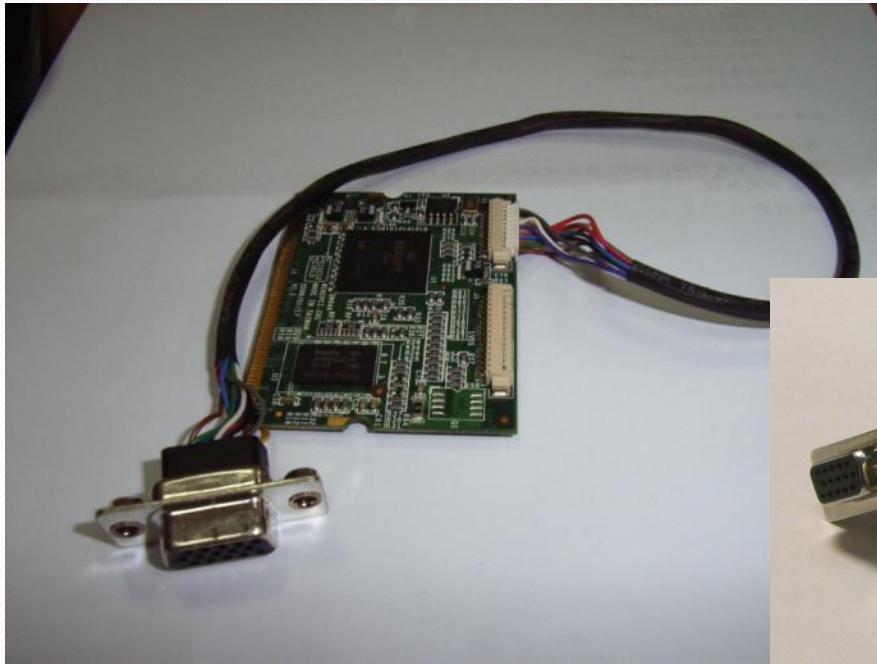
Pin	Signal Name
Left	Console Redirection enable
Right	Console Redirection disable



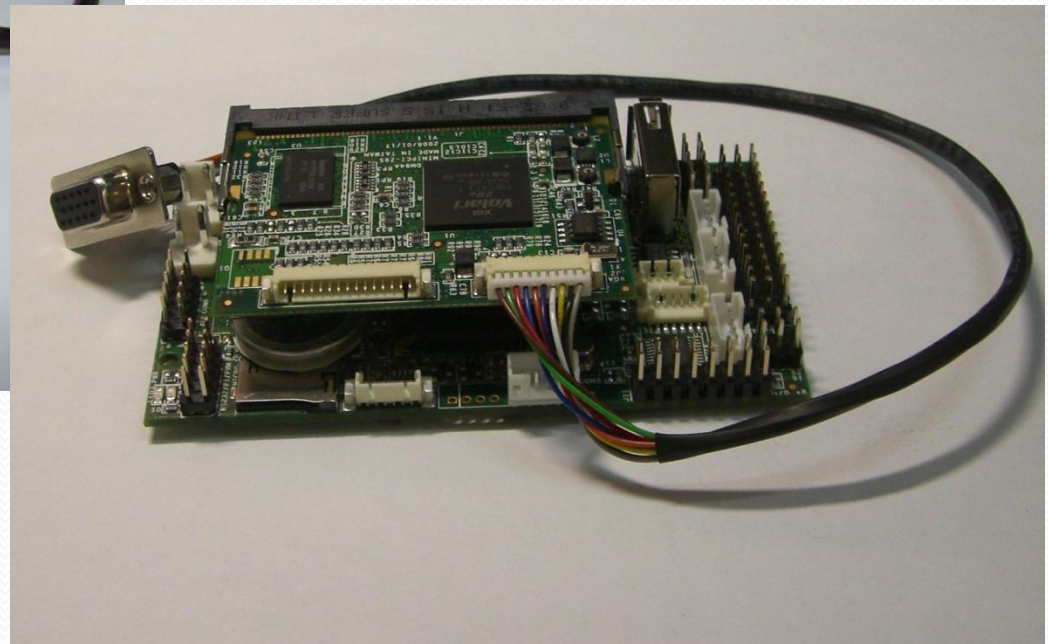


ACCESSORY

Mini VGA Card



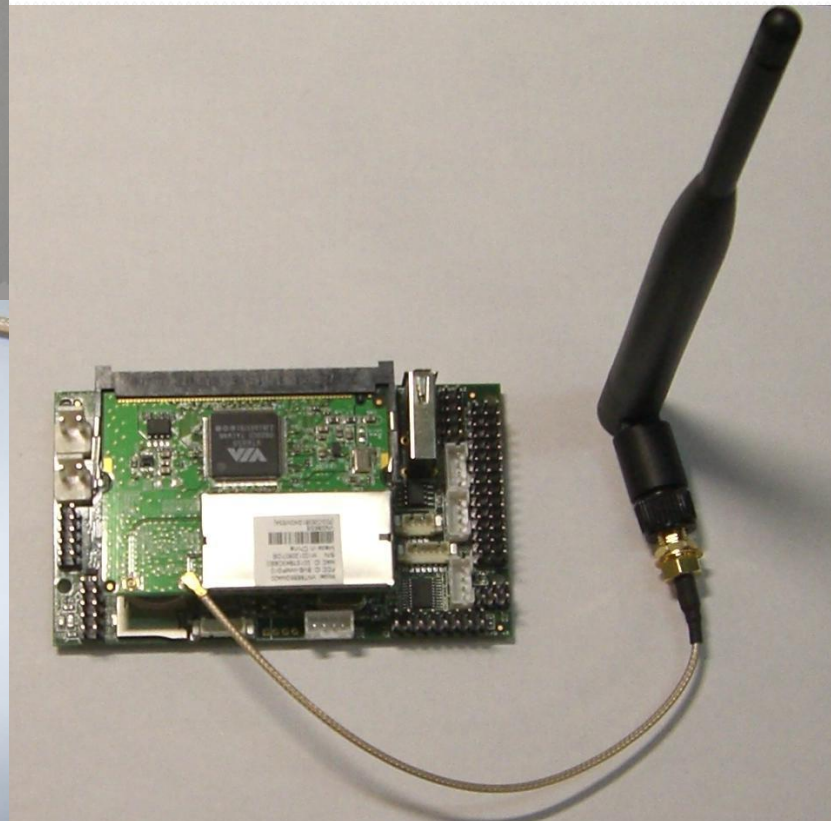
- Volari Z9S VGA Chipset with 32MB DDR2
- Up to 1600 x 1200 @16M Color
- Support Windows 98/2000/XP, Linux



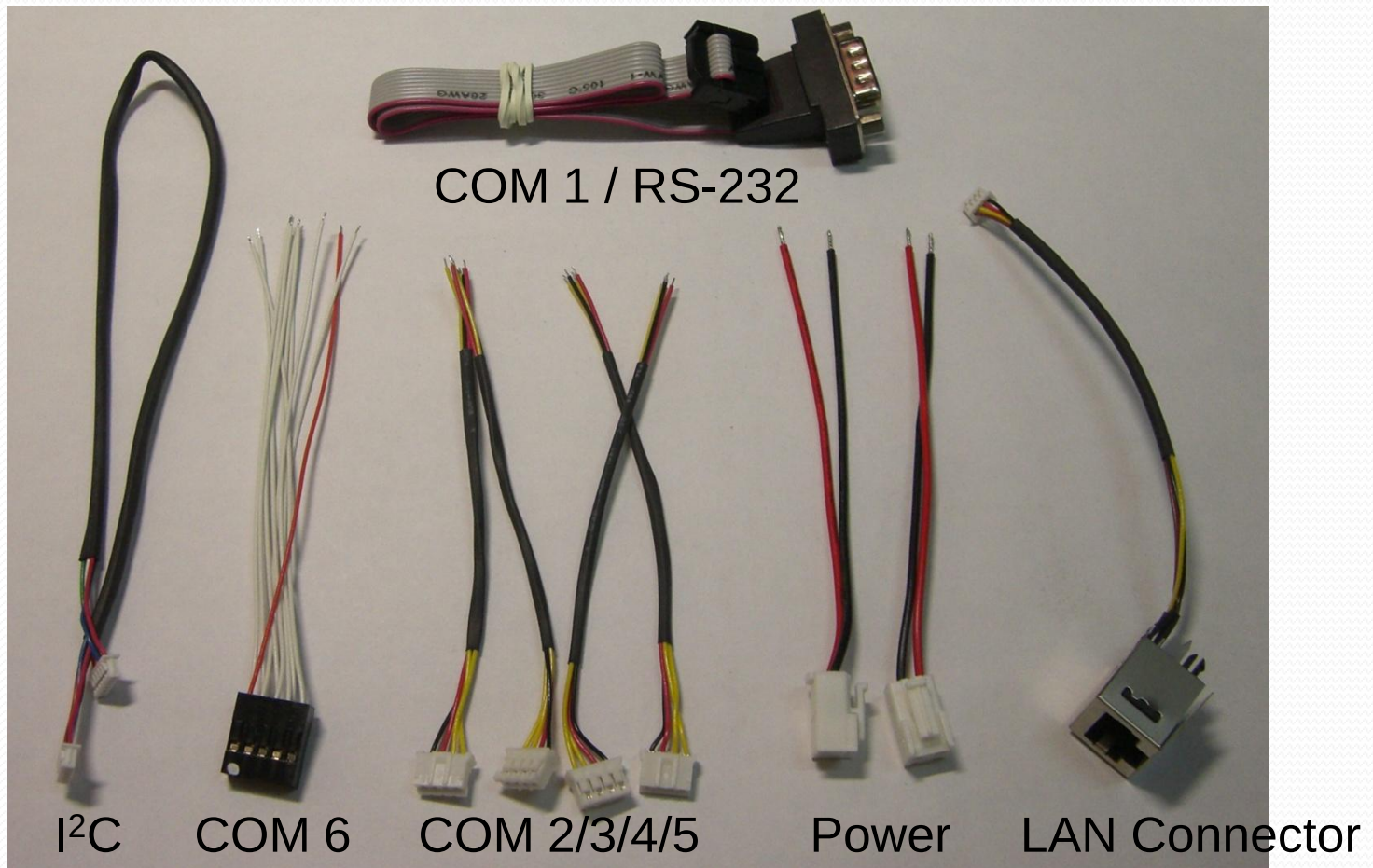
Mini PCI Wireless Card

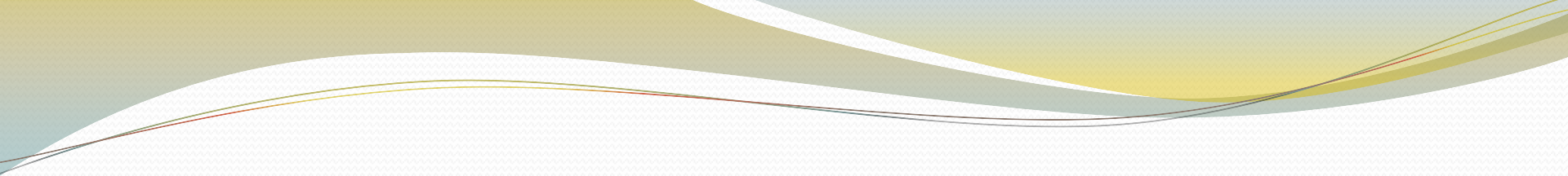


- VIA VT6655 Chipset
- 802.11b/g



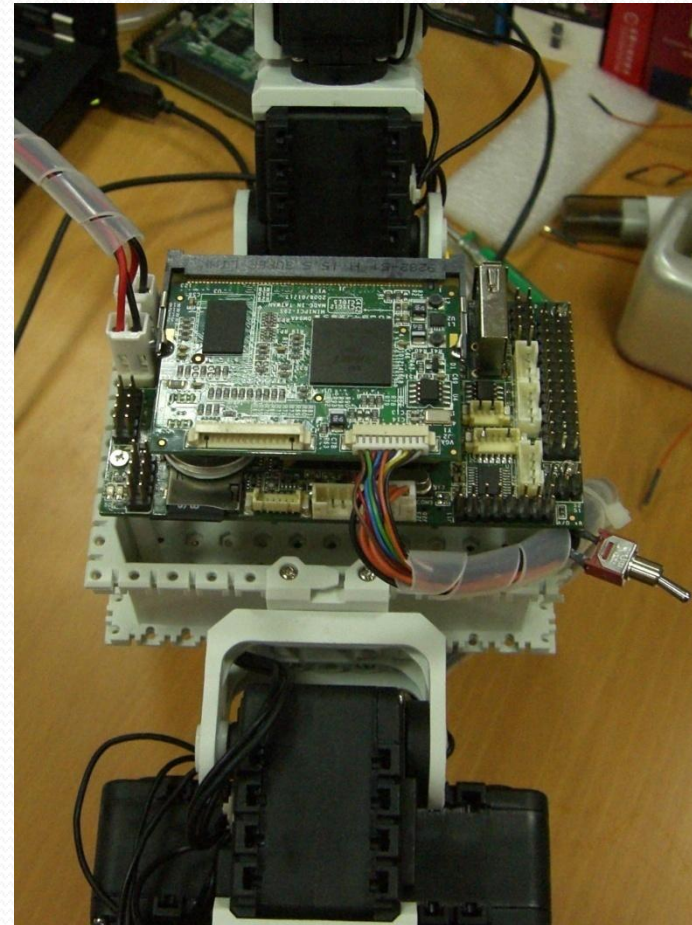
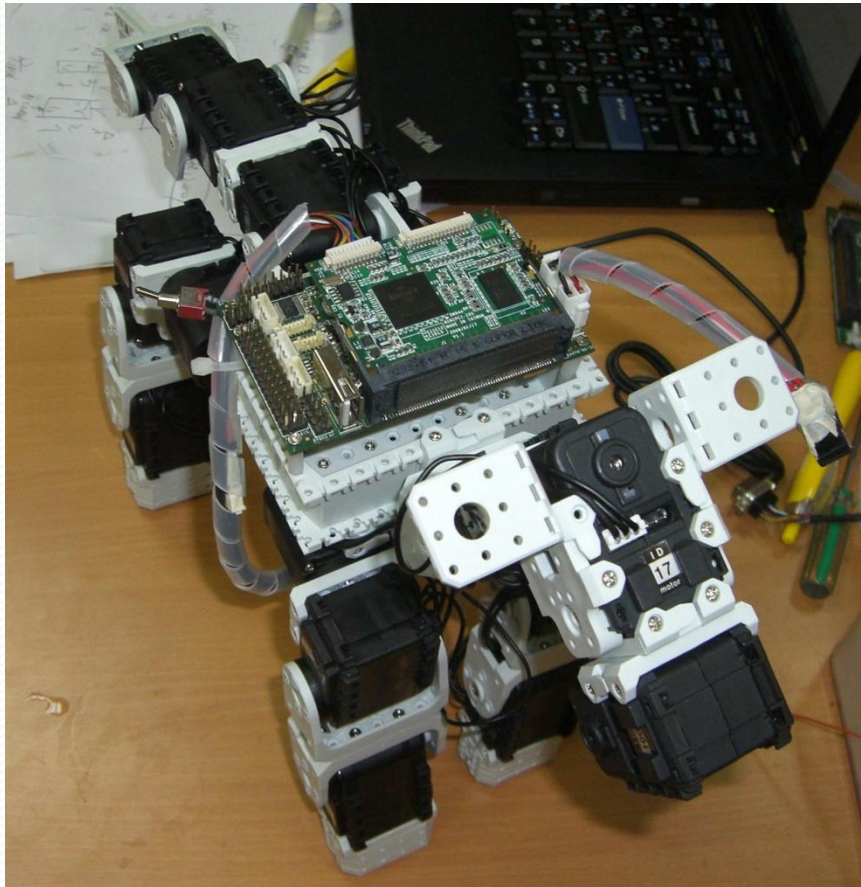
RoBoard RB-110 Cable set

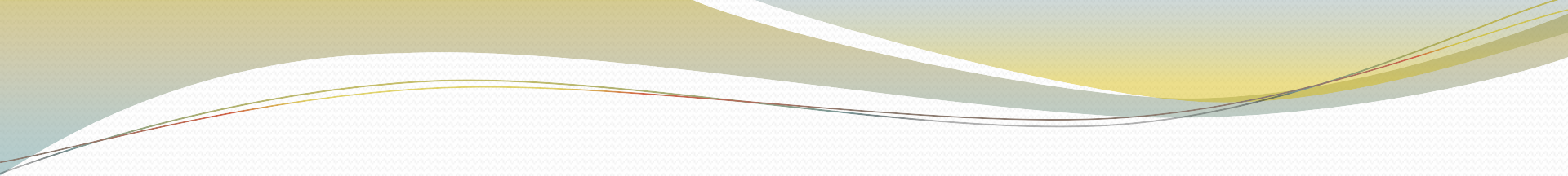




APPLICATION

Use RB-110 to Control Bioloid





The heart of Robotics

THANK YOU

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<http://www.roboard.com>