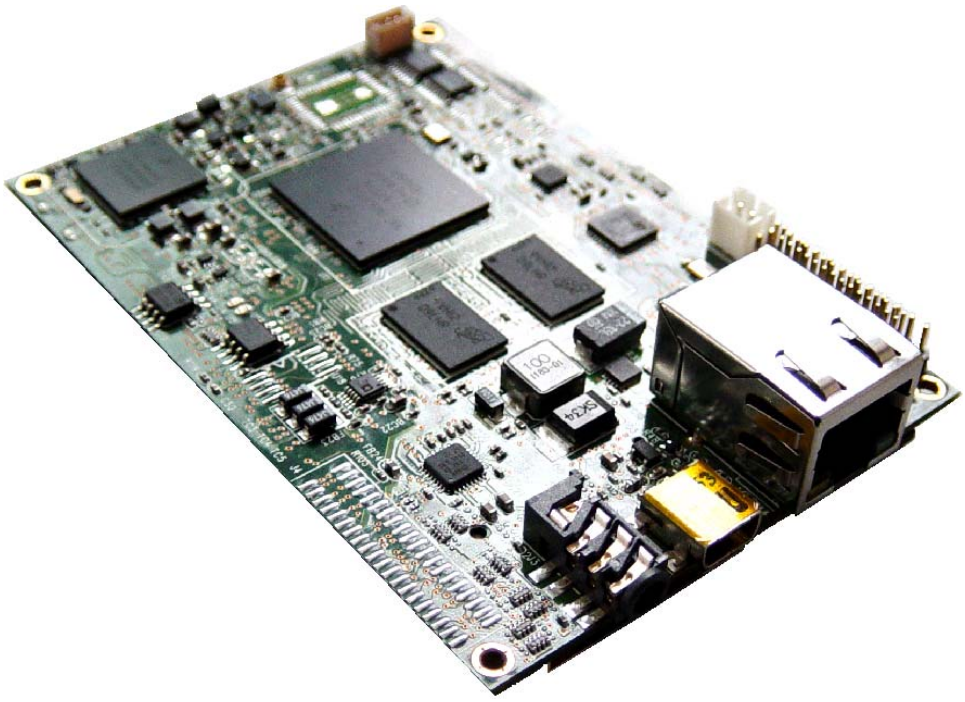
EX-9162M51A

Powerful Single Board

User Manual



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Safety Information

Electrical safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing EX-9162M51A to or from the system, ensure that the power cables for the EX-9162M51A are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a EX-9162M51A.
- Before connecting or removing signal cable from the single board, ensure that all power cables are unplugged.
- Seek professional assistance before using an adapter or extension cord. These EX-9162M51A could interrupt the grounding circuit.
- Make sure that your power supply is set to the correct voltage in your area. If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your retailer.

Operation Safety

- Before installation, please carefully read all the manuals that came with the package.
- Before using the product, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter technical problems with the product, contact a qualified service technician or your retailer.

Caution!

The symbol of the crossed out wheeled bin indicated that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulations for disposal of electric products.

Packing List

Before you begin installing your single board, please make sure the following materials as attached:

- 1 x EX-9162M51A Single Board
- 1 x USB A type (female) to Mini USB A type (male) converter
- 1 x CD with User Manual, Driver, Software Tools
- 1 x Warranty card
- 1 x Earphone Set

If any of the above item is damaged or missed, please contact your retailer.

Revision History

Date	Match	Revised Location	Revision	Author
2010-07-22			First Release	Sara, Hellen, Jason, Janice

CONTENTS

Chapter 1 Product Introduction

1.1 Key Features

EX-9162M51A is designed with Freescale's iMX51 CPU based on powerful ARM Cortex A8™ core.

- Excellent ARM Cortex A8 Multi-Media Platform
- Multiple IO Ports, Easy Extended for various application
- Build in Wireless
- Compact Size for Multiple Application
- Low Power Consumption and Power Management
- Fanless
- WinCE Ready
- API / Lib Provided
- SDK Provided
- Wide Input Voltage
- Low Cost

1.2 Specifications

- **Freescale iMX51 Cortex A8 800MHz CPU**
  Build In Cache: 32KB I-Cache and 32KB D-Cache (L1),256KB cache (L2)
- **DRAM:** DDR-II 256MB SDRAM on board
- **NAND Flash:** 512MB up to 1GB Flash
- **Auto Power Management:** for power saving
- **TV out:** Support composite Video out and Y/C S-Video out
- **LCD:** Dual Display Support, one is 24 bit TFT LCD, the other one is18-bit TFT LCD
  * Optional LVDS or VGA convert boards for different display
- **Touch Panel:** 4 way touch control
- **Ethernet :** 100/10M Ethernet, Support RJ45 connector (UPT)
- **USB 2.0:** USB OTG and USB Host (ULPI)
- **SD:** SD Card socket on board
- **Bus type:** Expansion EIM system bus
- **SPI Port:** CSPI bus for extension board
- **I2C :** I2C Port
- **I2S :** one for extension port, the other one for Bluetooth
- **Audio:** Audio Processor on board
- **Keypad:** 6x4 matrix keyboard
- **COM Port:** RS232 x 2 and one UART
- **CAN:** CAN bus on board
- **GPIO:** 10 bit 3V3 GPIO, 5V tolerance
- **ADC port:** 8 Ch 12-bit Analog to Digital Converter
- **Camera Port:** 2 Ch, up to 8Mpixel @ 15fps, up to 133Mpixel/sec
- **WiFi / Bluetooth, alternatively:** WiFi 802.11 b/g/n, or Bluetooth 2.0/3.0, one Antenna port
- **Power Requirement:** 6.5V ~ 35V power or 5V Supply or Li-Battery Supply
- **Battery Charger :** Build In
- **Dimension:** 94mm x 65mm
- **Operating Temperature:** -20℃ to 70℃ (-4℉ ~ 158℉)

***We also provide daughter board - EX-9162X51AB for more IO extension, for more information, contact our customer service now!**

1.3 Block Diagram

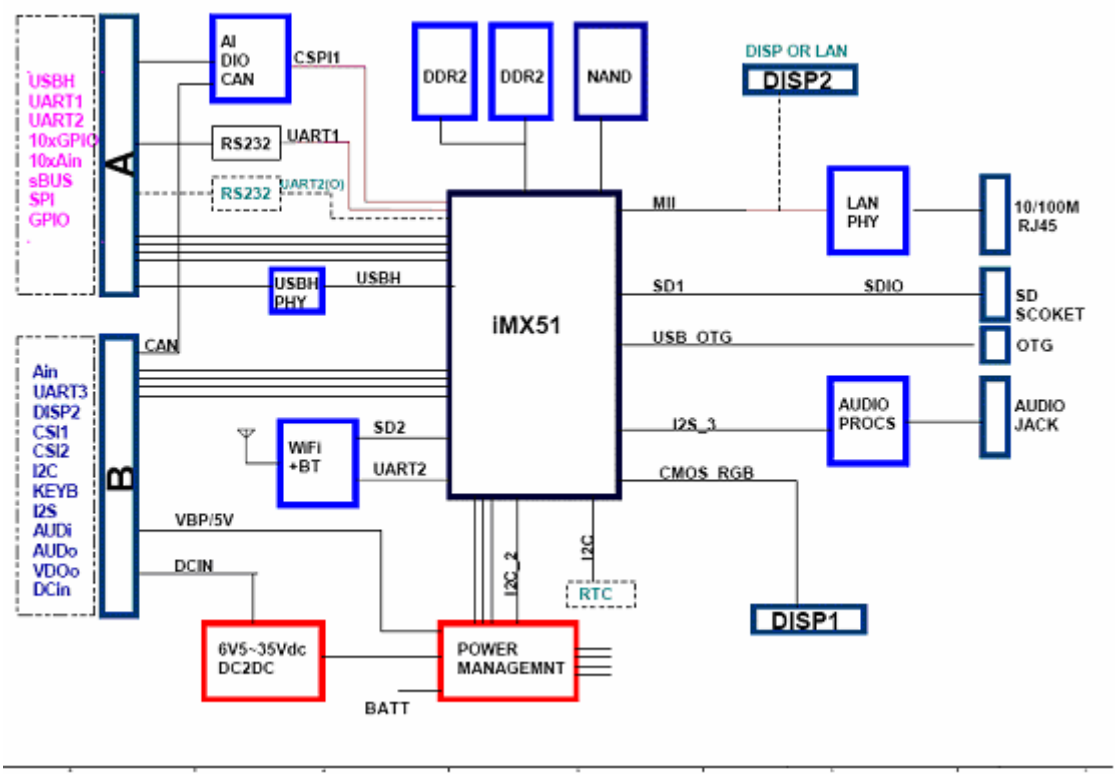


Figure 1-1: EX-9162M51A block diagram

EX-9162M51A is designed based on the new-generation, advanced ARM Cortex-A8 CPU – iMX51. It is characteristic of lower power consumption, as well as powerful multi-media entertainment applications. EX-9162M51A is integrated with necessary functions inside the compact PCB, please refer to the above block diagram.

Port A and Port B are extended ports, 2x42 pins with 1.27mm pin-pitch, placed on both side of PCB bottom layer.

EX-9162M51A provides dual display ports, Display 1 is the default port, 24-bit RGB, CMOS level, for proper TFT LCD panel. There are many display converter boards available for different LCD Panels. The Display port 2 can be set as 2nd display port or LAN port, default Disp2 is used as a LAN function. This is fixed according to your order.

There are multiple power inputs, Wide Range 6.5~35Vdc, 5V direct, or 3.6V Li-battery power supply…etc,

Type of Power Input	When to use
Wide Range	Please use DCIN on Port B, range 6.5Vdc ~ 35Vdc is applied.
Wall adapter	5Vdc +/-5% is applied through Port B.
USB	Use USB Power, 5V input (Without WiFi or Bluetooth Operation)
Battery	3.6Vdc ~ 4.2Vdc Li Battery on VBAT1 port

The total power dissipation of usual operation is around 300~400mA@ 5V only, but the

actual power dissipation depends on how many Hardware Engines are used inside iMX51 CPU.

Basically, power dissipation is auto adjusted by power management chip and CPU. When CPU runs at high speed, CPU loading will be detected and measured, with core voltage goes up a little bit.

1.4 Screw Holes

Please ensure your EX-9162M51A single board in nice condition, no broken parts and placed in the case correctly.

Place four (4) screw holes to fix into your casing, 2.5mm each, indicated in red circles at the figure below. Screws are designed to fix the EX-9162M51A PCB, and increase Ground connection, as well as avoid EMI issue.

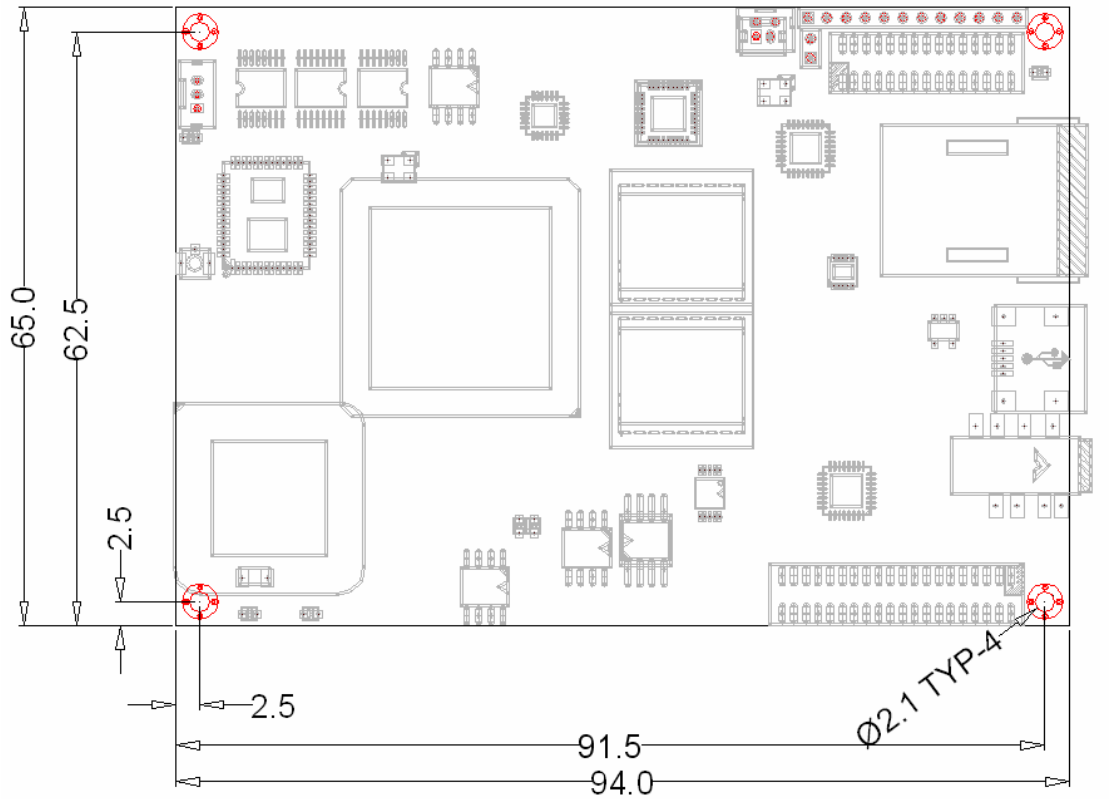


Figure 1-2: EX-9162M51A SBC's Screw Holes

4 screws (red color) be connected to Ground

Do not over fasten the screws and use the right screw driver.

1.5 Board Layout and Dimension

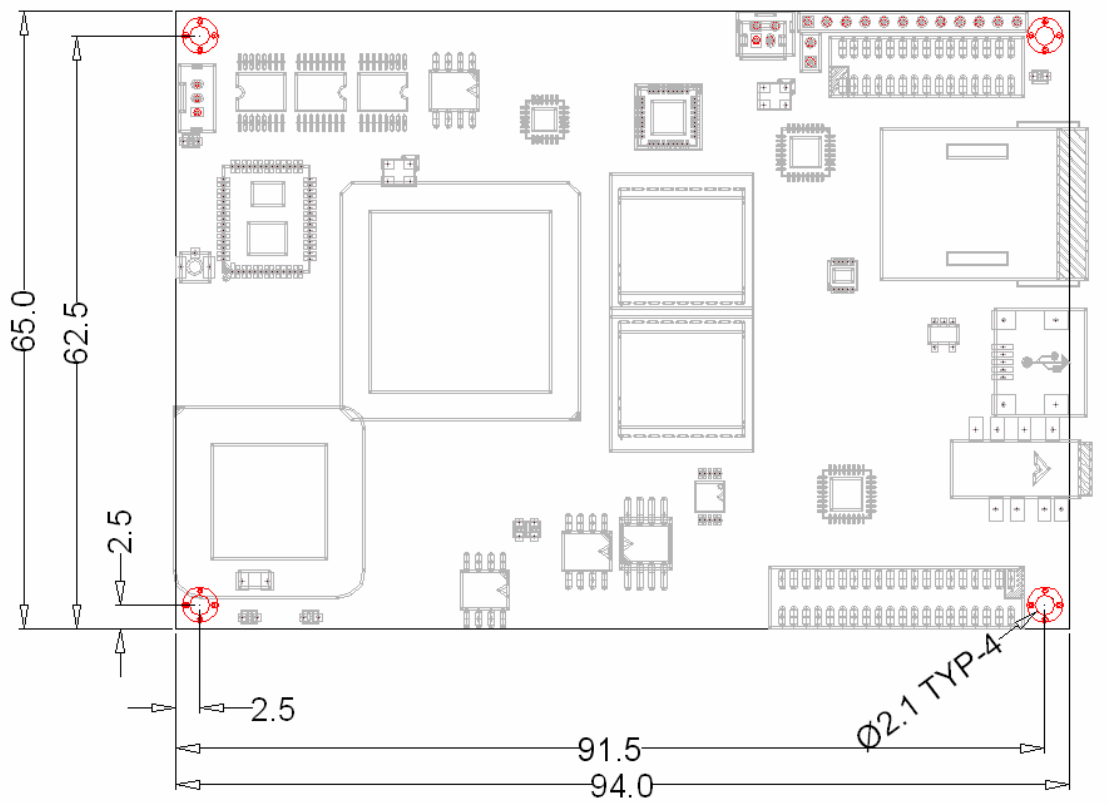


Figure 1-3 EX-9162M51A PCB Dimension and Profile

1.6 Extension Connectors

EX-9162M51A provides 2 extended connectors, Port A (J5) and Port B (J6), for the function of I2C, SPI, GPIO, ADC, UART, USB, S-Video Signals, Key pad, and so on. The function's detailed description will be shown on Chapter 2. Port J7 is display port 1, and J4 is the mirror to J7 pins(left/right reversed) , placed on Top layer. J5,J6 and J7 are used to plug with Carrier Board EX-9162X51AB directly.

1.6.1 Connector Location Diagram

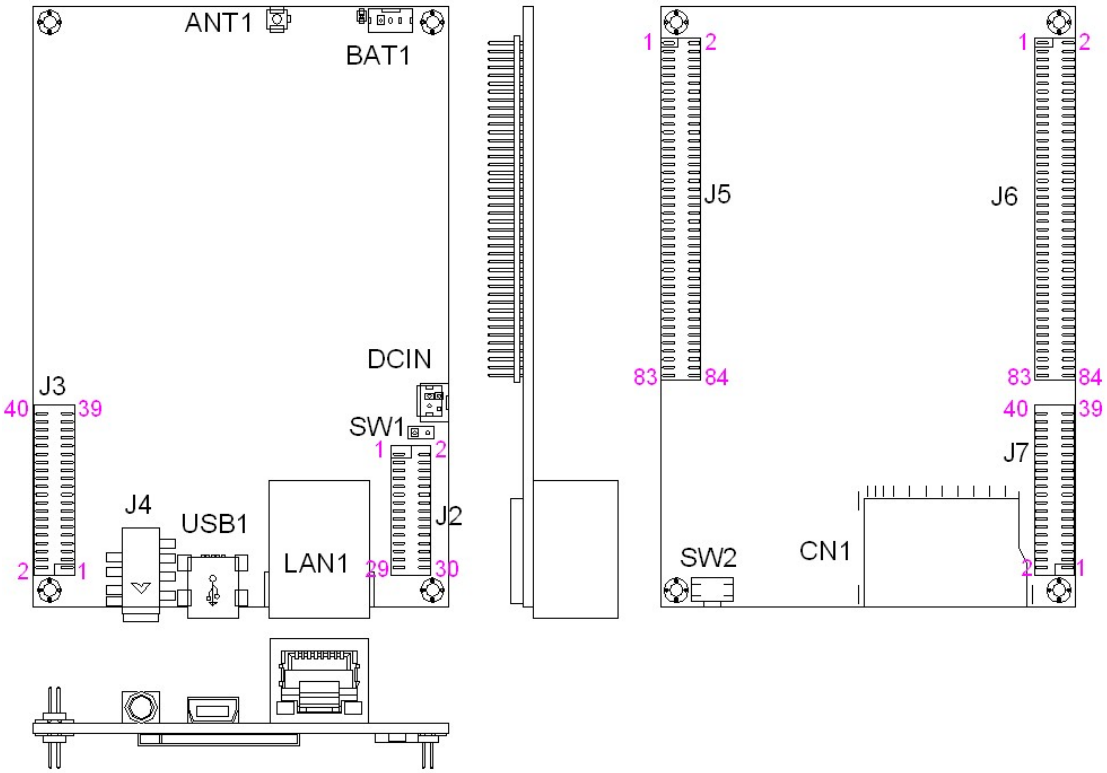


Figure1-4：Connector Location Diagram

1.6.2 Pin Assignment

Table 1-1: Port A(J5)-Extension Pin Description

Pin	Name	Sym	Port Function	Remark
1	USB_HS_DP	I/O	USB Host	USB Host port
2	USB_HS_DM	I/O		
3	5V	PO	5V Power Output	Output from DC2DC
4	GND	GND		
5	RXD1	I	UART1, System Debug port	iMX51 UART port 1
6	TXD1	O		
7	RTS1	I		
8	CTS1	O		
9	RXD2	I	UART2, Optional, provided only when no Bluetooth	iMX51 UART port 2
10	TXD2	O		
11	RTS2	I		
12	CTS2	O		

13	xAi0	Ai	2.5V, 12bit ADC	Analog Input pins
14	xAI1	Ai	2.5V, 12bit ADC	
15	xAI3	Ai	2.5V, 12bit ADC	
16	xAI2	Ai	2.5V, 12bit ADC	
17	xDIO1	I/O	2.7V, In/out, Set by SW, API	GPIO
18	xDIO0	I/O	I2.7V, in/out, Set by SW,API	
19	CSPI1_MOSI	O	2.7V	SPI1
20	CSPI1_MISO	I	2.7V	
21	CSPI1_RDY	X	2.7V	
22	CSPI1_SCLK	O	2.7V	
23	NC			
24	CSPI1_SS1	O		
25	3V3	PO	3.15V, Supply from PMIC	
26	xAI4	Ai	2.5V, 12bit ADC	
27	xAI5	Ai	2.5V, 12bit ADC	
28	xDIO2	I/O	In/out Set by SW,API	
29	xDIO9	I/O	In/out Set by SW,API	
30	xDIO8	I/O	In/out Set by SW,API	
31	xDIO3	I/O	In/out Set by SW,API	
32	xDIO4	I/O	In/out Set by SW,API	
33	xDIO6	I/O	In/out Set by SW,API	
34	xDIO7	I/O	In/out Set by SW,API	
35	xDIO5	I/O	In/out Set by SW,API	
36	GND	GND		
37	OWIRE	I/O	For one wire IO control	
38	NC			
39	3V3	PO	3.15V, Supply from PMIC	
40	GND	GND		
41	EIM_DA5	I/O	Expansion Bus	
42	EIM_DA2	I/O		
43	EIM_DA3	I/O		
44	EIM_DA4	I/O		
45	EIM_DA7	I/O		
46	EIM_DA0	I/O		
47	EIM_DA1	I/O		
48	EIM_DA6	I/O		
49	EIM_DA13	I/O		
50	EIM_DA8	I/O		
51	EIM_DA9	I/O		
52	EIM_DA10	I/O		
53	EIM_DA15	I/O		
54	EIM_DA12	I/O		
55	EIM_DA11	I/O		
56	EIM_DA14	I/O		
57	EIM_A19	I/O	Can be EIM A19-A25 or Extend GPIO, controlled by SW	
58	EIM_A18	I/O		
59	EIM_A17	I/O		
60	EIM_A16	I/O		
61	EIM_A21	I/O		
62	EIM_A22	I/O		
63	EIM_A23	I/O		
64	EIM_A20	I/O		
65	EIM_A25	I/O		
66	EIM_A24	I/O		
67	EIM_BCLK	O	Expansion Bus	
68	EIM_OE	O		
69	EIM_EB1	O		
70	EIM_CSS	O		
71	EIM_LBA	O		
72	EIM_WAIT	I		

73	EIM_RW	O		
74	EIM_EB0	O		
75	EIM_CS1	O		
76	EIM_CS0	O		
77	RESETIO	O	IO Reset Signal, active L	
78	TRCTL_PATA	O	As Extend GPIO, controlled by	
79	GPIO1_8	I/O	GPIO, from iMX51	
80	GPIO1_7	I/O	GPIO, from iMX51	

Table 1-2: Port B (J6) - Extension Pin Description

Pin	Name	Sym	Port Function.	Remark
1	ADCIN	Ai		
2	ADCIN	Ai		
3	RESETIO	O		
4	POR	I		
5	UART3.TXD	O		
6	UART3.RXD	I		
7	SER_DISP2_CS	O	DISP1, 2 for Series LCD	
8	DISPB2_SER_RS	O		
9	DISPB2_SER_DIO	I/O		
10	DISPB2_SER_DIN	I		
16	DISPB2_SER_CLK	O		
11	SER_DISP1_CS	O		
12	DISPB1_SER_RS	O		
13	DISPB1_SER_DIO	I/O		
14	DISPB1_SER_DIN	I		
15	DISPB1_SER_CLK	O		
17	CSI1_D11	I	CAMERA 1 & CAMERA 2	
18	CSI1_D10	I		
19	CSI1_D13	I		
20	CSI1_D12	I		
21	CSI1_D15	I		
22	CSI1_D14	I		
23	CSI1_D17	I		
24	CSI1_D16	I		
25	CSI1_D19	I		
26	CSI1_D18	I		
27	CSI1_PIXCLK	I		
28	CSI1_MCLK	O		
29	CSI1_VSYNC	I		
30	CSI1_HSYNC	I		
31	CSI2_D18	I		
32	CSI2_D15	I		
33	CSI2_D13	I		
34	CSI2_D17	I		
35	CSI2_D12	I		
36	CSI2_D16	I		
37	CSI2_D19	I		
38	CSI2_D14	I		
39	CSI2_HSYNC	I		
40	CSI2_VSYNC	I		
41	GPIO_CAM2_LPM	O		
42	CSI2_PIXCLK	O		
43	I2C1_CLK	O	I2C	
44	I2C1_DAT	I/O		
45	CAM_RESET_B	O	3V	
46	CAM1_LPM	O	3V	
47	KEY_COL0		KeyPad	
48	KEY_COL1			
49	KEY_COL2			
50	KEY_COL3			
51	KEY_COL4			

52	KEY_COL5			
53	KEY_ROW0			
54	KEY_ROW1			
55	KEY_ROW2			
56	KEY_ROW3			
57	1.8V	PO		
58	5V	PO		
59	GND	GND		
60	3V3	PO	3.15V	
61	CAN1-		CAN	
62	CAN1+			
63	AUD4_RXD	I	I2S4, direct input to iMX51	
64	AUD4_TXD	O	Same above	
65	AUD4_TXFS	O	Same above	
66	AUD4_TXC	O	Same above	
67	GND			
68	OWIRE_LINE			
69	AUDIO_AGND	AGND		
70	ON_OFF	I	ON/OFF PMIC	Toggle Switch
71	AUDIO_LOUT_R		Audio Output, R Ch	
72	AUDIO_LIN_R		Audio Input, R Ch	
73	AUDIO_LOUT_L		Audio Output, L Ch	
74	AUDIO_LIN_L		Audio Input, L Ch	
75	VDO_C	Ao	S-Video. Color	
76	VDO_Y	Ao	S-Video, Lumin.	
77	AGND_RGB	AGND	Video GND	
78	Video_out	Ao	Video Composite Signal	
79	VOA	PO	Power Supply, by SW	
80	COIN_CELL_BAT	PI	Coin Cell Battery, Input	
81	GND	GND		
82	DCIN	PI	6.5V~35Vdc Input	
83	WALL_5V_IN	PI	Vin to PMIC	Short with 5V through R97
84	5V	PO	DC2DC output, 5V	Up to 2.5A

Power Supply Notes:

*** When use wide range power input , please short R97 (=0R).**

DC2DC is a wide range DC input and generates 5V.

***If 5Vdc power supply is applied, please connect to WALL_5V_IN directly. (Port B, J6, pin 83)**

***If you will use battery, please apply Li-ion Battery, 3.6V~4.2V. (BAT1 connector)**

EX-9162M51A has Battery Charger built in.

Table 1-3: J4 (Display1) Pin Description

Pin	Name	Sym	Description
1	DISP1_DAT0	O	B0: lsb
2	DISP1_DAT1	O	B1
3	DISP1_DAT2	O	B2
4	DISP1_DAT3	O	B3
5	DISP1_DAT4	O	B4
6	DISP1_DAT5	O	B5
7	DISP1_DAT6	O	B6
8	DISP1_DAT7	O	B7: msb
9	GND	PG	
10	DISP1_DAT8	O	G0: lsb
11	DISP1_DAT9	O	G1
12	DISP1_DAT10	O	G2
13	DISP1_DAT11	O	G3
14	DISP1_DAT12	O	G4
15	DISP1_DAT13	O	G5
16	DISP1_DAT14	O	G6
17	DISP1_DAT15	O	G7: msb
18	GND	PG	
19	DISP1_DAT16	O	R0: lsb
20	DISP1_DAT17	O	R1
21	DISP1_DAT18	O	R2
22	DISP1_DAT19	O	R3
23	DISP1_DAT20	O	R4
24	DISP1_DAT21	O	R5
25	DISP1_DAT22	O	R6
26	DISP1_DAT23	O	R7: msb
27	GND	Ground	
28	3V	PO	LCD power; No supply LCD Backlight
29	3V	PO	LCD power. No supply LCD Backlight
30	HSYNC	O	
31	VSYNC	O	
32	DRDY	O	DE signal for LCD
33	PCLK	O	
34	CONTRAST	O	H: turn on LCD backlight; L: off
35	LED-		LED negative
36	LED+		LED positive
37	TScreen_LEFT	I/O	Touch Screen
38	TScreen_BOTTOM	I/O	
39	TScreen_RIGHT	I/O	
40	TScreen_TOP	I/O	

Table 1-4: J2 (Display2) Pin Description

Pin	Name	Sym	Description
1	GND		
2	DISP2_DAT0/ETH_RDATA3		
3	DISP2_DAT1		
4	DISP2_DAT2/ETH_RX_ER		
5	DISP2_DAT3		
6	DISP2_DAT4		
7	DISP2_DAT5		
8	DISP2_DAT6/ETH_TDATA1		
9	DISP2_DAT7/ETH_TDATA2		
10	DISP2_DAT8/ETH_TDATA3		
11	DISP2_DAT9/ETH_TX_EN		
12	DISP2_DAT10/ETH_COL		
13	DISP2_DAT11/ETH_RX_CLK		
14	DISP2_DAT12/ETH_RX_DV		
15	DISP2_DAT13/ETH_TX_CLK		
16	DISP2_DAT14/ETH_RDATA0		
17	DISP2_DAT15/ETH_TDATA0		
18	DISP2_DAT16		
19	DISP2_DAT17		
20	GND		
21	ETH_RDATA2		
22	ETH_MDC		
23	ETH_MDIO		
24	ETH_CRS		
25	ETH_RDATA1		
26			
27	3V		
28	GND		
29	LANintr		
30	ETH_RESET_B		

1.7 Power Distribution

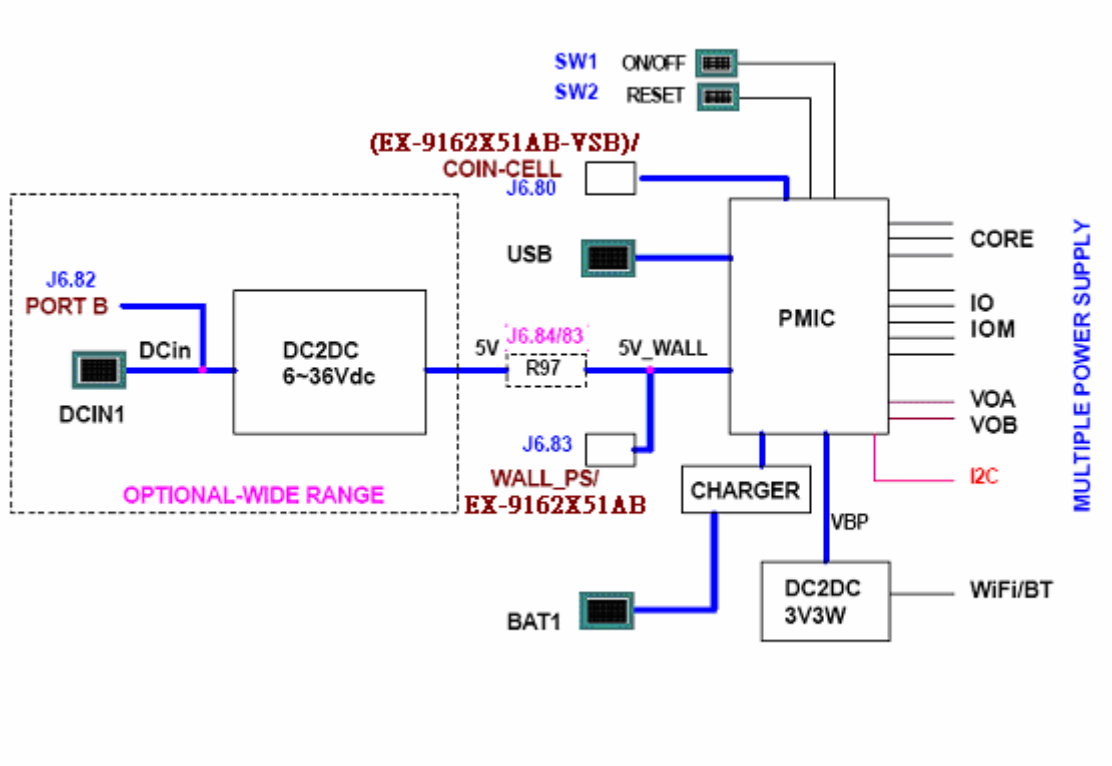


Figure 1-5: Block Diagram of Power Distribution

PMIC: This is the main power management IC, supplying multi-channel power to the entire board. It supplies CPU core voltages and fine tune its voltage dynamically according to CPU performance and loading. PMIC can accept many power inputs, such as USB, 5V_Wall adapter and Li-ion Battery. These Power inputs are input directly to PMIC. 5V_Wall isn't dedicated to connector, you could use it at Port_B (J6) pin 83 USB and Battery have dedicated IO connector, named USB1 and BAT1. USB1 is located at the front board edge, while BAT1 is placed at rear board edge.
If user has 5V DC power supply, connect to J6/Pin83 and supply entire board. When you have another voltage, Wide Range DC to DC circuit is needed.

6.5V~35V Wide Range DC to DC converter: Wide range Power Input provides 6Vdc to 35Vdc, that is an optional function for some application. Also you could input the power directly onto DCIN1 connector. For easy extension on Board to Board connection, you could use J6/pin82. This module outputs 5Vdc. This 5Vdc could supply voltage to 5V_wall through R97 0R, that is a default connecting part.

BAT1: This is a connector for 3.6V Li-Ion Battery, 3-pin, extra pin for thermal sensor of Li-Battery. NC (no connection) on no use. Battery capacity depends on user's application. You may or may not connect a Li Battery to BAT1 connector. Usually the battery is 1600mA/hr Li-Ion.

USB Power Supply: Usually, USB could supply 100mA/500mA @5V, from PC host to devices, PC could supply EX-9162M51A 5V power supply through USB, only when WiFi /

Bluetooth is absent.

1.7.1 Power Consumption

Mode	Total Power
Run	350mA@5V
User Idle	NA
System Idle	NA
Suspend	NA
Power Off	NA

Run Mode: It is the normal/functional operating mode. At this mode, the CPU ARM runs in its normal operational mode. It needs more power current, when you turn on hardware engines of iMX51 CPU as H264 codec engine … etc.

Stop Mode: In this mode, all system clocks are stopped. PLLs are stopped. Power gating can be done on ARM platform, IPU,VPU and EMI. Synchronization of the CKIL clock is bypassed.

Chapter 2 Function Description

The following API list could be used for EX-9162M51A and EX-9162N51AB. EX-9162N51AB is the incorporation of the CPU board EX-9162M51A and its IO carrier board EX-9162X51AB. EX-9162X51AB expands many useful IO functions for EX-9162M51A. Some API modules are implemented only when EX-9162X51AB is available.
Detailed information about EX-9162X51AB, please refer to EX-9162X51AB User Manual.

2.1 API Function List

Table 2-1: API Function List

Function	EX-9162M51A	EX-9162N51AB
Power Management	Y	Y
Inner Adj. Voltages	Y	N
Battery	Y	Y
RTC	Y	Y
LCD display	Y	Y
Touch screen	Y	Y
Audio	Y	Y
Audio MUX	N	Y
Video	N	Y
SD/MMC	Y	Y
Keyboard	Y	Y
USB OTG	Y	Y
LAN	Y	Y
WiFi	Y	Y
Bluetooth	Y	Y
Serial Port	Y	Y
6 COM PORTS	N	Y
GPIO	Y	Y
ADC	Y	Y
SPI Interface	Y	Y
I2C Interface	Y	Y
CAN Bus	Y	Y
SRAM	N	Y
433/866/915 RF	N	Y
GPS	N	Y
3G Module	N	Y
GSM&GPRS	N	Y

2.2 Power Management

This section describes the programmable power supply APIs for EX-9162M51A.

2.2.1 Overview

EX-9162M51A provides two kinds of adjustable power supply for external application, VOA and VOB, whose voltage can be programmable within a limited range. VOA can supply 4-step voltage under 150mA capacity; VOB supply 2-step voltages under 50mA.

2.2.2 API Function Call

Interface	
1	BOOL SetVoltage(REGULATOR_VREG regulator,REGULATOR_VREG_VOLTAGE voltage)
2	BOOLGetVoltage(REGULATOR_VREG regulator,REGULATOR_VREG_VOLTAGE* voltage)

2.2.3 API Function Description

1. CEX-9162M51ACtl::SetVoltage

Set outside for the voltage

BOOL SetVoltage(REGULATOR_VREG regulator,REGULATOR_VREG_VOLTAGE voltage)

Parameters

REGULATOR_VREG

[in]Specified pin.

VOA_VREG

VOB_VREG

REGULATOR_VREG_VOLTAGE

[in]Designated VOA, VOB side were outside the range of values for the voltage,

VOA: VOA_2_30V

VOA_2_50V

VOA_2_775V

VOA_3_000V

VOB: VOB_1_80V

VOB_2_90V

Return value

Set successful return true, else false.

2. CEX-9162M51ACtl::GetVoltage

Get the current value of foreign supply voltage.

BOOL GetVoltage(REGULATOR_VREG regulator,REGULATOR_VREG_VOLTAGE* voltage)

Parameters

REGULATOR_VREG

[in]Specified pin.

VOA_VREG
VOB_VREG
REGULATOR_VREG_VOLTAGE
[out]Designated VOA, VOB side were outside the range of values for the voltage,
VOA: VOA_2_30V
VOA_2_50V
VOA_2_775V
VOA_3_000V
VOB: VOB_1_80V
VOB_2_90V

Return value

Returns true for success, else false.

2.2.4 Application Example

VOA voltage value is set to 2.5V, the code is as follows:

```
REGULATOR_VREG                  nPort;
REGULATOR_VREG_VOLTAGE          nVol;
nPort = VOA_VREG;
nVol.voa = VOA_2_50V;
m_pDvcBase->SetVoltage(nPort, nVol);
```

For VOA, on the voltage value, the code is as follows:

```
m_pDvcBase->GetVoltage(nPort,&nVol);
```

2.3 Battery Function

2.3.1 Battery Management

--EX-9162M51A supports Battery. Please use Li-ion Battery, 3.6V~4.2V
--EX-9162M51A has Battery Charger inside.

2.3.2 Connector

BAT1 is a 3-pin connector with housing, for external battery input.

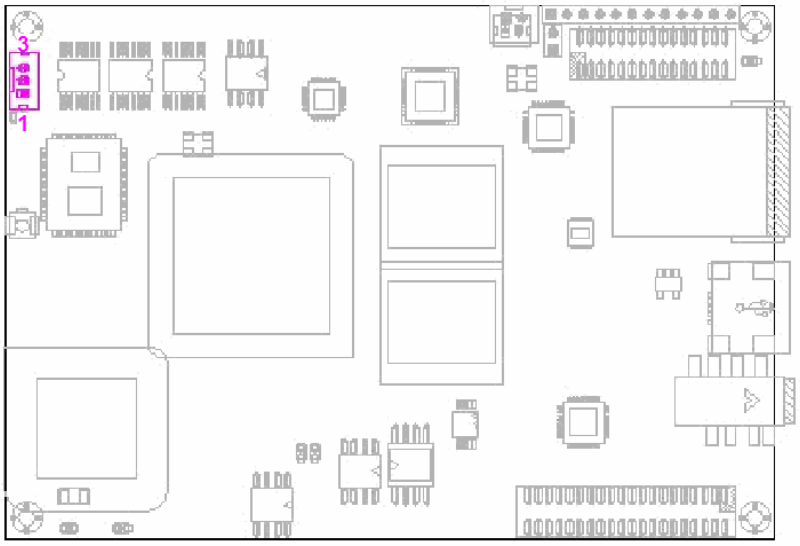


Figure 2-1: Battery Connector

Pin1 is the positive terminal of the battery, the current sensing point. The supply voltage of the battery is sensed through an ADC. The current of battery can be read back via the ADC by monitoring the voltage drop over the sensing resistor.
Pin2 is battery ground.
Pin3 is used to read out the battery pack thermistor. A resistor divider network should assure the resulting voltage within the ADC input range, in particular when the thermistor's inspection function is being used.

1. Make sure the positive(pin1) and negative pole(pin2) on the right position, not on the contrary.
2. After a long time of use, please check the voltage of the battery. When the voltage is too low, please replace the battery!

2.3.3 Charging LED indicator

The driver at CHRGLED serves as the trickle (sign of life) LED and will be activated when standalone charging is started, and will also remain on when the device is powered on, until the charger is programmed by SPI.

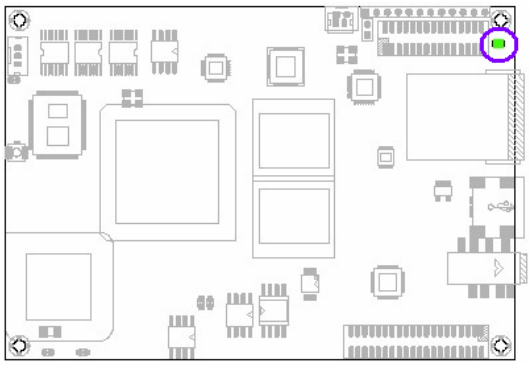


Figure 2-2: Charging LED Indicator

2.3.4 Charging interface

The charger supports charging from a wall charger or from a USB host.

The charger interface provides linear operation via an integrated DAC at programmable current levels. It incorporates a standalone trickle charge mode, in case of a dead battery with dual LED indicator driver. Over-voltage, short-circuit, and under-voltage detectors are included as well as charger detection and removal.

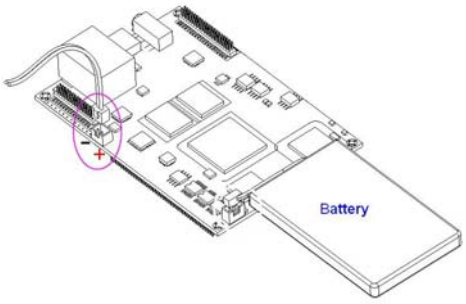


Figure 2-3: Wall Charger Interface

The charger includes the necessary circuitry to allow for USB charging. The battery management system also provides a battery presence detector, and a converter from A to D that serves for measuring the charge current, battery and other supply voltages, as well as for measuring the battery thermistor and die temperature. Finally, a system is included for monitoring the current drawn from, or charged into the main battery for support of a Coulomb Counter function.

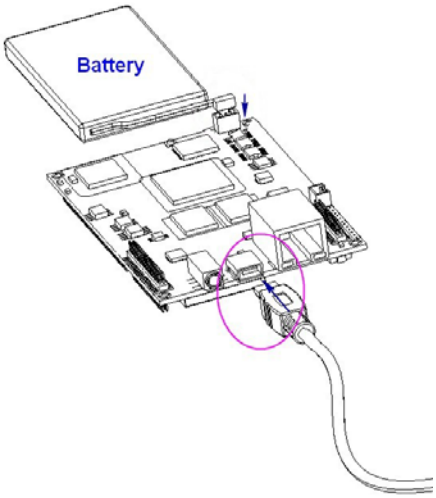


Figure 2-4: USB Charging Interface

2.4 Audio Function

Audio Function is separated into two portion, one is EX-9162M51A's audio processor, the other one is EX-9162X51AB's audio multiplexer. The following audio processor is welded onto EX-9162M51A. The Low Power Stereo Codec with Headphone Amp is designed for portable products needing line-in, mic-in, line-out, headphone-out, and digital I/O. It is able to achieve ultra low power with very high performance and functionality. Capless headphone design and an internal PLL help cost down the whole system.

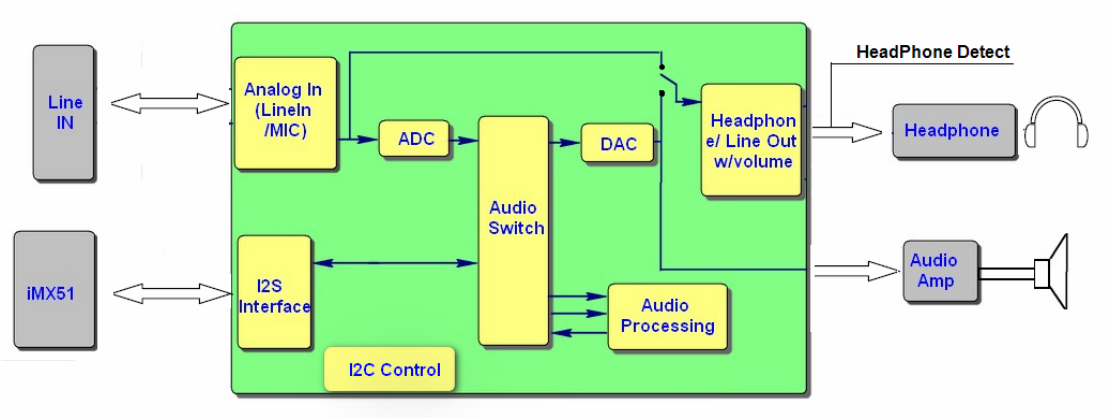


Figure 2-5: EX-9162M51A's Audio Block Diagram

2.4.1 Audio Connector

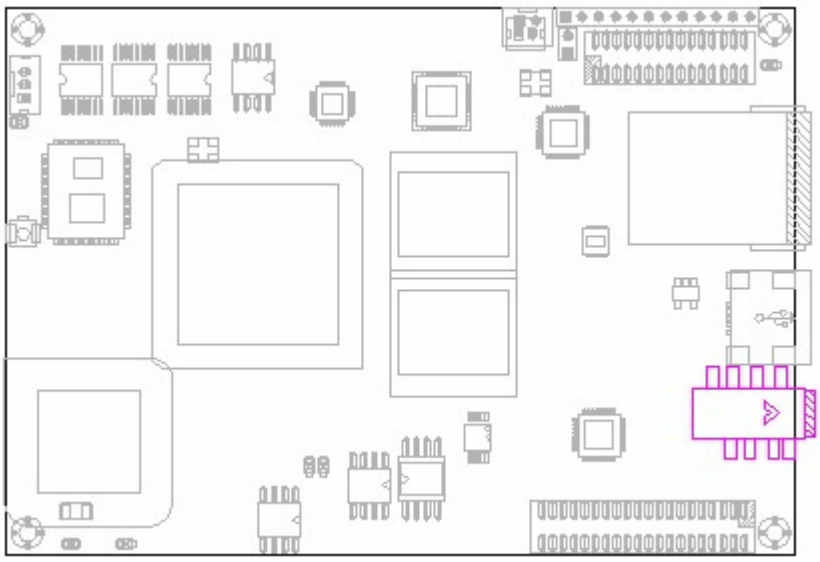


Figure 2-6: EX-9162M51A Audio Connector

2.4.2 Audio APIs for EX-9162N51AB

2.4.2.1 Audio Multiplexer Overview

There are Audio Input Multiplexer and Output Multiplexer circuit in the EX-9162N51AB single board. Audio Input Multiplexer supports 4-channel audio line input, inner Microphone and 3G/GSM audio path. And audio output multiplexer has two input paths from EX-9162M51A audio output and 3G/GSM voice output. 3G/GSM has only one single audio channel.

4-channel external audio Line input, and internal audio channels are designed for system debug port, GPS port …etc. Totally six ways of Audio input channel provide switching, including the system, GSM, Line1 \ Line2 \ Line3 \ Line4; Two-way output channel, including systems, GSM, and volume control.

2.4.2.2 API Function

Interface	
1	BOOL SetAudioIn(int channelIn)
2	BOOL SetSpeakerCh(int channelOut)
3	BOOL SetAudioVolume(int nLVol,int nRVol)
4	BOOL GetAudioVolume(int& nLVol,int& nRVol)

2.4.2.3 Audio API Description

1. CEX-9162M51ACtl::SetAudioIn

Set six input channels.

BOOL SetAudioIn(int channelIn)

Parameters

channelIn

[in] Specified channel number.

0: system

1: Line1

2: Line2

3: Line3

4: Line4

5: GSM

Return value

Set successful return true, else false.

2. CEX-9162M51ACtl::SetSpeakerCh

Set output channel.

Usually select the input channel for the system, Line1 \ Line2 \ Line3 \ Line4, the output channel is set to the system, only when you select GSM as the input channels are required to set the output channel for the GSM

BOOL SetSpeakerCh(int channelOut)

Parameters

channelOut

[in] Specified channel number.

0: system

1: GSM

Return value

Set successful return true, else false.

3. CEX-9162M51ACtl::SetAudioVolume

Set the output volume.

BOOL SetAudioVolume(int nLVol,int nRVol)

Parameters

nLVol

[in] Specify the value of the output volume of the left channel, in the 0-31 range.

nRVol

[in] Specify the value of the output volume of the right channel, in the 0-31 range.

Return value

Set successful return true, else false

4. CEX-9162M51ACtl::GetAudioVolume

Get the output volume.

BOOL GetAudioVolume(int& nLVol,int& nRVol)

Parameters

nLVol

[out]The volume of the left channel value, the range of 0-31

nRVol

[out] Right channel volume value, the range of 0-31 range.

Return value

Get successful return true, else false

2.4.2.4 An Example to Call APIs

If the sound channel to switch to the system, the code is as follows:

```
m_pDvcBase->SetAudioIn(0);
m_pDvcBase->SetSpeakerCh(0);
```

If the voice switch to the Line1 channel, the code is as follows:

```
m_pDvcBase->SetAudioIn(1);
m_pDvcBase->SetSpeakerCh(0);
```

If the switch to the GSM voice channel, the code is as follows:

```
m_pDvcBase->SetAudioIn(5);
m_pDvcBase->SetSpeakerCh(0);
```

Set the system volume to 20db, the code is as follows:

```
m_pDvcBase->SetAudioVolume(20,20);
```

2.5 WiFi / Bluetooth Function

EX-9162M51A offers a full-featured WiFi 802.11b/g/n or Bluetooth V2.1+EDR dual radio module that simultaneously provides WiFi and Bluetooth connections.
And it supports single antenna configuration for WiFi and Bluetooth; for state-of-the-art WiFi-Bluetooth co-existence and VoIP optimizations; and EEPROM and full RF front-end integrated for WiFi and Bluetooth.
WiFi has same frequency band as Bluetooth, and shares the same 2.4GHz antenna with bluetooth. Therefore, WiFi or Bluetooth is applied alternatively at one time, please select one before you place order.

Please be reminded that 2.4GHz antenna must be assembled before using WiFi or Bluetooth.

2.5.1 WiFi / BT Access

2.5.1.1 WiFi Access

Please prepare the necessary hardware before WiFi connection.

Table 2-2: Hardware Required for WiFi / BT access

Required Hardware	**Description**
WiFi Access Point	
Antenna	Use the standard WiFi antenna and connect it to the antenna interface. For more information about the connection between the module and the antenna, please refer to Figure 2-7: Antenna Connection.

Test Software

The following two DLL files are necessary when you are going to use WiFi/Bluetooth Module.

Table2-3: Software Required for WiFi test

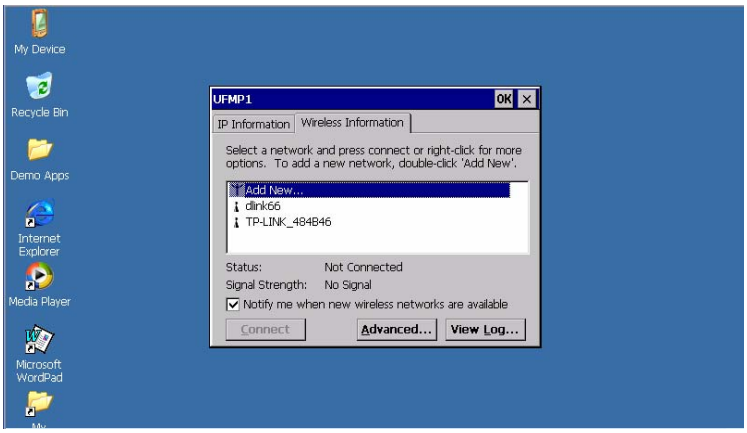
Requirement	**Description**
ufsdio.dll and ufmp.dll	Driver .dll file of WiFi module has been included in the WinCE OS.

Test Procedure

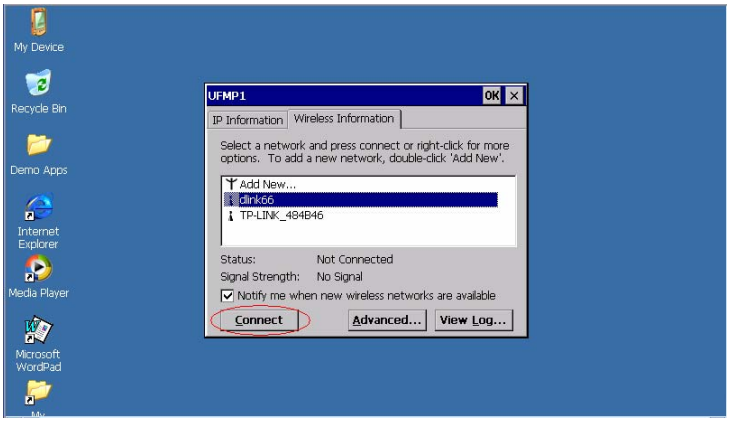
Please follow the guide below to test the WiFi module step by step. .

1. Power on the EX-9162N51AB board.

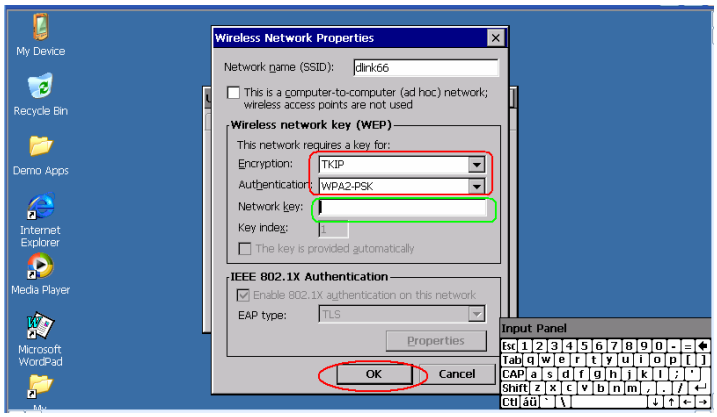
2. Click the icon  located in the WinCE task bar. Usually the "**UFMP1**" dialogue box will pop out automatically, and WiFi module will automatically search the available network around and list them. Please refer to the right figure.



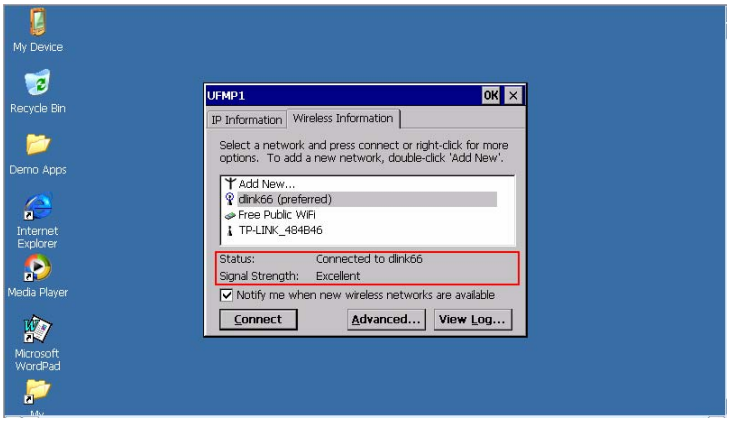
3. Select one and click the button "**Connect**"



4. In the opened "**Wireless Network Properties**" dialog box, set "Encryption" as "**TKIP**" and "Authentication" as "**WPA2-PSK**". If your wireless access point has been set a password, input the "Network key", then click the button "**OK**", the WiFi module will access the network



5. On the "**UFMP1**" dialogue box, it will display the "**Status**" and the "**Signal Strength**" of the connected network.

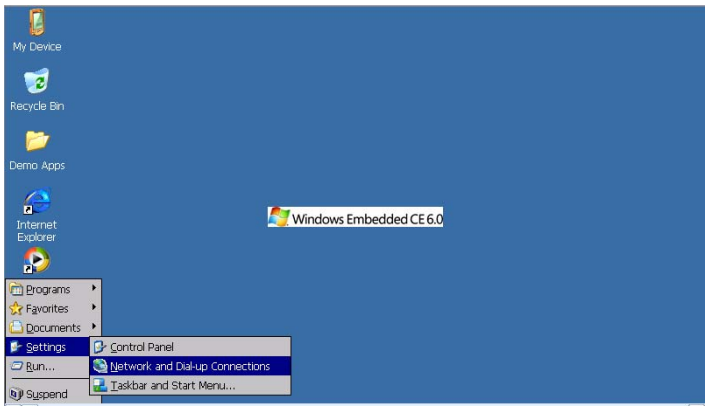


6. Set IP address

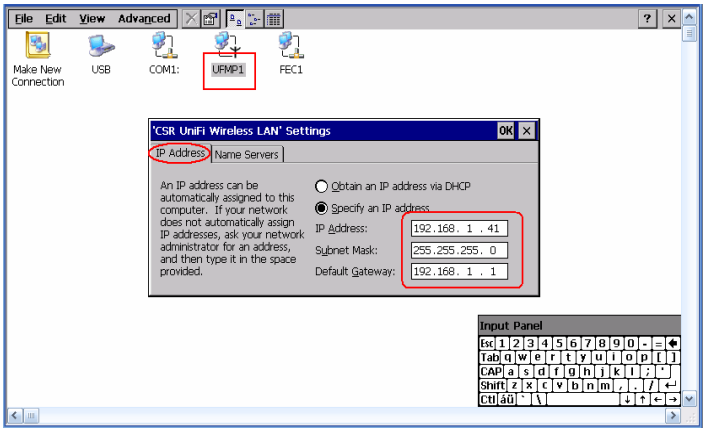
Open the WinCE OS directory "**Start\Settings\Network and Dial-up Connections\UFMP1**",

Input IP address, Subnet mask, Gateway, DNS etc. according to your network settings. Here is the example.

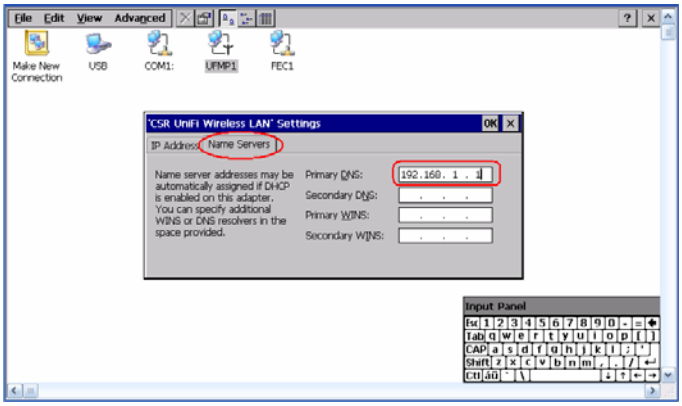
Click the path "**Start \Settings \Network and Dial-up Connections**"



Double click "**UFMP1**" and open the "'**CSR UniFi Wireless LAN Settings**" dialog box. Set the parameters in the "**IP Address**" label.

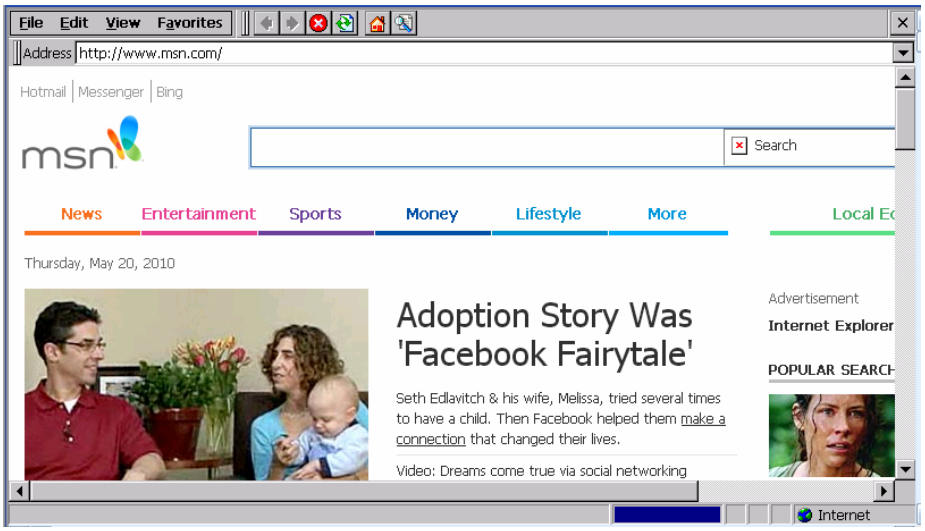


Set the parameters in the “**Name Servers**” label.



7. Click “**OK**”, complete the settings.

8. Double click the “**Internet Explorer**” icon on the desktop, open the IE browser, input a website, then you can login the web.



2.5.1.2 Bluetooth Access

Please prepare the necessary hardware and software before the Bluetooth connection.

Table 2-4: Hardware Required for Bluetooth access

Requirement	Description
Bluetooth Device	Such as a Bluetooth mobile phone, to activate the Bluetooth function.
Antenna	Use the standard Bluetooth antenna and connect it to the antenna interface.

Figure 2-7 Shows How to Connect WiFi/Bluetooth Antenna.

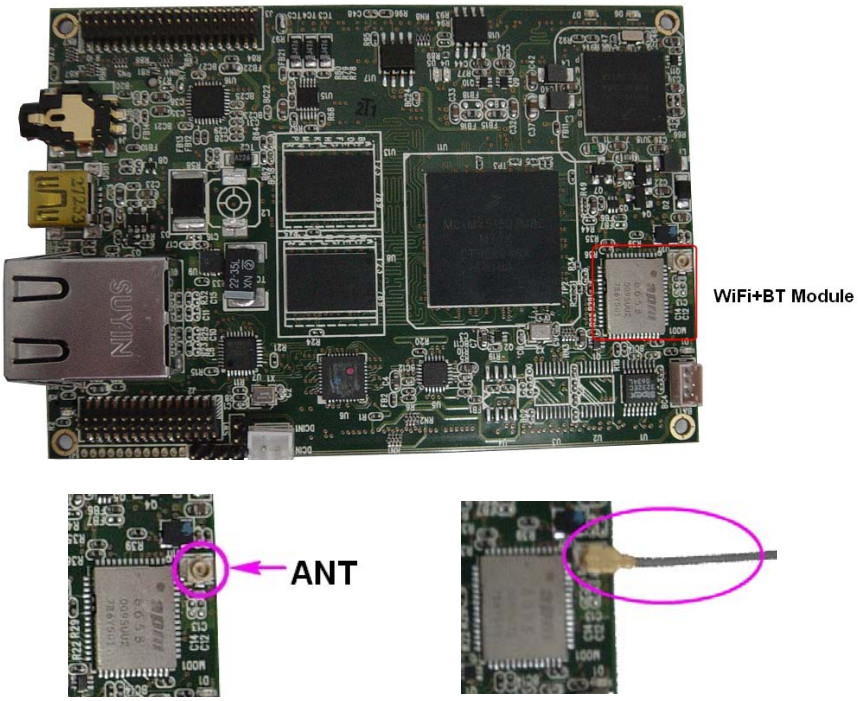


Figure 2-7: Antenna Connection

Test Software

Table 2-5 lists the software required to run the test.

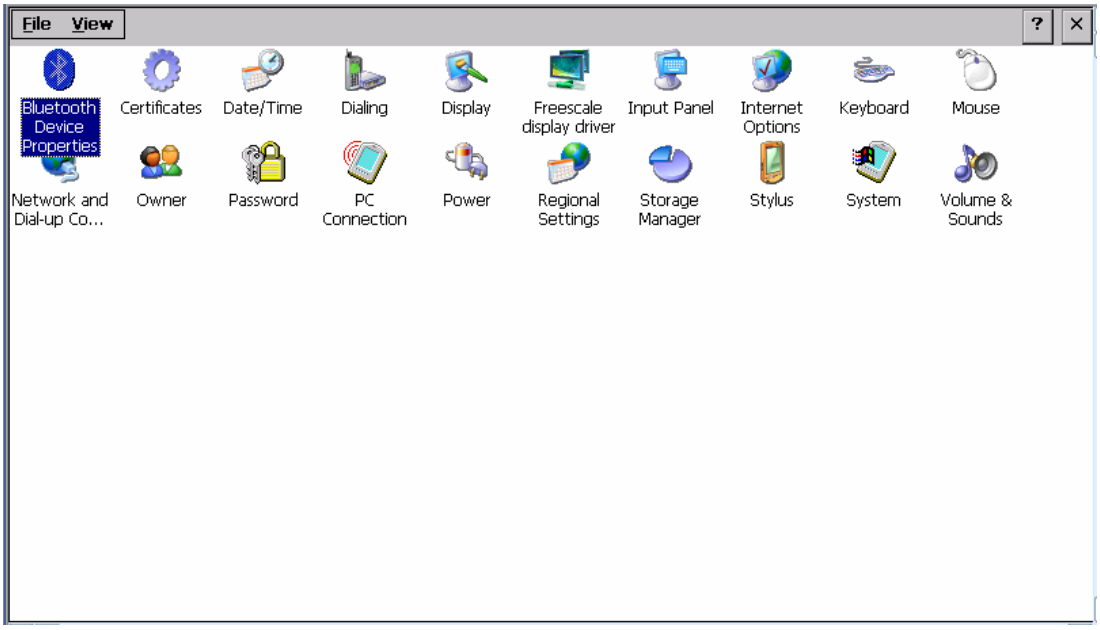
Table 2-5: Software Required for BT test

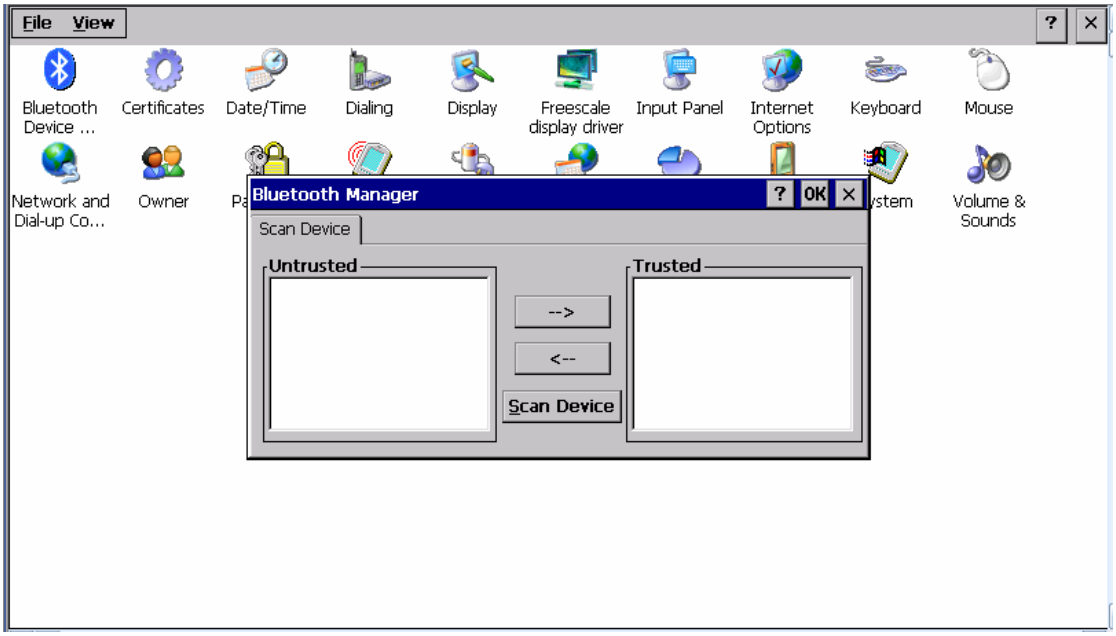
Requirement	Description
bthbcsp.dll	Driver .dll file of Bluetooth module, that is supported within WinCE

Test Sequences

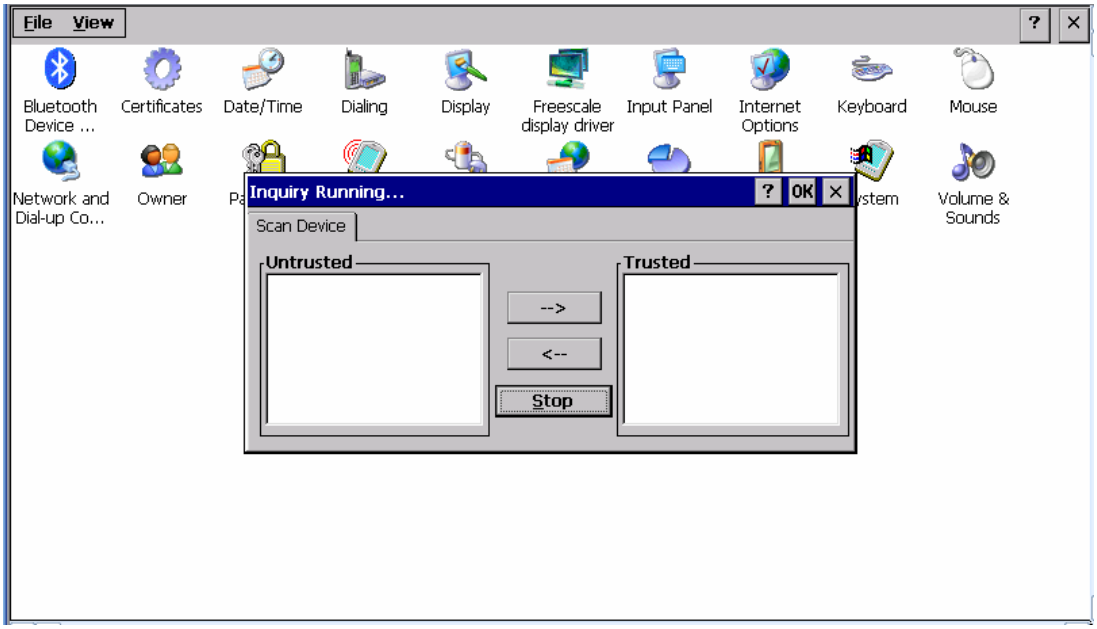
Please follow the guide to test the Bluetooth module step by step.

1. Turn on a Bluetooth device, such as a Bluetooth mobile.
2. Power on the EX-9162N51AB board.
3. Open the WinCE OS directory "**My Device\Control Panel\ Bluetooth Device Properties**", and the "**Bluetooth Manager**", a Dialog Box will pop up.

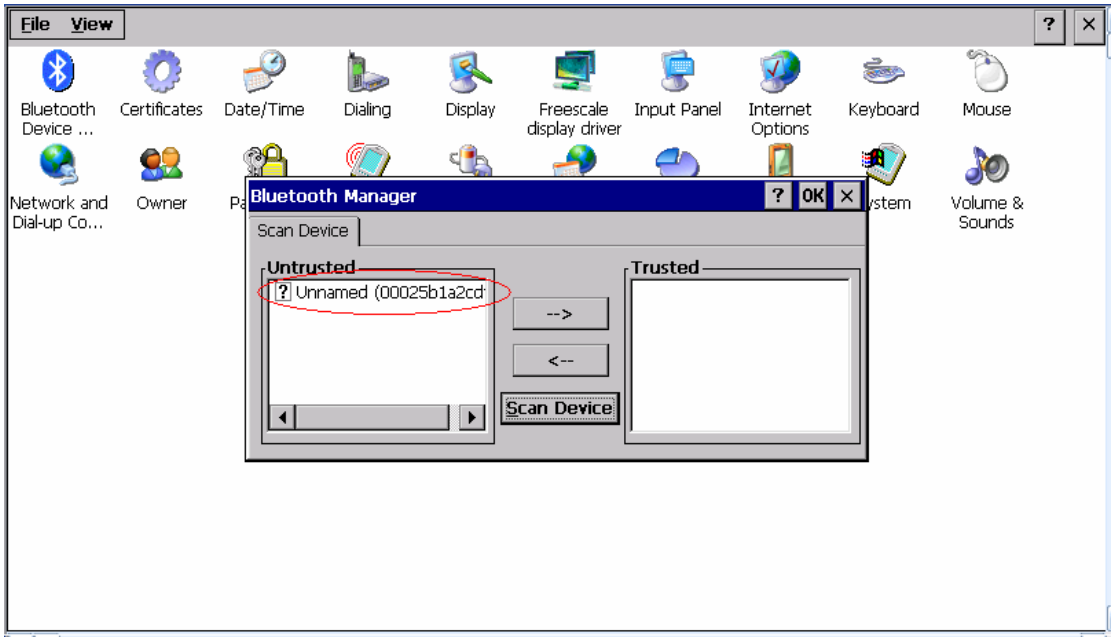




4. Click the button "**Scan Device**", then the Bluetooth module will scan other existing Bluetooth device.



5. If the Bluetooth mobile is on, the module can scan it, and the name and address of the Bluetooth device will be displayed in the dialog "**Untrusted**".



2.5.2 WiFi / Bluetooth API

The API fulfills the function of IP Configure, POWER ENABLE/DISABLE, WiFi and BT switch.

2.5.2.1 Overview

The API provides the switch of WiFi and Bluetooth. WiFi or Bluetooth works at one moment alternatively.
In order for power saving, please turn off the power of WiFi/Bluetooth Module when no use.

2.5.2.2 API Function

	Interface
1	BOOL WiFiBTPowerOn(int nModule)
2	BOOL WiFiBTPowerOff(int nModule)

2.5.2.3 API Function Description

1. CEX-9162M51ACtl::WiFiBTPowerOn

Set module opened.

BOOL WiFiBTPowerOn(int nModule)

Parameters

nModule

[in] The specified module ID

1: WIFI

2: Bluetooth

Return value

Set successful return true, else false

2. CEX-9162M51ACtl::WiFiBTPowerOff

Set Module Close.

BOOL WiFiBTPowerOff(int nModule)

Parameters

nModule

[in] The specified module ID

1: WIFI

2: Bluetooth

Return value

Set successful return true, else false

2.5.2.4 Application Example

If set to open WIFI module, the code is as follows:

```
m_pDvcBase->WiFiBTPowerOn(1);
```

If set to turn off WIFI modules, the code is as follows:

```
m_pDvcBase->WiFiBTPowerOff (1);
```

2.6 KeyPad Function

2.6.1 Introduction

The KPP (Keyboard Port) is a fixed key function as below.

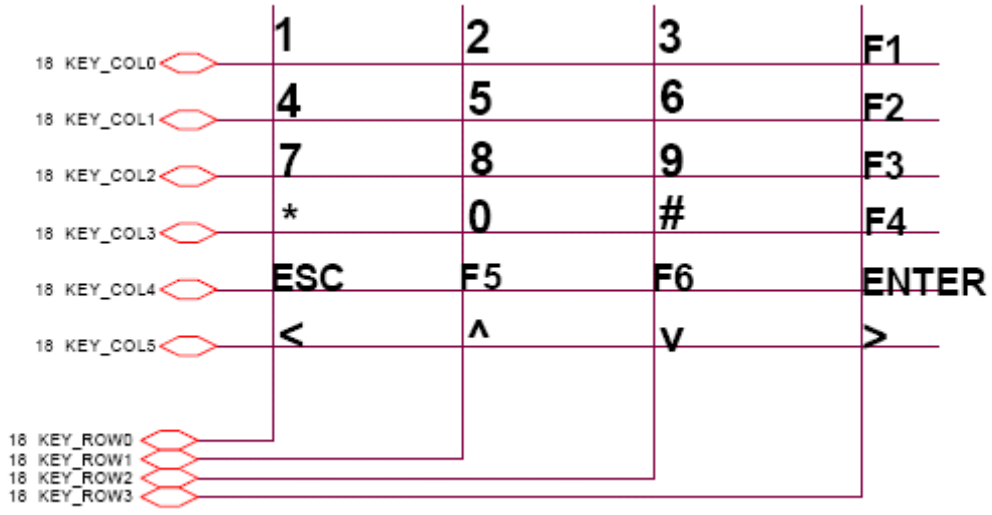


Figure 2-8: Keypad Layout

2.6.2 Connector

KPP port can be found on Port B Connector.

2.6.3 Electrical Parameters

Table 2-6: Key Board Electrical Parameters

Parameter	Sym	Min	Typ	Max	Unit
High-level output voltage	VOH	2.9	3.1	3.3	V
Low-level output voltage	VOL	-	-	0.15	V
High-Level DC input voltage	VIH	2.2	-	3.3	V
Low-Level DC input voltage	VIL	0	-	0.45	V

2.7 LAN Function

2.7.1 Introduction

The Local Area Network (LAN) is a low-power 10BASE-T/100BASE-TX physical layer(PHY) transceiver that transmits and receives information through unshielded twisted-pair cable.

2.7.2 LAN Configure

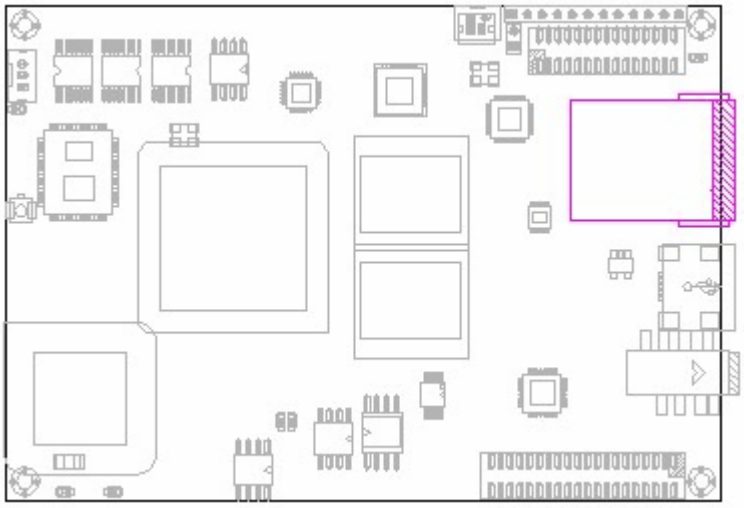
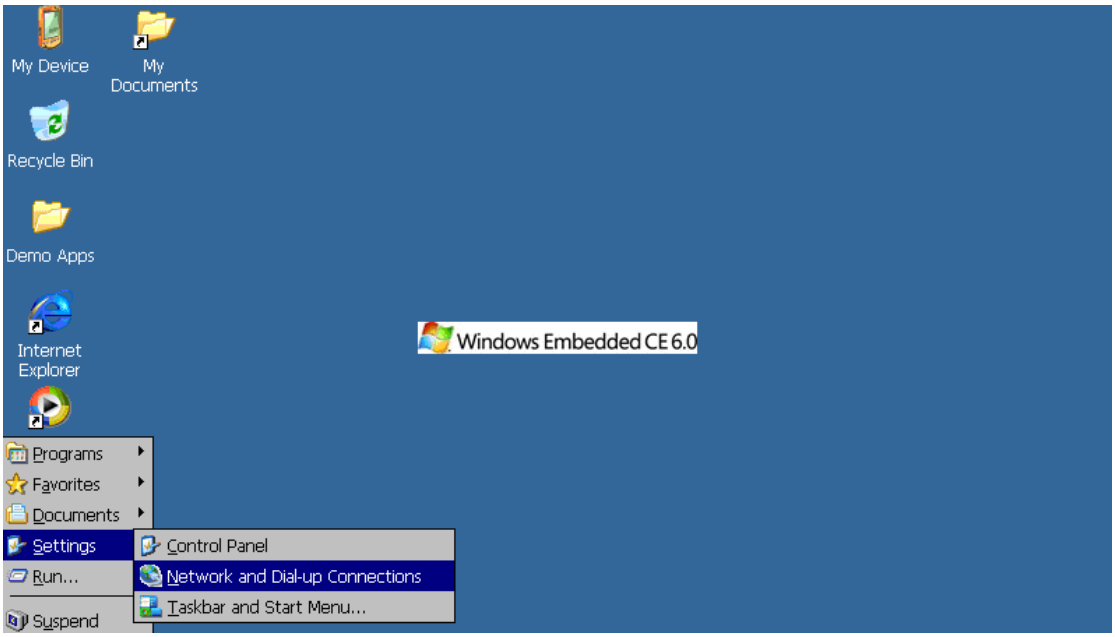


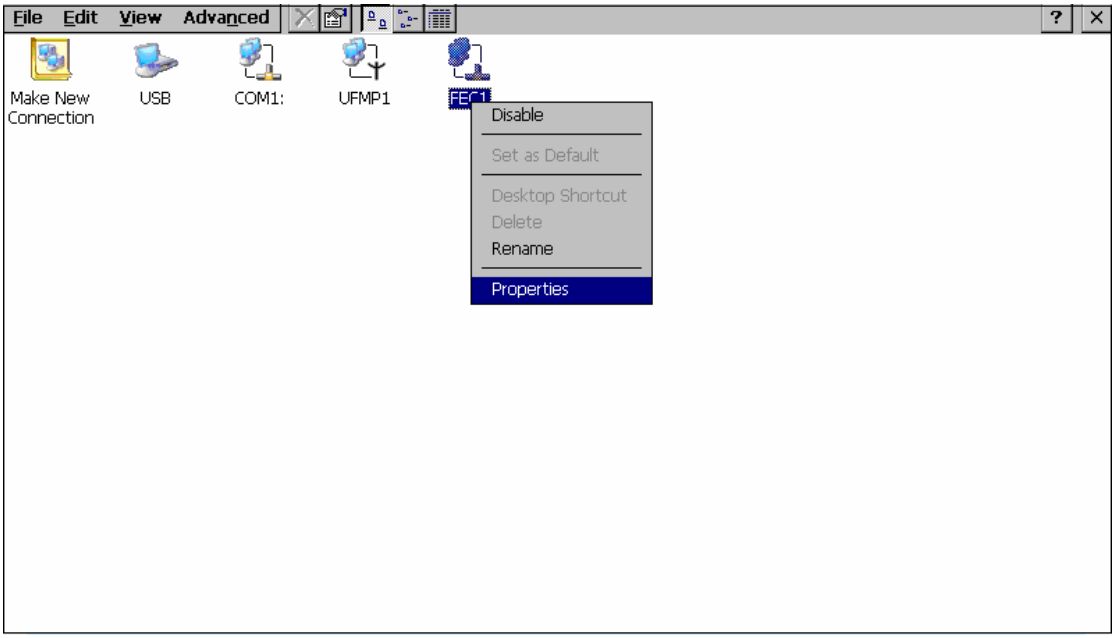
Figure 2-9: LAN Connector

Please follow the steps to activate LAN.

WinCE6.0→Start→Settings→Network and Dial-up Connections

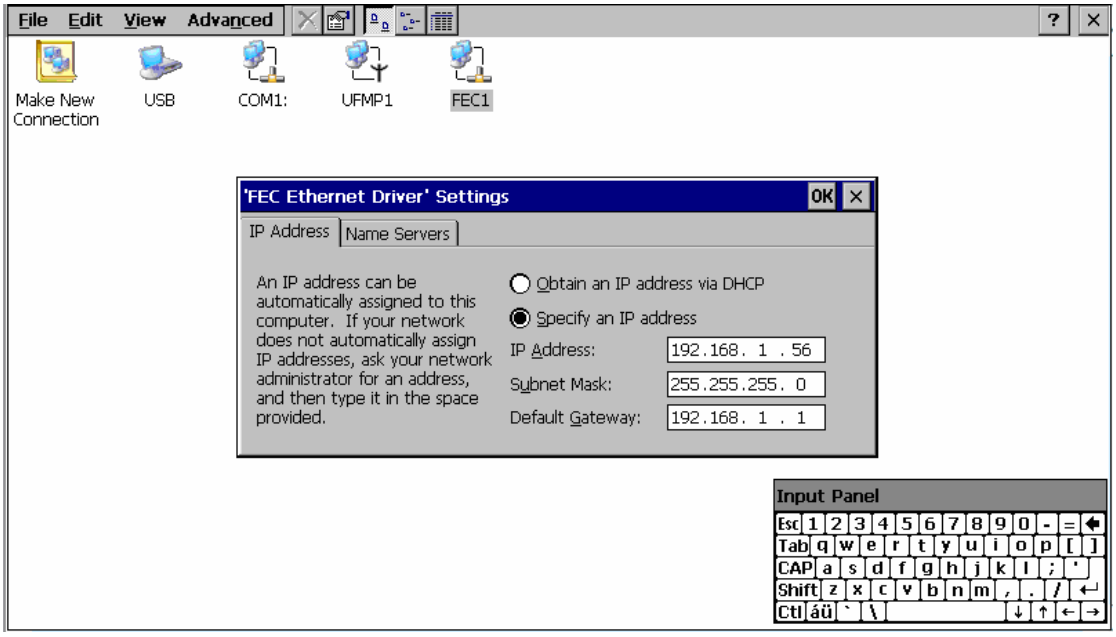


Right click “**FEC1**”→**Properties,** then dialog **“FEC Ethernet driver” Settings** will pop up.

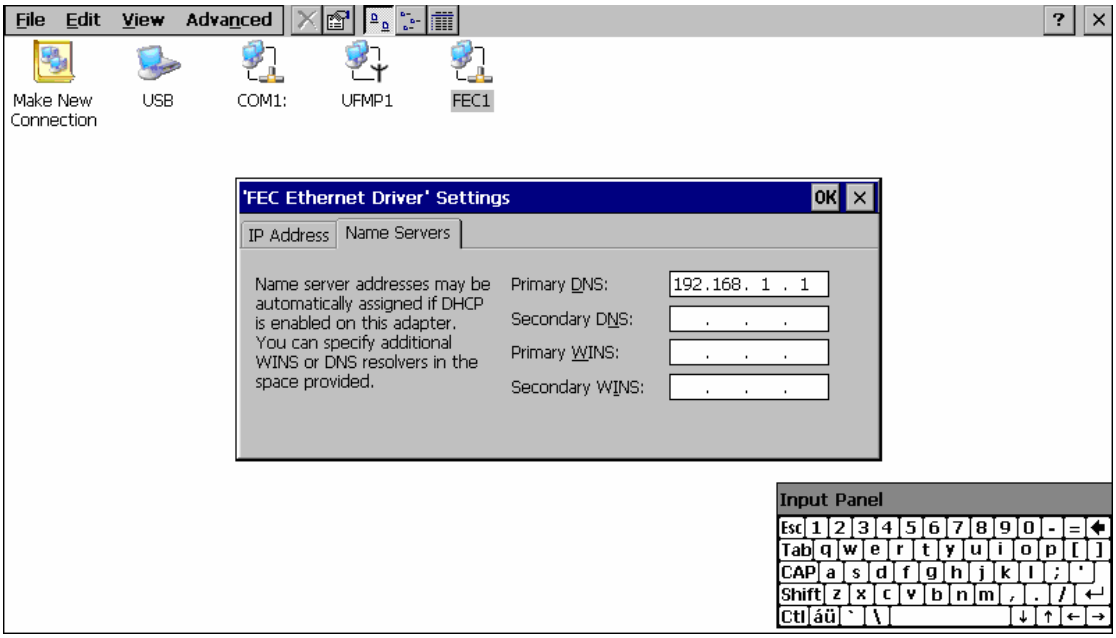


“FEC Ethernet driver” Settings:

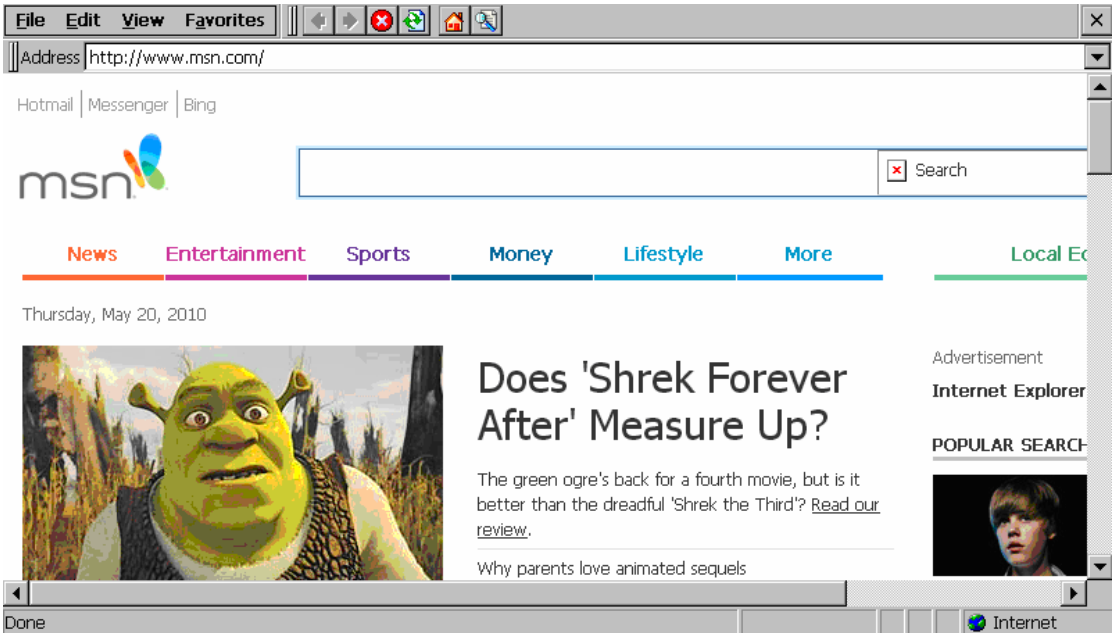
→**IP Address** → Select **“Specify an IP address**”, please fill in the number of IP address, subnet mask and default gateway, for example, IP address: 192.168.1.58 → subnet mask: 255.255.255.0 → default gateway: 192.168.1.1.



Then configure **Name Servers**, for instance, set **Primary DNS** as 192.168.1.1.



At last, click **OK**, and you can browse explorer.



2.8 SD Card Function

The Secure Digital Card (SD) is an evolution of MMC technology. It is specifically designed to meet the security, capacity, performance, and environment requirements inherent in newly emerging audio and video consumer electronic EX-9162M51As.

2.8.1 Connector

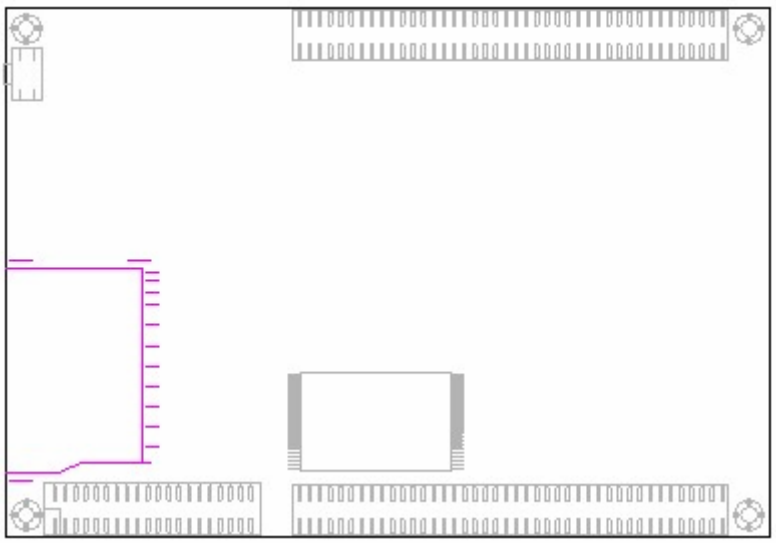


Figure 2-10: SD Card Connector

2.8.2 SD card identify

The time for SD card identifying is various, depends on the SD card capacity. So far, the max capacity ever tested is 32GB.

2.9 LCD Display Function

2.9.1 Approved LCD panel

The following LCD panels have been tested and approved for the EX-9162M51A board. Please refer to the following specifications to determine which model to incorporate into your application.
Many LCD module could match EX-9162M51A, but LCD change needs to modify LCD device driver and backlight power, because there is no standard LCD interface in LCD field. We provide some converter boards for different LCD panels, such as 7" TFT, 7" LVDS, and VGA Monitors, etc.

Table 2-7: 3.5" LCD general specification (Example)

Model	**AM-320240LATNQW-T00H**	**Unit**
Screen Size	3.5 inch (diagonal)	
Display Resolution	320(W)*240(H)	dot
Active Area	70.08 x 52.56	mm
Dot pitch	0.073(W)*0.219(H)	mm
Color configuration	R.G.B-stripe	
Overall Dimension	77.8(W)x66.0(H)x5.5(T)	mm
Input Interface	Digital 18-bits RGB	
Power Consumption	185mA in all black	
Power	3.0~3.6	V

Table 2.8 7" LCD general specification (Example)

Model	**AM-800480E3TMQW-T01H-A**	**Unit**
Screen Size	7 inch(diagonal)	
Display Resolution	800RGB(W)* 480(H)	dots
Active Area	152.4(W)*91.44 (H)	mm
Pixel pitch	0.195(W)*0.1905(H)	mm
Color configuration	R.G.B Vertical stripe	
Overall Dimension	165(W)*104(H)*7.06 (D)	mm
Backlight unit	LED	
Display color	262,144	colors
Power Consumption	185mA in all black	
Power Supply for LCD	3.0~4.0	V
Power Supply Current For LCD	200~300	mA
Power Supply for LED	9.3~9.9	V
Power Supply Current For LED	180	mA

2.9.2 Connector

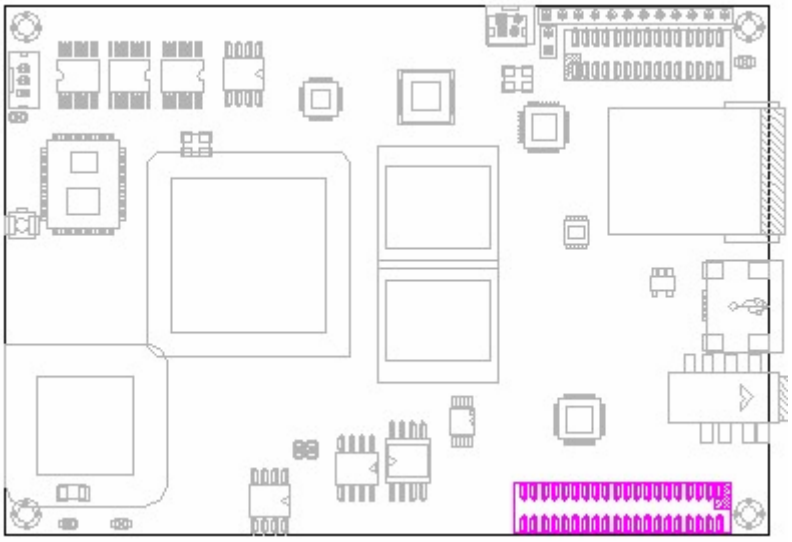


Figure 2-11 : LCD Display Connector

2.10 Touch Screen Function

The touch screen is a 12-bit successive approximation ADC with a synchronous serial interface and low on resistance switches for driving touch screens. The touch screen operates from a single 2.2V to 5.25V power supply and features throughput rates greater than 125kSPS.

2.10.1 Connector

Available on Display connector

2.11 USB Host Function

The Universal Serial Bus Host (USB H) is fully compliant with Universal Serial Bus Specification Rev. 2.0. The USB H can transmit and receive USB data at high-speed (480 Mbit/s), full-speed (12 Mbit/s) or low-speed (1.5 Mbit/s).

Table 2-9: USB Host Pin Description

Pin Name	Symbol	Function
DM	I/O	data minus (D-) pin of the USB cable
DP	I/O	data plus (D+) pin of the USB cable

2.11.1 Connector

Available on PORT A Connector.

2.12 USB OTG Function

2.12.1 Overview

The Universal Serial Bus On-The-Go (USB OTG) allows two USB EX-9162M51As to talk to each other without requiring the services of a personal computer (PC). Although OTG appears to add peer-to-peer connections to the USB world, it does not. Instead, USB OTG retains the standard USB host/peripheral model, in which a single host talks to USB peripherals. OTG does introduce, however, the dual-role EX-9162M51A, or simply stated, a EX-9162M51A capable of functioning as host or peripheral. Part of the magic of OTG is that a host and peripheral can exchange roles if necessary.

2.12.2 USB OTG Pin definition

Table 2-10: USB OTG Pin Description

Pin	Name	Sym	Function
1	Vbus	I/O	Power pin of the USB cable. Vbus = 5V
2	DM	I/O	Data minus (D-) pin of the USB cable
3	DP	I/O	Data plus (D+) pin of the USB cable
4	ID	I	Identification (ID) pin of the mini-USB cable.
5	GND	GND	Ground

2.12.3 Connector

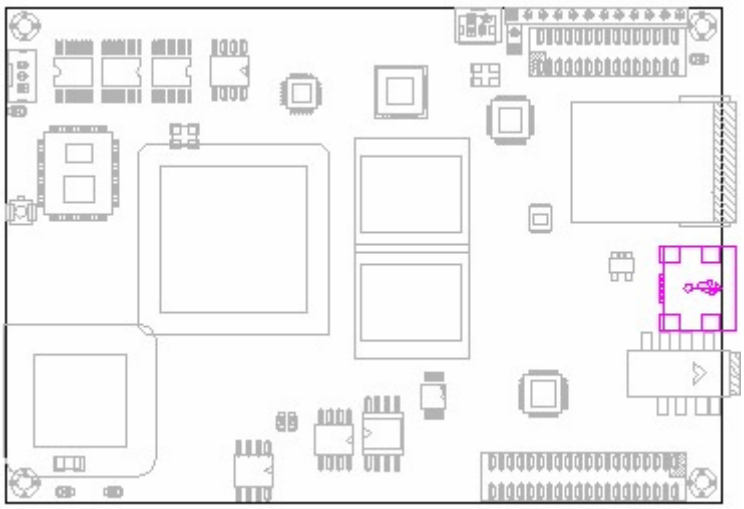


Figure 2-12: USB OTG connector Location

2.13 Serial Port Function

2.13.1 Overview

The Universal Asynchronous Receiver/Transmitter (UART) ports do compile with standard RS232 specification.

The UART generates baud rates based on a dedicated input clock and its programmable divisor. The UART also contains programmable auto baud detection circuitry to receive 1 or 2 stop bits as well as odd, even no parity. The receiver detects framing errors, idle conditions, BREAK characters, parity errors, and overrun errors.

UART is COM port without any driver, IO voltage is 3.1V on EX-9162M51A. For some application, directly drive hardware modules by UART 3.1V. You could also do this without driver chip. Please remove out any driver chip and solder on the necessary resistor networks to reach it.

2.13.2 Serial Port Connector

Available on PORT B connectors.

2.13.3 RS232 Pin Description

Table 2-11: RS232 Pin Description

Pin	Name	Sym	Function
2	RXD	I	Serial Data Input (RXD)
3	TXD	O	Serial Data Output (TXD)
5	SG	GND	Ground Signal
7	RTS	I/O	This line informs the Modem that the UART is ready to exchange data.
8	CTS	I	This line indicates that the Modem is ready to exchange data.

2.13.4 Port List

UART1 : iMX51 default for system console, debug port ; RS232 driver chip
UART2 : Optional, available only in case of no Bluetooth,
UART3 : On extension port B, 3.15V signal, without RS232 driver.

Table 2-12 : UART Port List

No.	Functions	WinCE COM	Connectors
COM1	RS232	COM port1	System console, debug port
COM2	RS232	COM port2	Optional, this port shares with Bluetooth
COM3	3.15V UART	COM port3	Without RS232 driver chip On extension Port B J6, pin 5/pin 6

2.13.5 Electrical Parameters

Table 2-13 : UART Electrical Parameters

Parameter	Sym	Min	Typ	Max	Units
High-level output voltage	VOH	2.9	3.1	3.3	V
Low-level output voltage	VOL	-	-	0.15	V
High-Level DC input voltage	VIH	2.2	-	3.3	V
Low-Level DC input voltage	VIL	0	-	0.45	V

Table 2-14: RS232 Electrical Parameters

Parameter	Condition	Min	Typ	Max	Units
Driver Outputs					
Output Voltage Swing	3K ohm load to ground at all driver output.	±5.0	±5.4		V
Output Resistance		300			ohm
Output Short-Circuit Current	VOUT=0V		±35	±60	mA
	VOUT=±15V		±70	±100	
Receiver Input					
Input Voltage Range		-15		+15	V
Input Threshold LOW		0.6	1.2		V
Input Threshold HIGH			1.5	2.4	V
Input Hysteresis			0.3		V
Input Resistance		3	5	7	Kohm

2.14 GPIO Function

2.14.1 Overview

GPIO configuration and access to input and output pin of the state, including configurable GPIO pin: xIO8-xIO15、xIO4、xIO5.

2.14.2 API Functions

Interface	
1	BOOL sDIO_SetConfig(DIO16 nPortConfig)
2	BOOL sDIO_GetConfig(DIO16& nPortConfig)
3	BOOL sSetDOState(DIO16 nPortOut)
4	BOOL sGetDIState(DIO16& nPortIn)

2.14.3 API Function Description

1. CEX-9162M51ACtl::sDIO_SetConfig

Configure GPIO input, output.

BOOL sDIO_SetConfig(DIO16 nPortConfig)

Parameters

nPortConfig

[in] Contains 10 GPIO definition of pin, 0 is output, 1 is the input, the definition file reference Public.h.

Return value

Set successful return true, else false.

2. CEX-9162M51ACtl::sDIO_GetConfig

Get GPIO input and output status.

BOOL sDIO_GetConfig(DIO16& nPortConfig)

Parameters

nPortConfig

[out] Contains 10 GPIO definition of pin, 0 is output, 1 is the input.

Return value

Get successful return true, else false.

3. CEX-9162M51ACtl::sSetDOState

Set the state of the output pin.

BOOL sSetDOState(DIO16 nPortOut)

Parameters

nPortOut

[in] Set the level of change on the output pin, 0 is low, 1 is high.

Return value

Set successful return true, else false.

4. CEX-9162M51ACtl::sGetDIState

To obtain input on the level of change in pin.

BOOL sGetDIState(DIO16& nPortIn)

Parameters

nPortOut

[out] 0 is low, 1 is high.

Return value

Get successful return true, else false.

2.14.4 An Example to Call APIs

For example, xIO4, xIO8 configured as output, the others for the input pin, the code is as follows:

```
DIO16      aDIO1;
aDIO1.nDIO |= 0x1;
aDIO1.nDIO |= 0x4;
m_pDvcBase->sDIO_SetConfig(aDIO1);
```

Now, configure the Output pin of xIO4, xIO8 state, xIO4 high, xIO8 low, the code is as follows:

```
DIO16      aDIO1;
aDIO1.nDIO = 0x0;
aDIO1.nDIO |= 0x1;
m_pDvcBase->sSetDOState(aDIO1);
```

To obtain the state of the input pin, just look at the corresponding position, it is 0 or 1 on the input pin, the code is as follows:

```
DIO16      aDIO1;
aDIO1.nDIO = 0x0;
m_pDvcBase->sGetDIState(aDIO1);
```

2.15 ADC Function

2.15.1 API Overview

The ADC API is to read ADC value provided, and set the upper and lower warning-level value.
You could set the maximum and minimum warning level for each ADC, and it will generate interruption once the measured value is beyond maximum or minimum warning level.

2.15.2 API Function

Interface	
1	BOOL SetAINConfig(AIOCONFIG aAIOConfig)
2	BOOL GetAINConfig(AIOCONFIG& aAIOConfig)
3	BOOL sGetAINState(AIOADC& nAIOIn)
4	BOOL ADCGetSingleChannelEightSamples(WORD channels,WORD* pADCOut)

2.15.3 API Function Description

1. CEX-9162M51ACtl::SetAINConfig

Configure ADC values of the parameters, scan time, the upper and lower limits.

BOOL SetAINConfig(AIOCONFIG aAIOConfig)

Parameters

aAIOConfig

[in] Can be configured to scan time, the upper and lower limits, the definition file reference Public.h.

Return value

Set successful return true, else false.

2. CEX-9162M51ACtl::GetAINConfig

Configuration parameter values for ADC.

BOOL GetAINConfig(AIOCONFIG& aAIOConfig)

Parameters

aAIOConfig

[out] ADC for the current scan time, and the upper and lower limit values

Return value

Get successful return true, else false.

3. CEX-9162M51ACtl::sGetAINState

Get the current value of ADC scan.

BOOL sGetAINState(AIOADC& nAIOIn)

Parameters

nAIOIn

[out] Six 16-bit ADC sampling value, the definition file reference Public.h.

Return value

Get successful return true, else false.

4. CEX-9162M51ACtl::ADCGetSingleChannelEightSamples

Read the eight single-channel sampling value.

BOOL ADCGetSingleChannelEightSamples(WORD channels,WORD* pADCOut)

Parameters

channels

[in] Select channel number, range 5-7.

pADCOut

[out] ADC sampling point to read the value of the buffer for eight 16-bit integer value.

Return value

Get successful return true, else false.

2.15.4 An Example to Call APIs

For example, configure the ADC scan time is 10ms, maximum 40, minimum is 20, the code is as follows:

```
AIOCONFIG aAIOConfig;
aAIOConfig.cSampleTime = 10;
aAIOConfig.nHighLimit = 40;
aAIOConfig.nLowLimit = 20;
m_pDvcBase->SetAINConfig(aAIOConfig);
```

Get an external voltage of 6 ADC sample value, the code is exemplified as follows:

```
AIOADC   aAI;
m_pDvcBase->sGetAINState(aAI);
```

ADC Channel 6 for the eight sample values, code as follows:

```
WORD     nEightSample[8] = {0};
m_pDvcBase->ADCGetSingleChannelEightSamples(6,nEightSample);
```

2.16 SPI Interface Function

2.16.1 Introduction

The Configurable Serial Peripheral Interface (CSPI) module allows rapid data communication with less software interrupts than conventional serial communications.

Table 2-15: SPI Electrical Parameters

Pin(J5)	Pin Name	Sym	Function
19	CSPI1_MOSI	I/O	In Master mode, this bidirectional signal is a TX output signal from the Data Shift register. In Slave mode, it is a RX input from external SPI EX-9162M51A.
20	CSPI1_MISO	I/O	In Master mode, this bidirectional signal is a RX input signal to the Data Shift register. In Slave mode, it is a TX output to external SPI EX-9162M51A.
21	CSPI1_RDY	I	This signal triggers the CSPI to start a burst.
22	CSPI1_SCLK	I	In Master mode, this bidirectional signal is a SPI clock output. In Slave mode, it is a SPI clock input.
24	CSPI1_SS	O	Peripherals Chip Select.

2.16.2 Electrical Parameters

Table 2-16: SPI Electrical Parameters

Parameter	Sym	Min	Typ	Max	Units
High-level output voltage	VOH	2.9	3.1	3.3	V
Low-level output voltage	VOL	-	-	0.15	V
High-Level DC input voltage	VIH	2.2	-	3.3	V
Low-Level DC input voltage	VIL	0	-	0.45	V

2.16.3 Connectors

Available on Port A.

2.16.4 SPI APIs

2.16.4.1 Overview

It provides multi-byte SPI read & write operation, which is derived from CCommunication class.

2.16.4.2 Headers

File Type	Definition
Head file	Communication/ Communication.h Communication/ SPI/ SPICom.h Communication/ SPI/ ecspibus.h

2.16.4.3 API Function

Interface	
1	CSPICom(LPCWSTR strSPIName,int nChannel)
2	BOOL Open()
3	BOOL Close()
4	BOOL HasOpened()
5	DWORD Read(BYTE* pData,DWORD nLen,DWORD& nOPLen)
6	DWORD Write(BYTE* pData,DWORD nLen,DWORD& nOPLen)

2.16.4.4 API Function Description

1. CSPICom::CSPICom

Create an SPI device interface, is the constructor.

CSPICom(LPCWSTR strSPIName,int nChannel)

Parameters

strSPIName

[in] Specify the interface name.

nChannel

[in] Channel number.

Return value

Create successful return true, else false.

2. CSPICom::Open

Open the Device Communication port.

BOOL Open()

Parameters

NONE

Return value

Set successful return true, else false.

3. CSPICom::Close

Close Communication Ports.

BOOL Close()

Parameters

NONE

Return value

Set successful return true, else false.

4. CSPICom::HasOpened

Whether the Communication ports are opened.

BOOL HasOpened()

Parameters

NONE

Return value

Set successful return true, else false.

5. CSPICom::Read

Data port reception facilities.

DWORD Read(BYTE* pData,DWORD nLen,DWORD& nOPLen)

Parameters

pData

[out] Point to the receiver buffer

nLen

[in] The length of receive data

nOPLen

[out] Undefined

Return value

Set successful return true, else false.

6. CSPICom::Write

Write data to the device port.

DWORD Write(BYTE* pData,DWORD nLen,DWORD& nOPLen)

Parameters

pData

[in] Point to send buffer

nLen

[in] Send data bytes

nOPLen

[out] Undefined

Return value

Set successful return true, else false.

2.16.4.5 An Example to Call API

```
#include "lib\Communication\SPI\SPICom.h"
```

To create an SPI device interface, the code is exemplified as follows:

```
CSPICom *m_pSPICom = NULL;
m_pSPICom = new CSPICom(TEXT("SPI1:"),0);
```

Open the port, the code is as follows:

```
if(m_pSPICom->HasOpened() == FALSE)
{
    m_pSPICom->Open();
}
```

To read data to the device, the code is exemplified as follows:

```
DWORD nLength = 0;
BYTE cText[64] = {0};
m_pSPICom->Read(cText,2,nLength);
```

Write data to the device, the code is as follows:

```
DWORD nLength = 0;
BYTE cText[64] =    "abcd";
int nL = strlen(cText);
m_pSPICom->Write(cText,nL,nLength);
```

2.17 I2C Interface Function

2.17.1 Introduction

The Inter-Integrated Circuit (I2C) is a two-wire, bidirectional serial bus. This bus is suitable for applications requiring occasional communications over a short distance between many EX-9162M51As. The flexible I2C allows additional EX-9162M51As to be connected to the bus for expansion and system development. The I2C operates up to 400kbps but it depends on the pad loading and timing.

2.17.2 I2C Pin Description

Table 2-17: I2C Pin Description

Pin(J6)	Pin Name	Sym	Description
43	I2C1_CLK	O	I2C, serial clock output
44	I2C1_DAT	I/O	I2C, serial data input/output

2.17.3 I2C Connectors

Available on Port B connector.

2.17.4 I2C APIs

2.17.4.1 Overview

It provides multi-byte read and write I2C operation, which derived from CCommunication class.

2.17.4.2 Headers

File Type	Definition
Head file	Communication/ Communication.h Communication/ I2C/ I2CCom.h Communication/ I2C/ i2cbus.h

2.17.4.3 API Function

Interface	
1	CI2CCom(LPCWSTR strI2CName,BYTE byAddr)
2	BOOL Open()
3	BOOL Close()
4	BOOL HasOpened()
5	DWORD Read(BYTE* pData,DWORD nLen,DWORD& nOPLen)
6	DWORD Write(BYTE* pData,DWORD nLen,DWORD& nOPLen)

2.17.4.4 API Function Description

1. CI2CCom::CI2CCom

Create an I2C device interface, is the constructor.

CI2CCom(LPCWSTR strI2CName,BYTE byAddr)

Parameters

strI2CName

[in] Specify the interface name.

byAddr

[in] Specified device address.

Return value

Create successful return true, else false.

2. CI2CCom::Open

Open the Device Communication port.

BOOL Open()

Parameters

NONE

Return value

Set successful return true, else false.

3. CI2CCom::Close

Close Communication Ports.

BOOL Close()

Parameters

NONE

Return value

Set successful return true, else false.

4. CI2CCom::HasOpened

Whether the Communication ports are opened.

BOOL HasOpened()

Parameters

NONE

Return value

Set successful return true, else false.

5. CI2CCom::Read

Data port reception facilities.

DWORD Read(BYTE* pData,DWORD nLen,DWORD& nOPLen)

Parameters

pData

[out] Point to the receiver buffer

nLen

[in] The length of receive data

nOPLen

[out] Undefined

Return value

Set successful return true, else false.

6. CI2CCom::Write

Write data to the device port.

DWORD Write(BYTE* pData,DWORD nLen,DWORD& nOPLen)

Parameters

pData

[in] Point to send buffer

nLen

[in] Send data bytes

nOPLen

[out] Undefined

Return value

Set successful return true, else false.

2.17.4.5 An Example to Call APIs

```
#include "lib\Communication\I2C\I2CCom.h"
```

Create an I2C device interface, the code is as follows:

```
CI2CCom *m_pI2CCom = NULL;
m_pI2CCom = new CI2CCom(_T("I2C1:"),0x01);
```

Open the port, the code is as follows:

```
if(m_pI2CCom->HasOpened() == FALSE)
{
    m_pI2CCom->Open();
}
```

Read the device registers in the data, the code is as follows: (This case of operation for the 16 register.)

```
BYTE Registers[5] = {0};
DWORD nLen = 0;
Registers[0] = 0;           // Register Address
Registers[1] = 0x02; // Register Address
if(m_pI2CCom->Write(Registers,2,nLen)==FALSE)
    return FALSE;
Sleep(20);
if(m_pI2CCom->Read(Registers,2,nLen)==FALSE)
    return FALSE;
```

Write data to the device registers, the code is as follows:

```
Registers[0] = 0;           // Register Address
```

```
Registers[1] = 0x02; // Register Address
Registers[2] = 0x1;
Registers[3] = 0x2;
if(m_pSGTLI2CCom->Write(Registers, 4,nLen) == FALSE)
    return FALSE;
```

2.17.5 HSI2C APIs

2.17.5.1 Overview

HSI2C APIs provide multi-byte read and write HSI2C operation, which is derived from CCommunication class.

2.17.5.2 Headers

File Type	Definition
Head file	Communication/ Communication.h Communication/ HSI2C/ HSI2CCom.h Communication/ HSI2C/ hsi2cbus.h

2.17.5.3 API Function

Interface	
1	HSI2CCom(LPCWSTR strI2CName,BYTE byAddr)
2	BOOL Open()
3	BOOL Close()
4	BOOL HasOpened()
5	DWORD Read(BYTE* pData,DWORD nLen,DWORD& nOPLen)
6	DWORD Write(BYTE* pData,DWORD nLen,DWORD& nOPLen)

2.17.5.4 API Function Description

1. HSI2CCom::HSI2CCom

Create an HSI2C device interface, is the constructor.

HSI2CCom(LPCWSTR strI2CName,BYTE byAddr)

Parameters

strI2CName

[in] Specify the interface name.

byAddr

[in] Specified device address.

Return value

Create successful return true, else false.

2. HSI2CCom::Open

Open the Device Communication port.

BOOL Open()

Parameters

NONE

Return value

Set successful return true, else false.

3. HSI2CCom::Close

Close Communication Ports.

BOOL Close()

Parameters

NONE

Return value

Set successful return true, else false.

4. HSI2CCom::HasOpened

Whether the Communication ports are opened.

BOOL HasOpened()

Parameters

NONE

Return value

Set successful return true, else false.

5. HSI2CCom::Read

Data port reception facilities.

DWORD Read(BYTE* pData,DWORD nLen,DWORD& nOPLen)

Parameters

pData

[out] Point to the receiver buffer

nLen

[in] The length of receive data

nOPLen

[out] Undefined

Return value

Set successful return true, else false.

6. HSI2CCom::Write

Write data to the device port.

DWORD Write(BYTE* pData,DWORD nLen,DWORD& nOPLen)

Parameters

pData

[in] Point to send buffer

nLen

[in] Send data bytes

nOPLen

[out] Undefined

Return value

Set successful return true, else false.

2.17.5.5 Application Example

Note: Be sure to include in the source file

```
#include "lib\Communication\HSI2C\HSI2CCom.h"
```

Create an HSI2C device interface, the code is as follows:

```
HSI2CCom *m_pHSI2CCom = NULL;
m_pHSI2CCom = new HSI2CCom(HSI2C1_FID,0x01);
```

Open the port, the code is as follows:

```
if(m_pHSI2CCom ->HasOpened() == FALSE)
{
    m_pHSI2CCom ->Open();
}
```

Read the device registers in the data, the code is as follows: (This case of operation for the 8 register.)

```
BYTE Registers[5] = {0};
DWORD nLen = 0;
Registers[0] = 0x02;  // Register Address
if(m_pHSI2CCom->Write(Registers,1,nLen)==FALSE)
    return FALSE;
//delay
Sleep(20);
if(m_pHSI2CCom->Read(Registers,1,nLen)==FALSE)
    return FALSE;
```

Write data to the device registers, the code is as follows:

```
Registers[0] = 0x02;  // Register Address
Registers[1] = 0x1;    //Data
if(m_pHSI2CCom->Write(Registers, 2,nLen) == FALSE)
    return FALSE;
```

2.18 CAN Bus Function

2.18.1 Introduction

Designed for operation in especially-harsh environments, these devices feature cross-wire protection, loss-of-ground and overvoltage protection, over-heated protection, as well as wide common-mode range.
The transceiver interfaces the single-ended CAN controller with the differential CAN bus found in industrial, building automation, and automotive applications. It operates over a –2V to 7V common-mode range on the bus, and it can withstand common-mode transients of 25 V.

2.18.2 Electrical Parameters

Table 2-18: Electrical Parameters

Parameter	Sym	Min	Typ	Max	Unit
High-level output voltage	VOH	3.0	3.15	3.45	V
Low-level output voltage	VOL	-	-	0.15	V
High-Level DC input voltage	VIH	2.2	-	3.15	V
Low-Level DC input voltage	VIL	0	-	0.945	V

2.18.3 Pin Description of CAN Bus

Table 2-19: CAN Pin Description

Pin(J6)	Pin Name	Sym	Description
61	CAN-	O	Low bus output
62	CAN+	I/O	High bus output

2.18.4 CAN Bus APIs

2.18.4.1 Overview

It provides CAN bus operation, ON/OFF, configuration, receive and send data.

2.18.4.2 API Function

Interface	
1	BOOL sCANOpen(void)
2	BOOL sCANClose(void)
3	BOOL sCAN_SetConfig(CANStructure aCANConfig)
4	BOOL sCAN_GetConfig(CANStructure& aCANConfig)
5	BOOL sCANSend(unsigned char* pBuf, int nLen)
6	BOOL sCANRead(unsigned char* pBuf, int nLen)

2.18.4.3 API Function Description

1. CEX-9162M51ACtl::sCANOpen

Open CANBUS module.

BOOL sCANOpen(void)

Parameters

NONE

Return value

Set successful return true, else false.

2. CEX-9162M51ACtl::sCANClose

Close CANBUS module.

BOOL sCANClose(void)

Parameters

NONE

Return value

Set successful return true, else false.

3. CEX-9162M51ACtl::sCAN_SetConfig

Configure the parameters Canbus.

BOOL sCAN_SetConfig(CANStructure aCANConfig)

Parameters

aCANConfig

[in] See the definition of this structure Public.h file.

Return value

Set successful return true, else false.

4. CEX-9162M51ACtl::sCAN_GetConfig

The parameter values for Canbus.

BOOL sCAN_GetConfig(CANStructure& aCANConfig)

Parameters

aCANConfig

[in] See the definition of this structure Public.h file

Return value

Set successful return true, else false.

5. CEX-9162M51ACtl::sCANSend

Send data to other devices,To send 8 bytes as the basic unit of.

BOOL sCANSend(unsigned char* pBuf, int nLen)

Parameters

pBuf

[in] Send buffer to point CanTxMsg structure

nLen

[in] The length of send data

Return value

Send successful return true, else false.

6. CEX-9162M51ACtl::sCANRead

Receiving data from other devices, Receive 8-byte as the basic unit.

BOOL sCANRead(unsigned char* pBuf, int nLen)

Parameters

pBuf

[out] Point CanRxMsg receive buffer structure

nLen

[out] The length of receive data

Return value

Receive successful return true, else false.

2.18.4.4 An Example to Call APIs

Open Canbus module, the code is as follows:

```
m_pDvcBase->sCANOpen()
```

Configure the parameter values, the code is as follows:

```
CANStructure   m_aCanbus;
m_aCanbus.CellStruct.CAN_TTCM = 0;
m_aCanbus.CellStruct.CAN_ABOM = 0;
m_aCanbus.CellStruct.CAN_AWUM = 0;
m_aCanbus.CellStruct.CAN_NART = 0;
m_aCanbus.CellStruct.CAN_RFLM = 0;
m_aCanbus.CellStruct.CAN_TXFP = 0;
m_aCanbus.CellStruct.CAN_Mode = CAN_Mode_Normal;
m_aCanbus.CellStruct.CAN_SJW = CAN_SJW_1tq;
m_aCanbus.CellStruct.CAN_BS1 = CAN_BS1_6tq;
m_aCanbus.CellStruct.CAN_BS2 = CAN_BS2_5tq;
m_aCanbus.CellStruct.CAN_Prescaler = 2;
/* CAN filter init */
m_aCanbus.FilterStruct.CAN_FilterNumber=0;
m_aCanbus.FilterStruct.CAN_FilterMode=CAN_FilterMode_IdMask;
m_aCanbus.FilterStruct.CAN_FilterScale=CAN_FilterScale_32bit;
m_aCanbus.FilterStruct.CAN_FilterIdHigh=0x0000;
m_aCanbus.FilterStruct.CAN_FilterIdLow=0x0000;
m_aCanbus.FilterStruct.CAN_FilterMaskIdHigh=0x0000;
m_aCanbus.FilterStruct.CAN_FilterMaskIdLow=0x0000;
m_aCanbus.FilterStruct.CAN_FilterFIFOAssignment=0;
m_aCanbus.FilterStruct.CAN_FilterActivation=1;
m_pDvcBase->sCAN_SetConfig(m_aCanbus);
```

Send data to other devices, the code is as follows:

```
BYTE cText[8] = “abcdefg”;
Int nL = Strlen(cText);
CanTxMsg       aTxMsg;
```

```
aTxMsg.StdId = 1;
aTxMsg.ExtId = 2;
aTxMsg.RTR = CAN_RTR_DATA;
aTxMsg.IDE = CAN_ID_STD;
aTxMsg.DLC = 8;
memcpy(aTxMsg.Data, cText,nL);
m_pDvcBase->sCANSend((BYTE*)&aTxMsg,sizeof(CanTxMsg));
```

Receiving data from other devices, the code is as follows:

```
CanRxMsg       aRxMsg;
m_pDvcBase->sCANRead((BYTE*)&aRxMsg,sizeof(CanRxMsg));
```

Chapter 3 Application Development Guide

3.1 Application Development Architecture

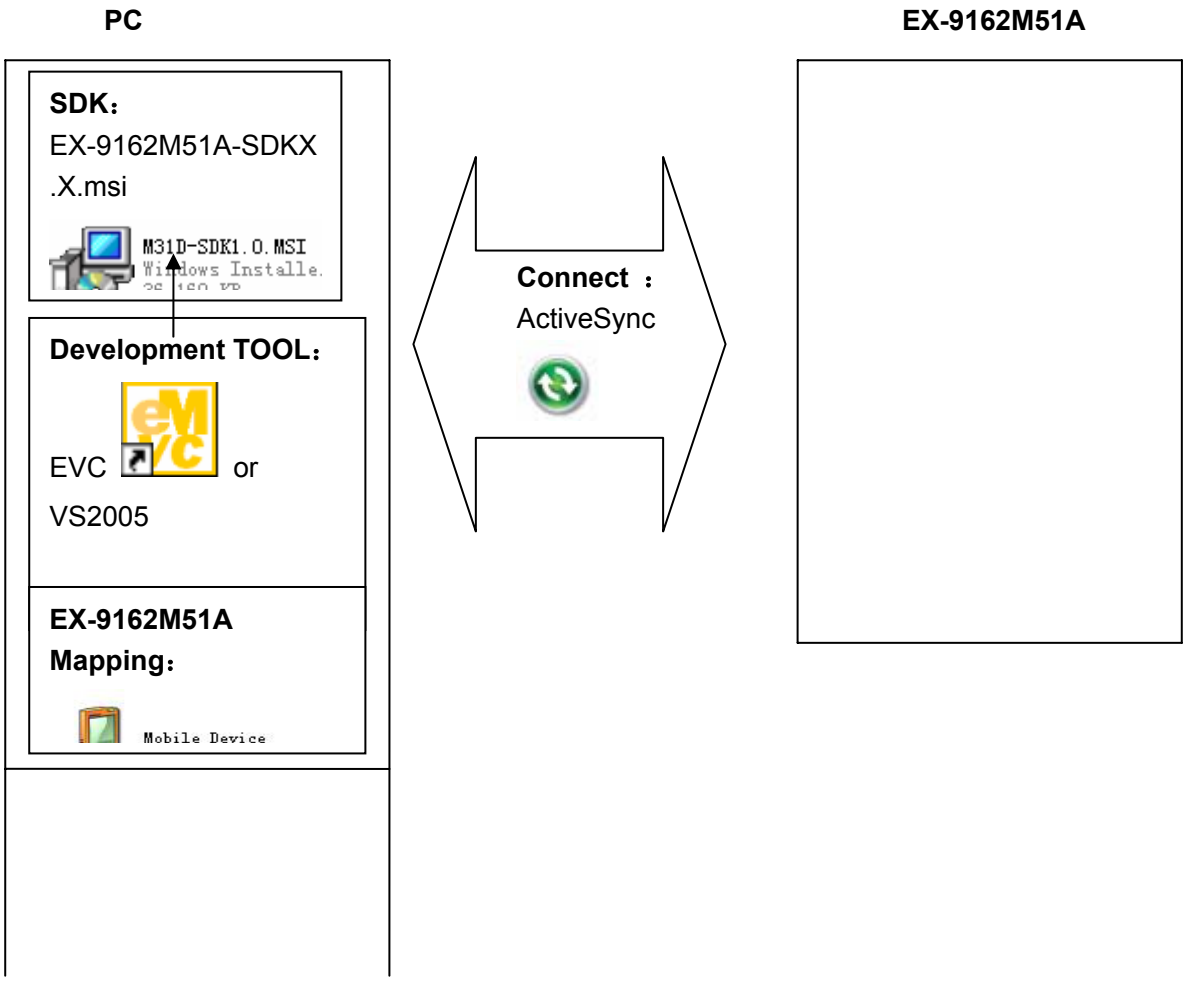


Figure 3-1: Application Development Architecture

3.2 How To Connect with PC

This section describes how to connect your EX-9162M51A to PC. Microsoft provides an application tool for connection named ActiveSync.

3.2.1 Install the Software Tool Microsoft ActiveSync

ActiveSync is an application used for communication between EX-9162M51A and PC under Windows CE, so the installation of ActiveSync on your PC is required.

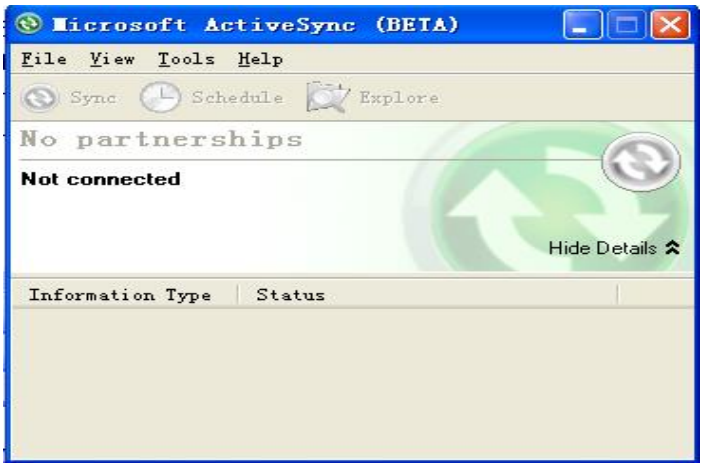
1. Obtain the tool Microsoft ActiveSync installation file. The version should be 3.8 or later. You can download the newest version from the Microsoft Web Site: (http://www.microsoft.com/downloads/browse.aspx?displaylang=en&productID=44C5CD04-E8D3-4E3A-A3A5-31A4D151F304).

2. Install the Microsoft ActiveSync following the steps provided by the wizard. This installation needs about 20MB disk space.

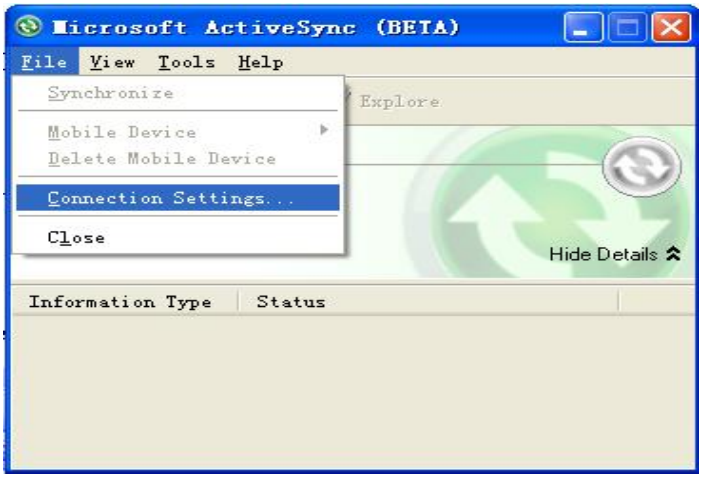
3.2.2 Run and Configure the Microsoft ActiveSync

This section describes how to configure the ActiveSync for connection.

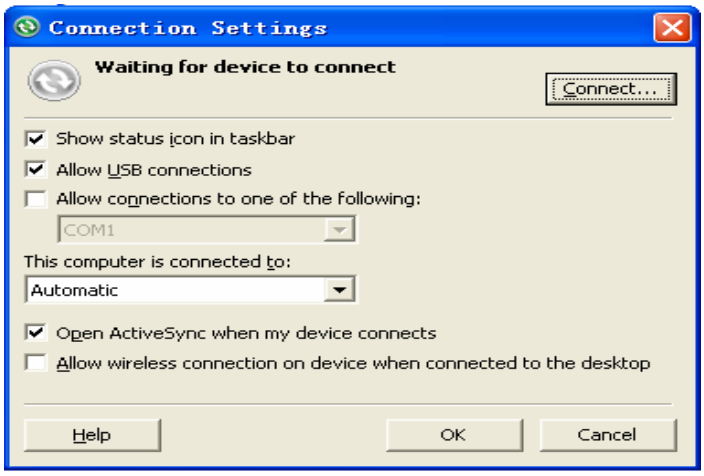
1. Find and run the ActiveSync, then the chart will appear.



2. Click **File → Connection settings**



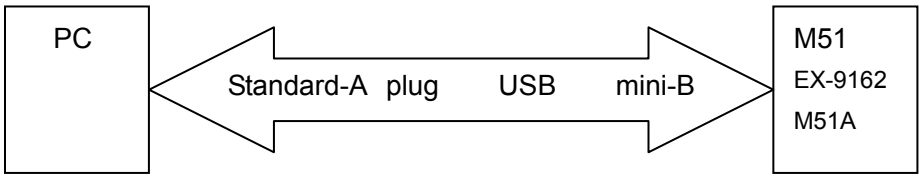
3. Select "**Allow USB connections"** on the dialog "***Connection Settings***" then click **OK (Figure 4-3)**



Since EX-9162M51A does not support COM port connection with PC, please don't select "**Allow connections to one of the following"**

3.2.3 Connection

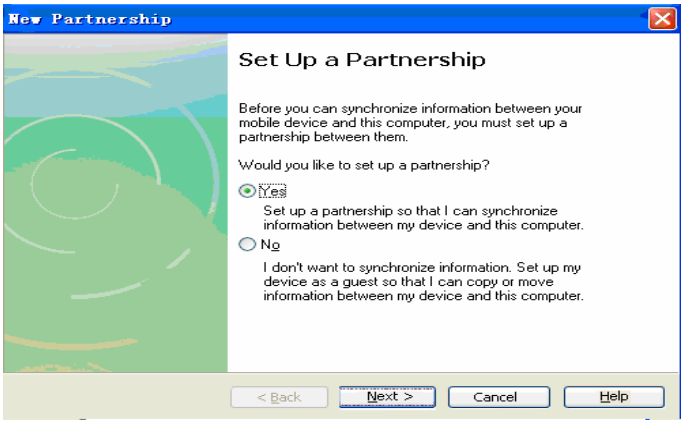
This section describes how to connect with PC.
1. Power on your EX-9162M51A. A few seconds later, you will see the WinCE 6.0 desktop on the EX-9162M51A.
2. When the Windows CE 6.0 boot up, connect your PC to EX-9162M51A with a standard-A plug & mini-B plug USB cable.



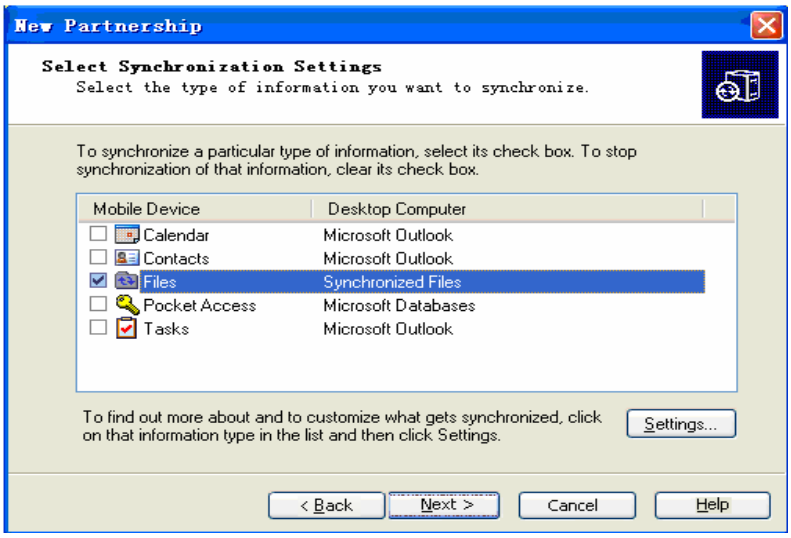
3. A few seconds later, the ActiveSync on the EX-9162M51A will send connection requirement to PC, and the ActiveSync on your PC will start connecting with EX-9162M51A.

4. The right figure will appear on the connection.

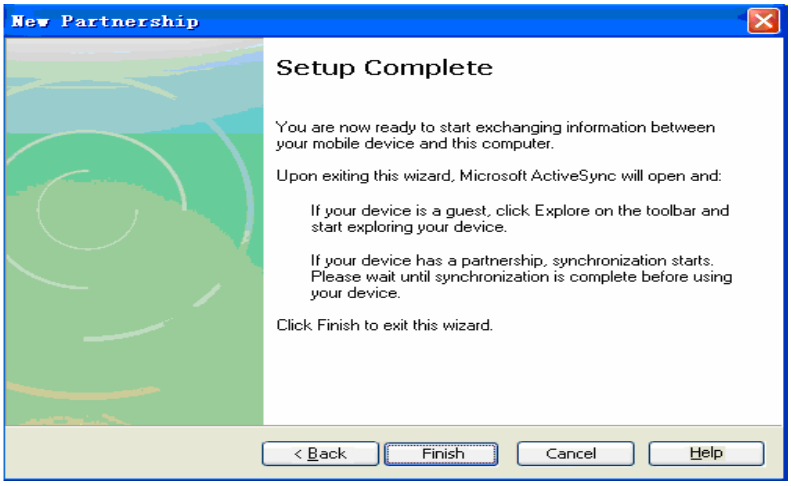
Select **Yes** to set up a partnership with EX-9162M51A then Click **Next**.



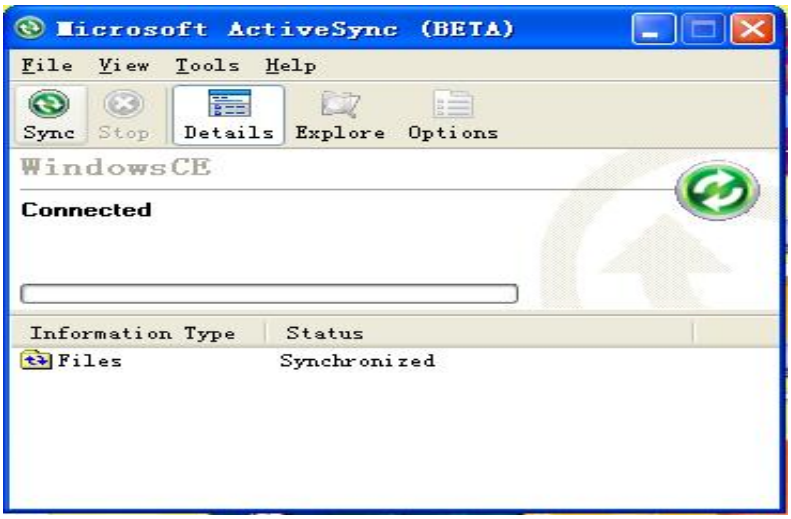
5.Select **Files**



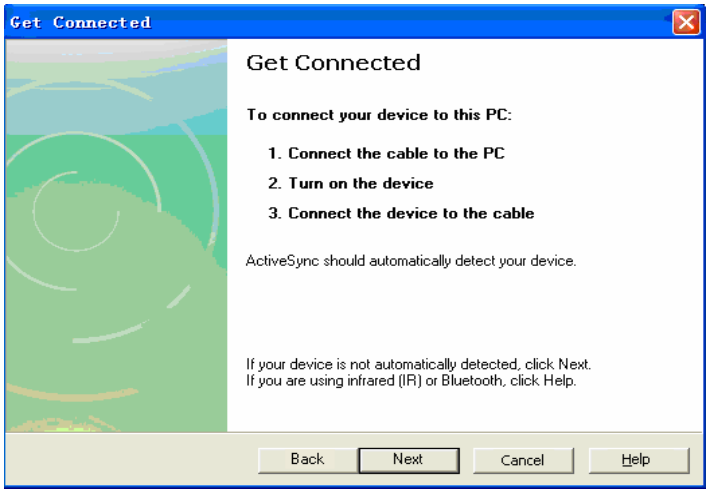
6. Click **Finish**.



7. PC will synchronize with EX-9162M51A

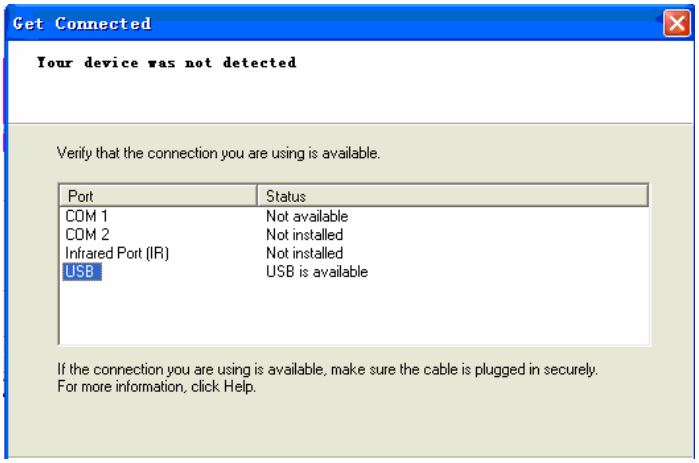


If ActiveSync does not connect with EX-9162M51A automatically, please do it manually.
Select **File** → **Connection settings** → click **connect** → Click **Next**.



Then the ActiveSync will start connecting with EX-9162M51A. You can get voice from earphone.

If ActiveSync can not detect EX-9162M51A, the dialog will pop up, please check the USB cable or refer to the ActiveSync Help information



8. Click **Explorer** to view the files in EX-9162M51A

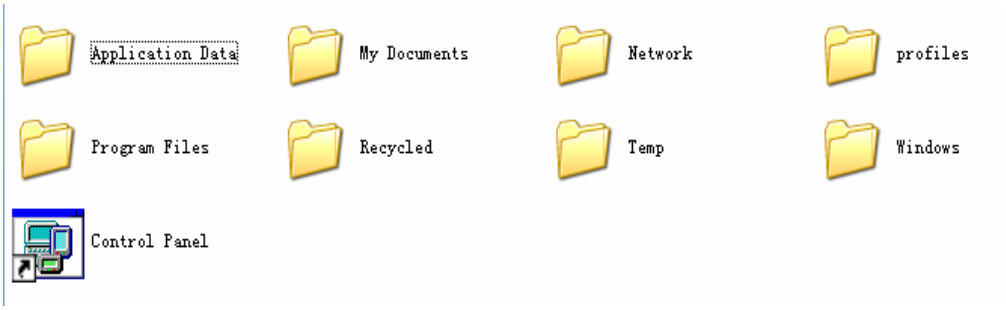
3.3 How To Download Files into EX-9162M51A

This chapter describes how to download users' files to EX-9162M51A. Before downloading, please connect PC to EX-9162M51A through ActiveSync with USB cable.

1. When you are developing an application in EVC or Microsoft Visual Studio, downloading will be done automatically when you've compiled your application. The EVC and Visual Studio finish compiling first, then use ActiveSync to download the result files of compilation to the EX-9162M51A.

2. In case of downloading other files into the EX-9162M51A, please click **My Computer** in PC desktop, and you will find an icon **Mobile Device,** which will show up when you 've installed the Microsoft ActiveSync).

You can also open the ActiveSync and click Explorer, and you will see all the files in the EX-9162M51A like the picture below.



It is just like a folder of PC, copy and remove files like what you do in PC.

3.4 SDK Install / Uninstall

Before developing Windows CE 6.0 applications for EX-9162M51A, an installation of M51 SDK(M51-SDKXX.MSI) is required. It can guarantee that your program be executed correctly in WinCE 6.0 OS. This is the standard Microsoft WinCE application development SDK. Please refer to the corresponding Microsoft document for the related application development.

3.4.1 Install SDK

The following steps will lead you to install the M51 SDK into your Windows OS source code tree and the Microsoft® eMbedded VC++ or Microsoft Visual Studio 2005 development environment.

1. Install EVC or Visual Studio 2005 from the installation discs if you haven't installed neither of them. Also, you can obtain the EVC installation files from the Microsoft Web Site (http://www.microsoft.com/downloads/details.aspx?familyid=1DACDB3D-50D1-41B2-A107-FA75AE960856&displaylang=en), it's free of charge.

2. Obtain the SDK installation file, M51-SDKX.X.msi, from CD. This file provides the resources for application development.

3. Open the msi file, follow the guides provided by the wizard to install. This installation needs about 110MB disk space.
Now you can start to develop your own WinCE 6.0 applications for the EX-9162M51A.

3.4.2 Uninstall SDK

This section describes how to remove an installation of M51 SDK from your PC.
Remove the SDK step by step:
1. Make sure you are not using the SDK when you are using the EVC or Visual Studio 2005.
2. Right click the icon **M51-SDKX.X.msi**, then select **Uninstall**.

3.5 APIs Summary

3.5.1 Overview

EX-9162M51A API modules cover WiFi, BT, Audio, CANBUS, DIO, Voltage, SPI, I2C, HSI2C, Communication, and so on.

3.5.2 Headers

File Type	Definition
Head file	M51Base.h EX-9162M51ACtl.h Public.h Communication/ Communication.h Communication/ SPI/ SPICom.h Communication/ SPI/ ecspibus.h Communication/ HSI2C/ HSI2CCom.h Communication/ HSI2C/ hsi2cbus.h Communication/ I2C/ I2CCom.h Communication/ I2C/ i2cbus.h
Library file	M51SeriesAPI.lib M51SeriesAPI.dll
Example	M51Test.exe

3.5.3 API Member

init	BOOL GetLibraryVersion(char *pVer)
	CEX-9162M51ACtl* Create(BYTE& nErrcode)
	BOOL HasOpened(void)
	BOOL Open(void)
	BOOL Close(void)
WIFI/BlueTooth	BOOL WiFiBTPowerOn(int nModule)
	BOOL WiFiBTPowerOff(int nModule)
Audio	BOOL SetAudioIn(int channelIn)
	BOOL SetSpeakerCh(int channelOut)
	BOOL SetAudioVolume(int nLVol,int nRVol)
	BOOL GetAudioVolume(int& nLVol,int& nRVol)
CANBUS	BOOL sCANOpen(void)
	BOOL sCANClose(void)
	BOOL sCAN_SetConfig(CANStructure aCANConfig)
	BOOL sCAN_GetConfig(CANStructure& aCANConfig)
	BOOL sCANSend(unsigned char* pBuf, int nLen)
	BOOL sCANRead(unsigned char* pBuf, int nLen)
	BOOL sDIO_SetConfig(DIO16 nPortConfig)
	BOOL sDIO_GetConfig(DIO16& nPortConfig)
	BOOL sSetDOState(DIO16 nPortOut)
	BOOL sGetDIState(DIO16& nPortIn)
	BOOL sGetAINState(AIOADC& nAIOIn)

	BOOL SetAINConfig(AIOCONFIG aAIOConfig)
	BOOL GetAINConfig(AIOCONFIG& aAIOConfig)
Voltage	BOOL ADCGetSingleChannelEightSamples(WORD channels, WORD* pADCOut)
	BOOL SetVoltage(REGULATOR_VREG regulator, REGULATOR_VREG_VOLTAGE voltage)
	BOOL GetVoltage(REGULATOR_VREG regulator, REGULATOR_VREG_VOLTAGE* voltage)
Communication（HSI2C）	BOOL HasOpened(void)
	BOOL Open(void)
	BOOL Close(void)
	DWORD Read(BYTE* byDataAry, DWORD nLen,DWORD& nOPLen)
	DWORD Write(BYTE* byDataAry, DWORD nLen,DWORD& nOPLen)

3.5.4 API Description

1. CM51Base::GetLibraryVersion

Get the software version number

BOOL GetLibraryVersion(char *pVer);

Parameters

pVer

Point to obtain the version number;

Return value

TRUE if return the version number, else NULL.

2. CEX-9162M51ACtl:: Create

Create EX-9162M51A object

CEX-9162M51ACtl* Create(pNotifyFun notifyFun,BYTE& nErrcode);

Parameters

notifyFun

` Point to a callback function pointer. Define a global function, passing the function name can be.

This callback function is used to pass the latitude and longitude GPS module receives data, it declared:

typedef void (*pNotifyFun)(char* pData,int nType);

pData: Transmission of data content

nType: Transfer data length

nErrcode

Specifies the create error code.

Error code define list:

#define CREATE_OK 0

#define PARAM_INVALID 1

#define MEM_LACK 2

#define NOT_FIND_DLL 3

Return value

TRUE if return a points to a EX-9162M51A object, else NULL.

3. CM51Base:: HasOpened

EX-9162M51A Communication ports are open

BOOL HasOpened(void);

Parameters

NONE

Return value

Return TRUE for all ports are open, FALSE have the port is not enabled.

4. CM51Base:: Open

Open EX-9162M51A on the Communication Port

BOOL Open(void);

Parameters

NONE

Return value

Return TRUE open all ports, FALSE have the port is not open.

5. CM51Base:: Close

Close EX-9162M51A on the Communication Port

BOOL Close(void);

Parameters

NONE

Return value

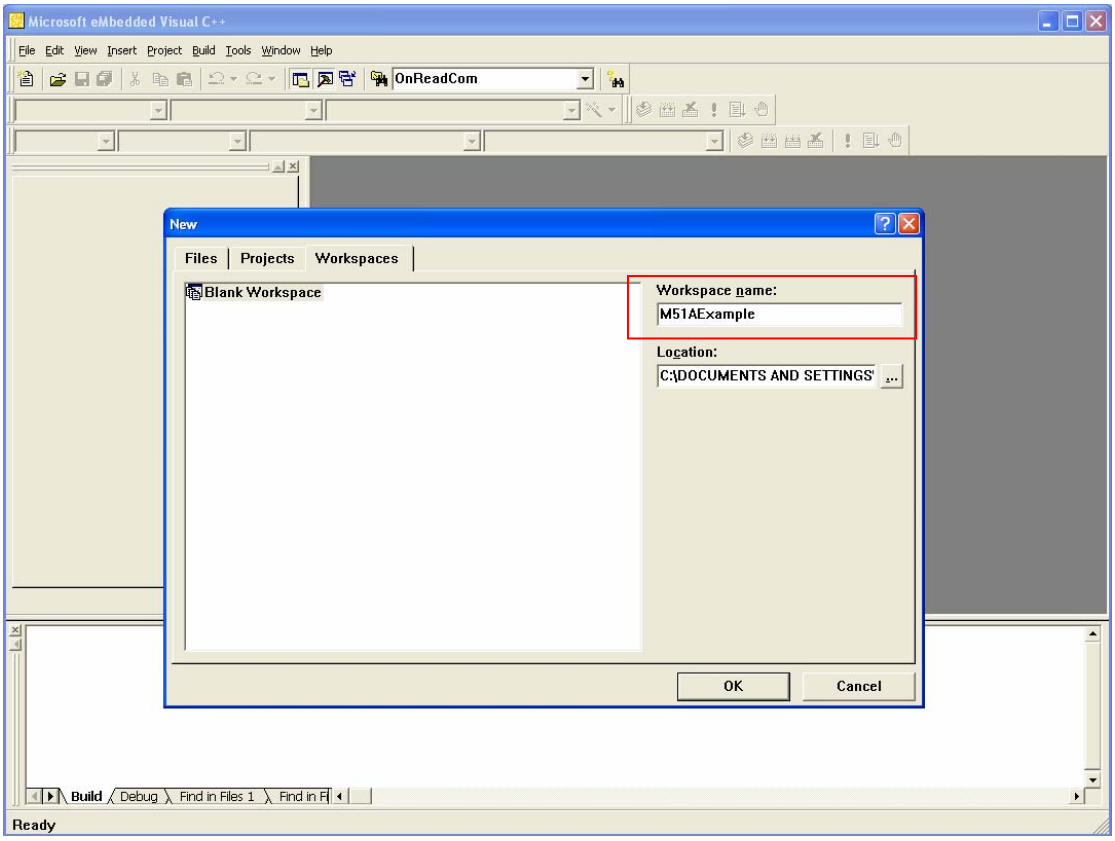
Return TRUE success, else failure.

3.5.5 An Example to call APIs in C/C++

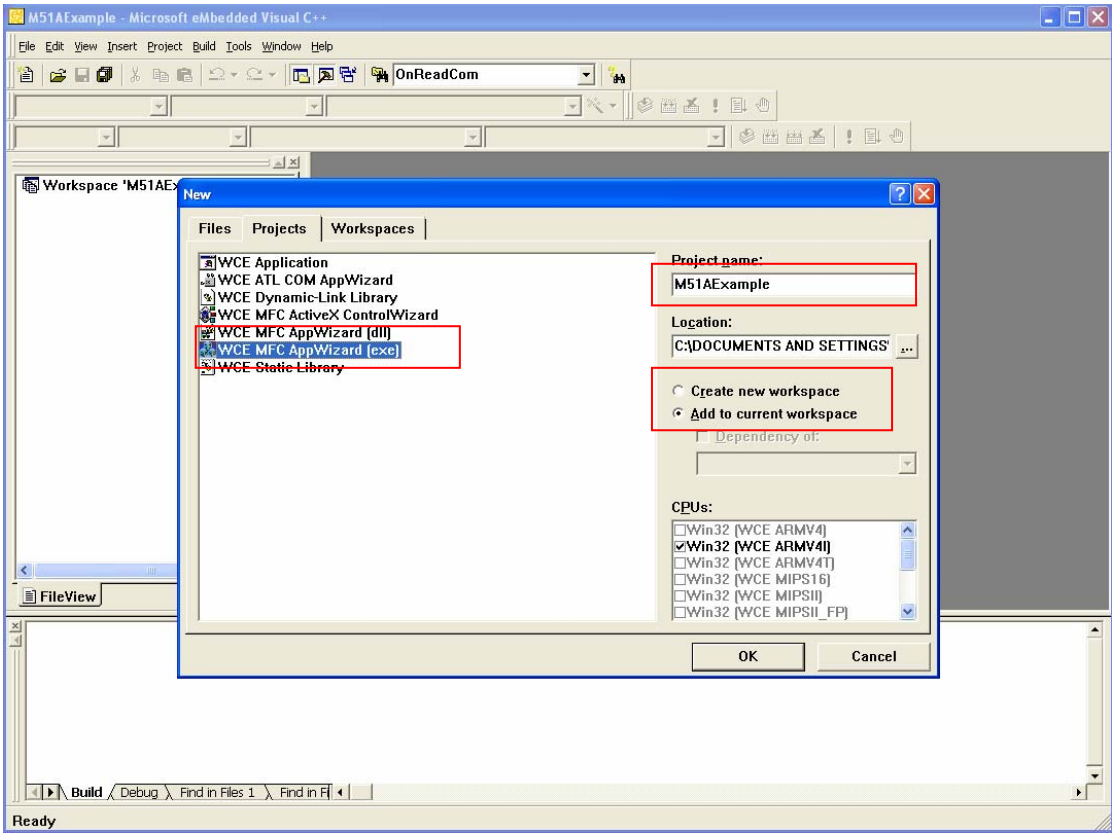
Below is an example to create works and initialization steps under EVC.

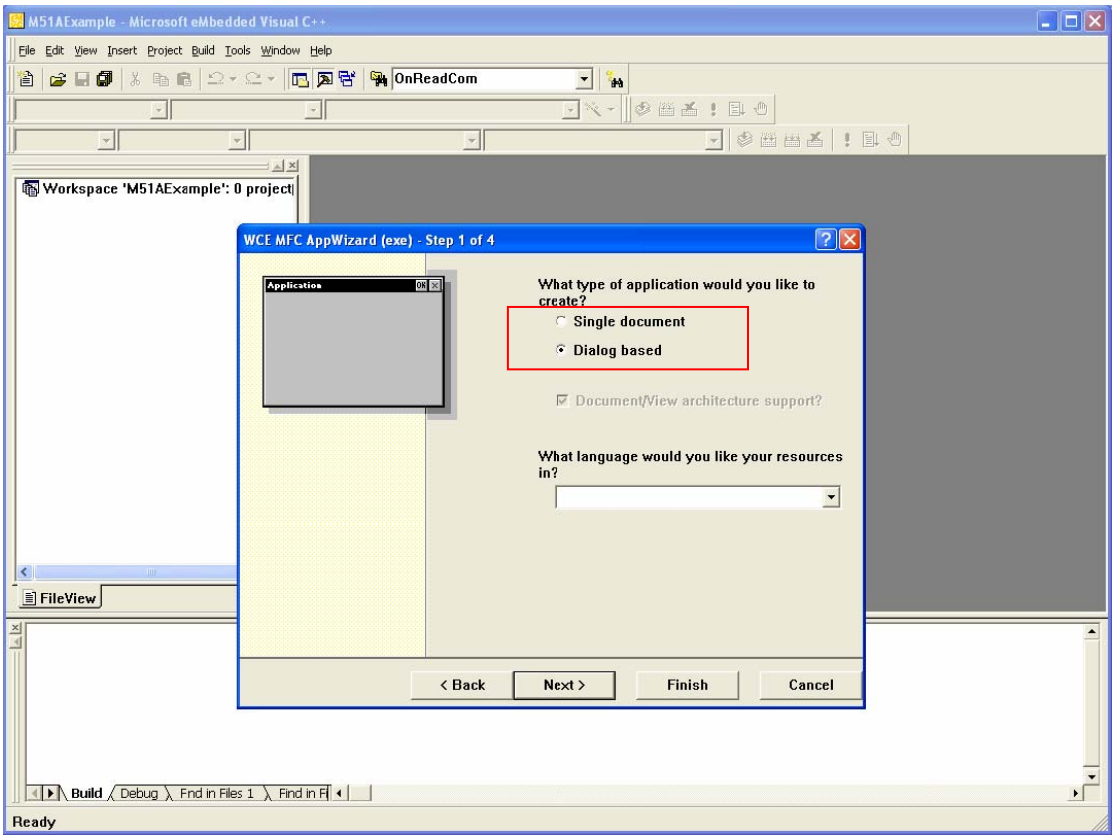
1. create a new dialog-based applications engineering, works entitled "EX-9162M51AExample".

"**File**"-"**new**"- choose Workspaces tab



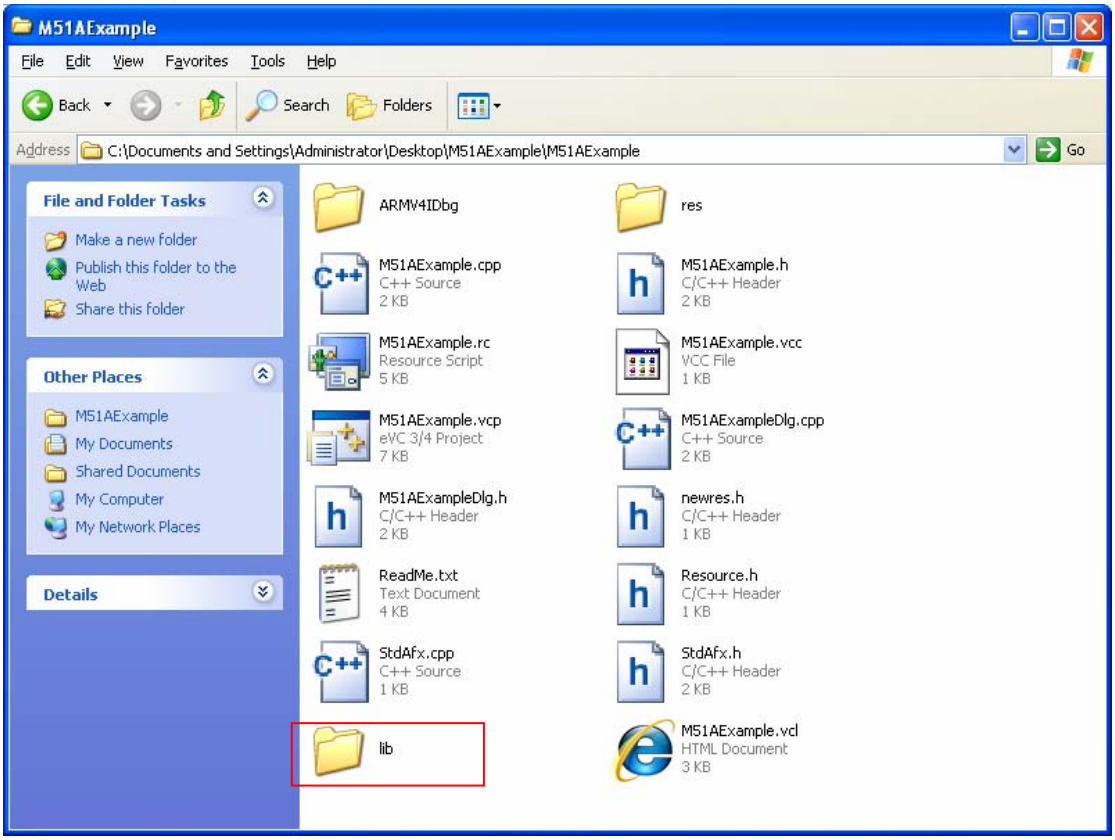
"**File**"-"**new**"- choose Projects tab



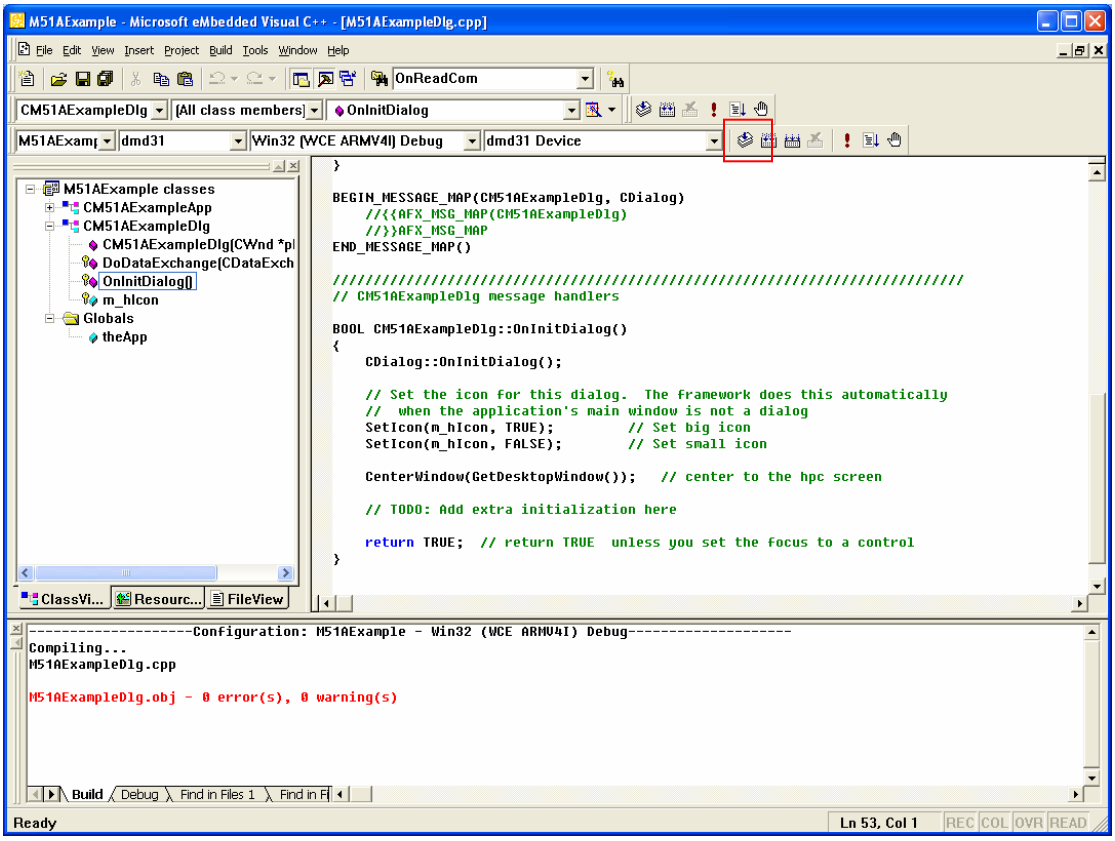


click “**Next**” until accomplishment.

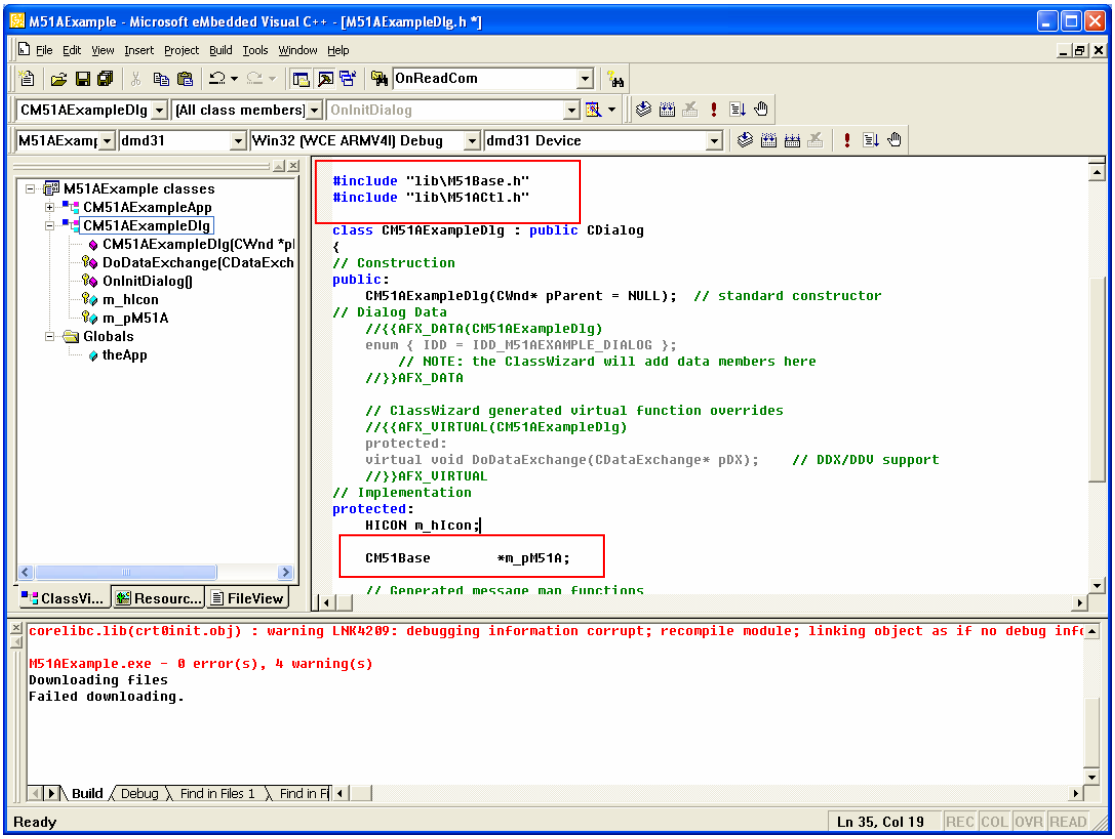
It will provide the lib folder copied to the project directory.



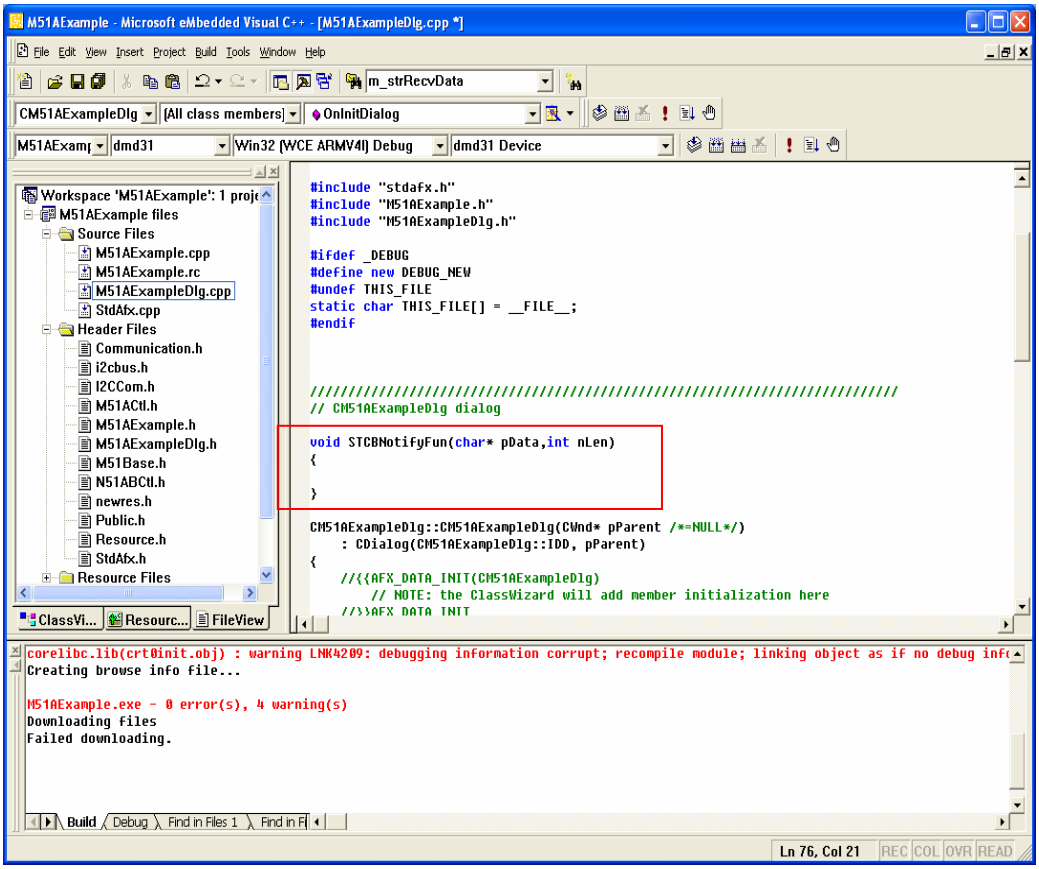
Click “**Compile**”, shown below.

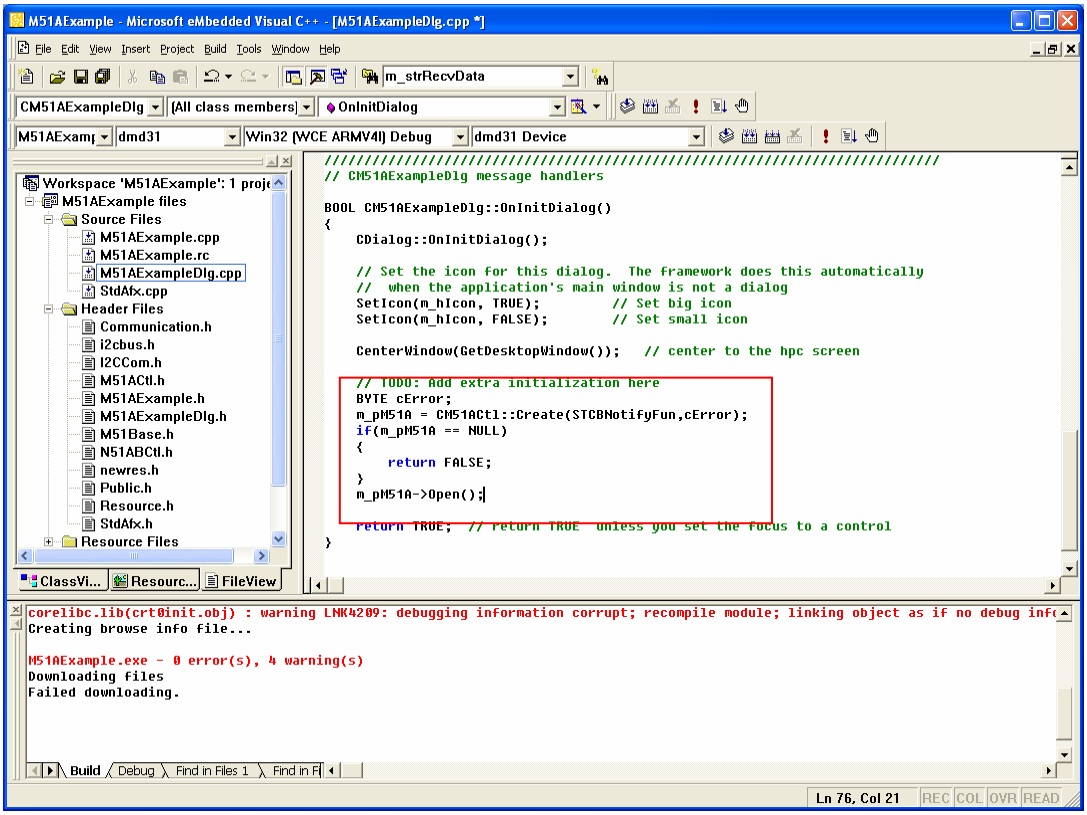


2. Add the following code into the file **EX-9162M51AExampleDlg.h**.



Add the following code into the file **EX-9162M51AExampleDlg.cpp.**
Defined as the callback function global function STCBNotifyFun.





Now, the object of EX-9162M51A pointer has been created, instantiated as above, so you can access the **M51SeriesAPI.lib** through this pointer, which provides the public methods. More details, please refer to the file **EX-9162M51ACtl.h**.

Appendix A: LCD Panel Selection & Rotation Setting

A.1 Configure EX-9162M51A and Run Up

Please make the connection between peripherals and EX-9162M51A.

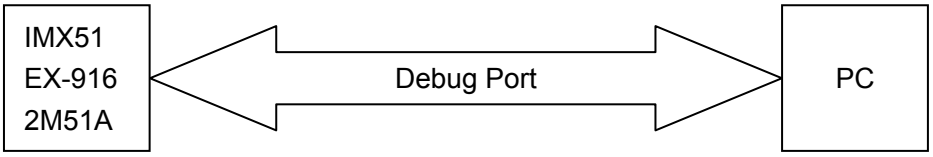
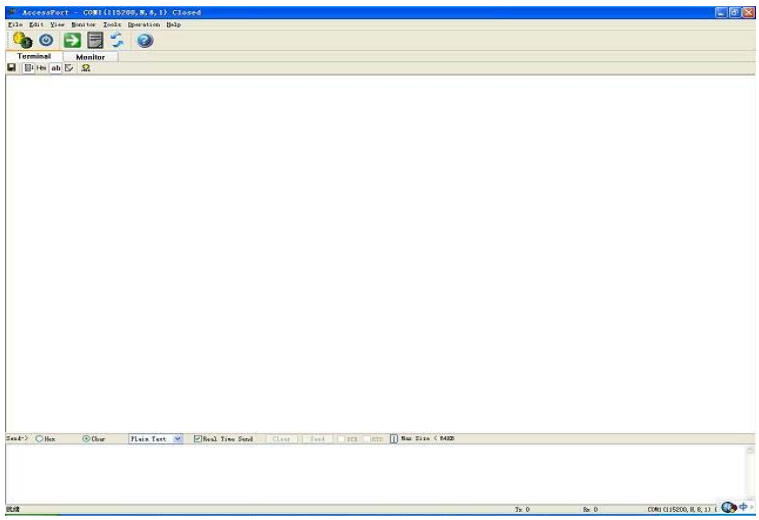
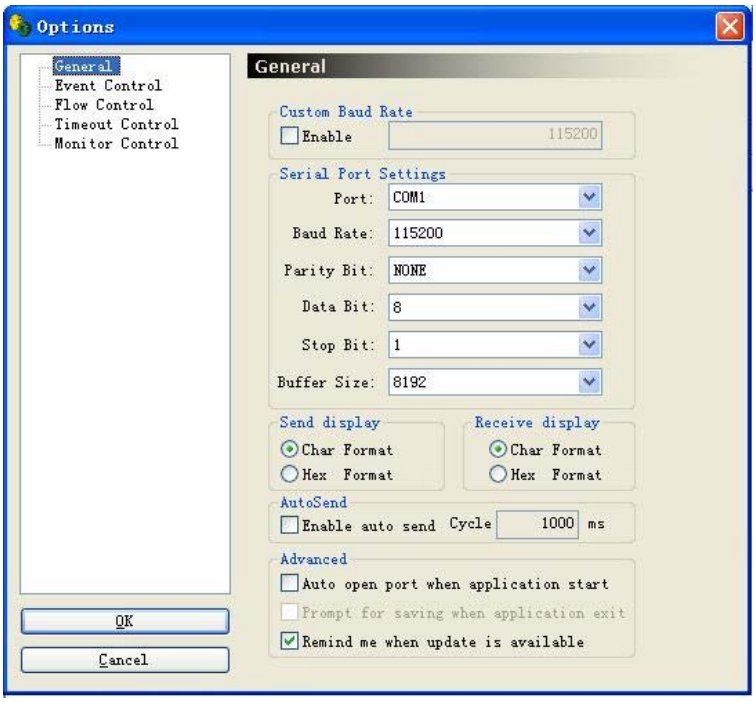


Figure A1: To connect EX-9162M51A to PC with debug port

Find and run the AccessPort.exe, double-click it.
*AccessPort is a COM port. When you use HyperTerminal on your PC, random codes or no data output may appear, however, it will not appear in AccessPort.



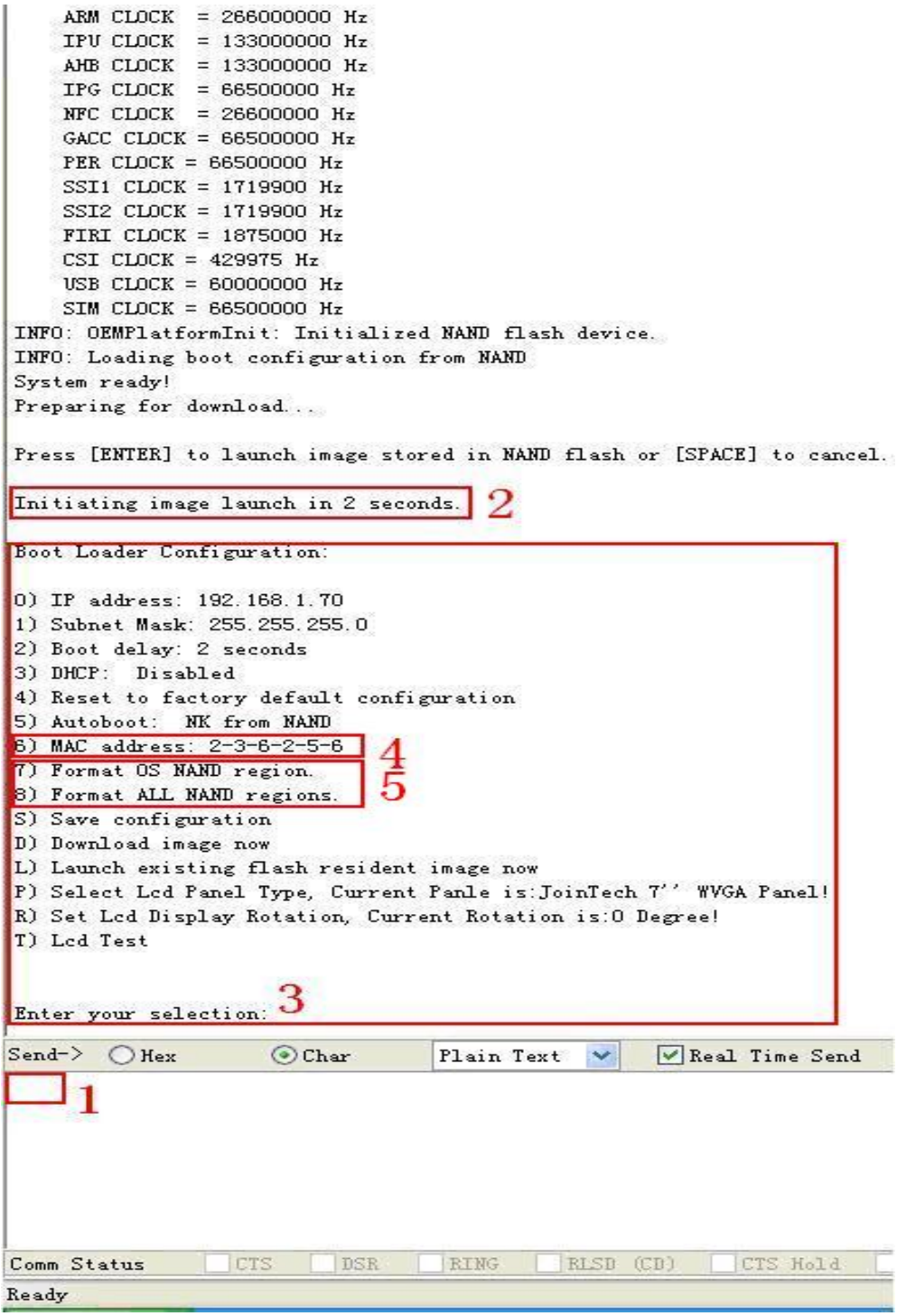
Please configure as the right figure



Click the Switch

Configure as below

** Eboot Operation Screen, please pay attention to the notes below


ARM CLOCK = 266000000 Hz
IPU CLOCK = 133000000 Hz
AHB CLOCK = 133000000 Hz
IPG CLOCK = 66500000 Hz
NFC CLOCK = 26600000 Hz
GACC CLOCK = 66500000 Hz
PER CLOCK = 66500000 Hz
SSI1 CLOCK = 1719900 Hz
SSI2 CLOCK = 1719900 Hz
FIRI CLOCK = 1875000 Hz
CSI CLOCK = 429975 Hz
USB CLOCK = 60000000 Hz
SIM CLOCK = 66500000 Hz
INFO: OEMPlatformInit: Initialized NAND flash device.
INFO: Loading boot configuration from NAND
System ready!
Preparing for download...
Press [ENTER] to launch image stored in NAND flash or [SPACE] to cancel.
Initiating image launch in 2 seconds.
2
Boot Loader Configuration:
0) IP address: 192.168.1.70
1) Subnet Mask: 255.255.255.0
2) Boot delay: 2 seconds
3) DHCP: Disabled
4) Reset to factory default configuration
5) Autoboot: NK from NAND
6) MAC address: 2-3-6-2-5-6
4
7) Format OS NAND region.
8) Format ALL NAND regions.
5
S) Save configuration
D) Download image now
L) Launch existing flash resident image now
P) Select Lcd Panel Type, Current Panle is:JoinTech 7'' WVGA Panel!
R) Set Lcd Display Rotation, Current Rotation is:0 Degree!
T) Lcd Test
Enter your selection:
3
Send-> Hex Char Plain Text Real Time Send
1
Comm Status CTS DSR RING RLSD (CD) CTS Hold
Ready

Eboot screen lasts for only 3 sec, then it will proceed WinCE automatically.
Due to short waiting time, please operate it as quickly as you can.
Please refer to the above figure and pay attention to the below:

1. To move Mouse to icon "**1**",
2. Power On EX-9162M51A. Please touch "Space Bar" on your keyboard once Eboot Screen show up as icon "**2**"

Till icon "**3**" show up, you could do some selection, else try again

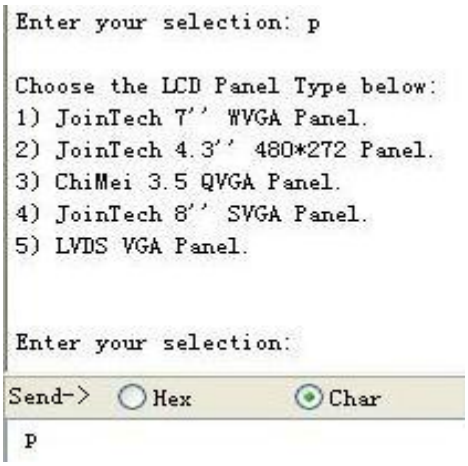
3. Input MAC address, the first digit **MUST** be **even**.

Caution!

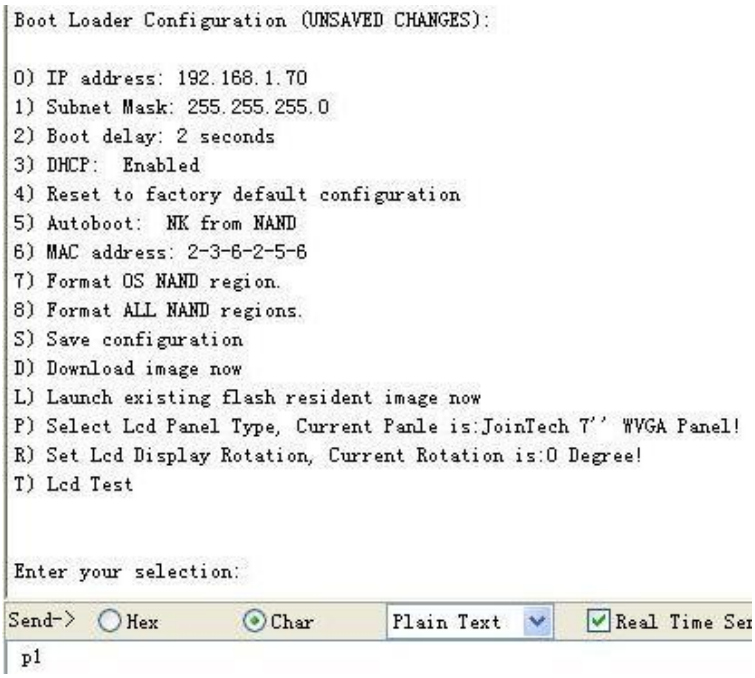
Don't select icon "5", this will erase WinCE even Eboot, and all will crash.

A.2 Panel Selection

Input ' **P'**. Attention: there is a 'space' before 'P'.
There are 5 models of LCD panel for selection.

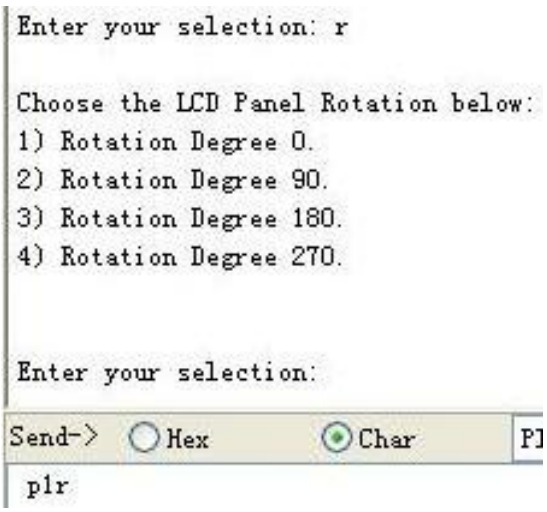


The default is '**1**', you can select the model number of the panel you selected.

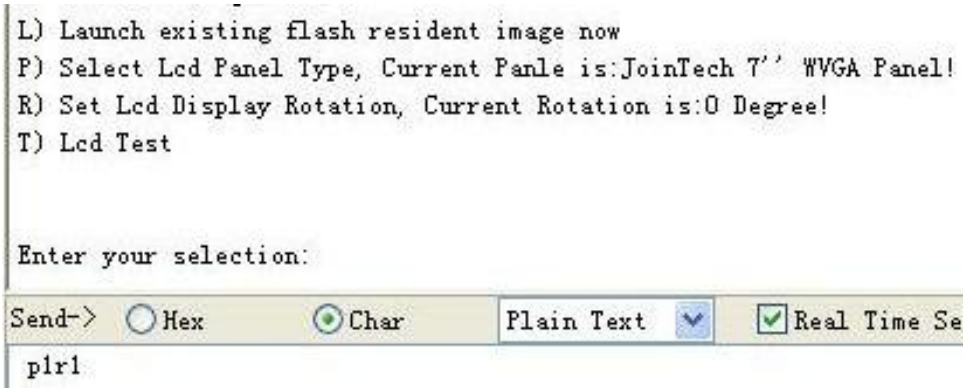


A.3 Panel Rotation

Select '**r**'

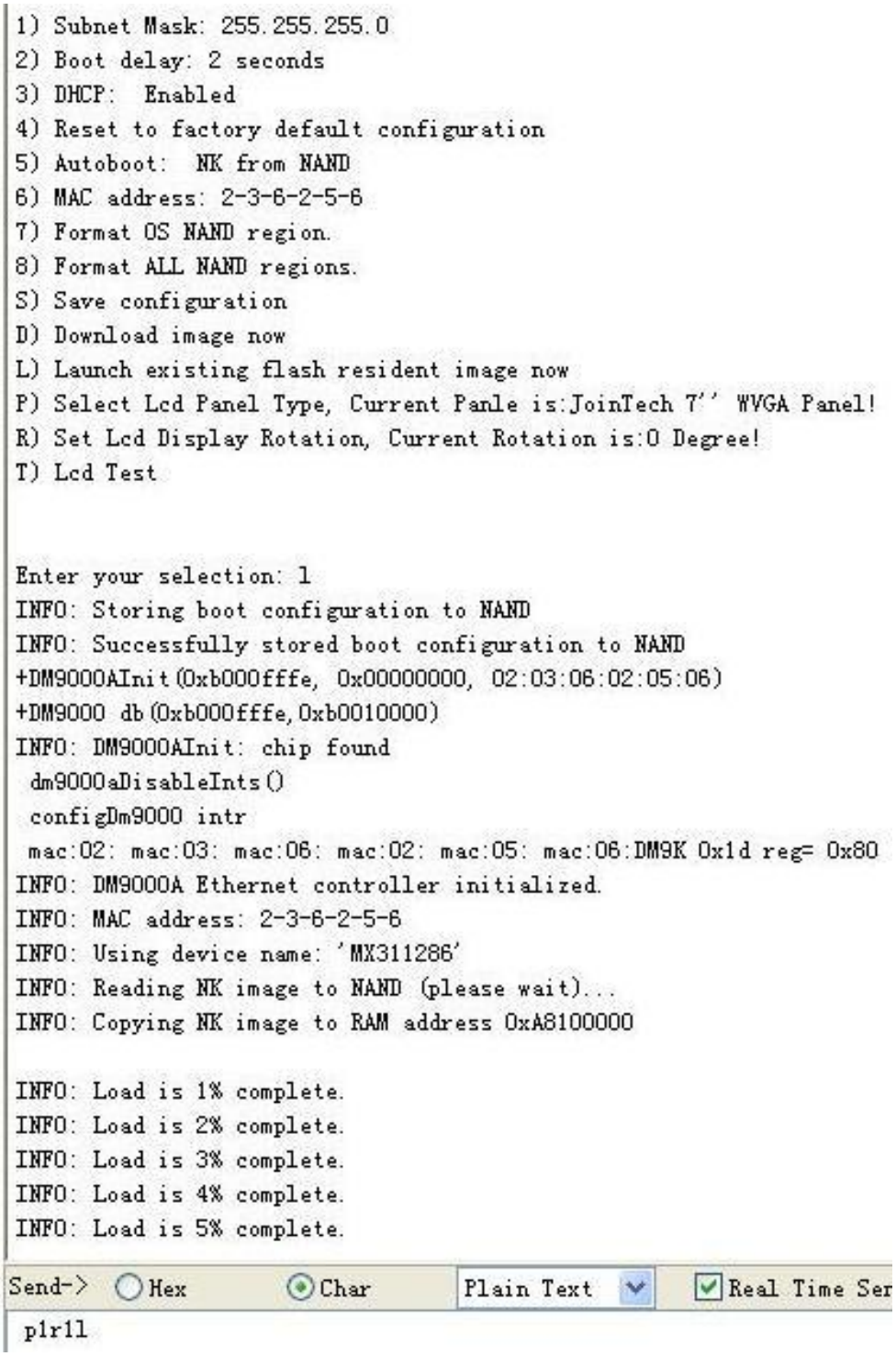


Default is '**0**'



A.4 Save and Launch

Choose '**L**'，the system will save and launch automatically.


1) Subnet Mask: 255.255.255.0
2) Boot delay: 2 seconds
3) DHCP: Enabled
4) Reset to factory default configuration
5) Autoboot: NK from NAND
6) MAC address: 2-3-6-2-5-6
7) Format OS NAND region.
8) Format ALL NAND regions.
S) Save configuration
D) Download image now
L) Launch existing flash resident image now
P) Select Lcd Panel Type, Current Panle is:JoinTech 7'' WVGA Panel!
R) Set Lcd Display Rotation, Current Rotation is:0 Degree!
T) Lcd Test
Enter your selection: 1
INFO: Storing boot configuration to NAND
INFO: Successfully stored boot configuration to NAND
+DM9000AInit(0xb000fffe, 0x00000000, 02:03:06:02:05:06)
+DM9000 db(0xb000fffe,0xb0010000)
INFO: DM9000AInit: chip found
dm9000aDisableInts()
configDm9000 intr
mac:02: mac:03: mac:06: mac:02: mac:05: mac:06:DM9K 0x1d reg= 0x80
INFO: DM9000A Ethernet controller initialized.
INFO: MAC address: 2-3-6-2-5-6
INFO: Using device name: 'MX311286'
INFO: Reading NK image to NAND (please wait)...
INFO: Copying NK image to RAM address 0xA8100000
INFO: Load is 1% complete.
INFO: Load is 2% complete.
INFO: Load is 3% complete.
INFO: Load is 4% complete.
INFO: Load is 5% complete.
Send->
Hex
Char
Plain Text
Real Time Ser
p1r1l

Appendix B: iMX51 image file(NK) Download

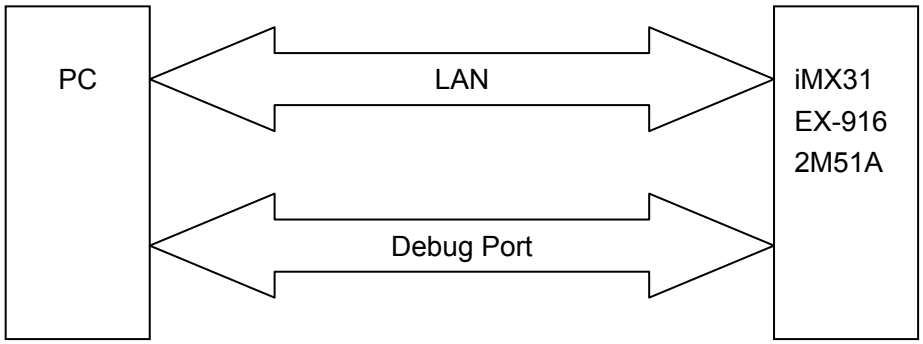
B.1 Setup and Configure

Before that, we need some COM Tool to display some debug message, COM tool may be AccessPort or HyperTerminal or others.

Please make the operation step by step.

1.Run up AccessPort. Please refer to A.1 Configure and Run for the guide if necessary.

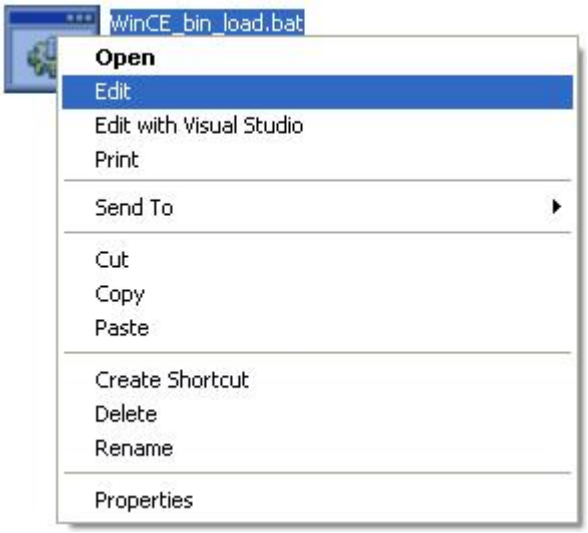
2. Connect the peripherals to EX-9162M51A board. Please refer to 2.7.2 LAN Configure and 2.13 Serial Port for the guide if necessary.



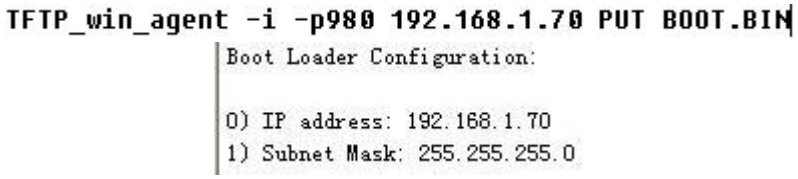
3. **Power on** and enter into the interface **EBOOT SETTING**.
   Please refer to Appendix A: Boot Setting for more details

Find out the installation document **WinCE_bin_load.zip**, then unzip it.

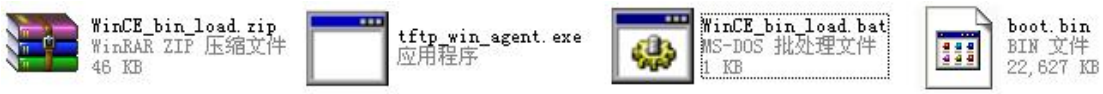
IP setting:



Set the IP address. Make sure the two have same IP addresses



Copy the newest NK to the same directory, and NK's name must be 'boot.bin'.



B.2 Download NK

NK is an executable image file for EX-9162M51A. You could create it with Microsoft Platform Builder.

Here we brief how to download NK into EX-9162M51A

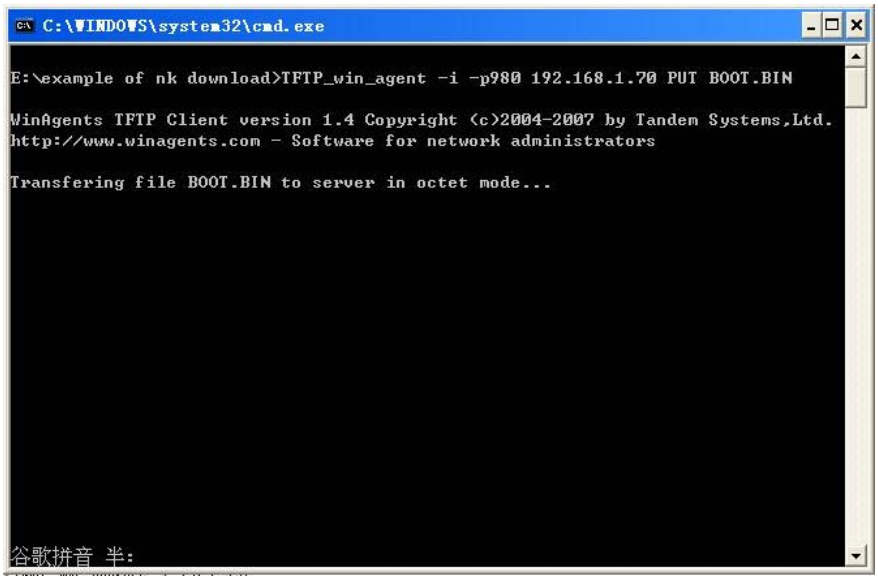
Input '**dy**'

```
Boot Loader Configuration:

0) IP address: 192.168.1.70
1) Subnet Mask: 255.255.255.0
2) Boot delay: 2 seconds
3) DHCP:  Disabled
4) Reset to factory default configuration
5) Autoboot:  NK from NAND
6) MAC address: 2-3-6-2-5-6
7) Format OS NAND region.
8) Format ALL NAND regions.
S) Save configuration
D) Download image now
L) Launch existing flash resident image now
P) Select Lcd Panel Type, Current Panle is:JoinTech 7'' WVGA Panel!
R) Set Lcd Display Rotation, Current Rotation is:0 Degree!
T) Lcd Test


Enter your selection: d
+DM9000AInit(0xb000fffe, 0x00000000, 02:03:06:02:05:06)
+DM9000 db(0xb000fffe,0xb0010000)
INFO: DM9000AInit: chip found
 dm9000aDisableInts()
 configDm9000 intr
 mac:02: mac:03: mac:06: mac:02: mac:05: mac:06:DM9K 0x1d reg= 0x80
INFO: DM9000A Ethernet controller initialized.
INFO: MAC address: 2-3-6-2-5-6
INFO: Using device name: 'MX311286'
+EbootSendBootmeAndWaitForTftp
Sent BOOTME to 255.255.255.255
Sent BOOTME to 255.255.255.255
```

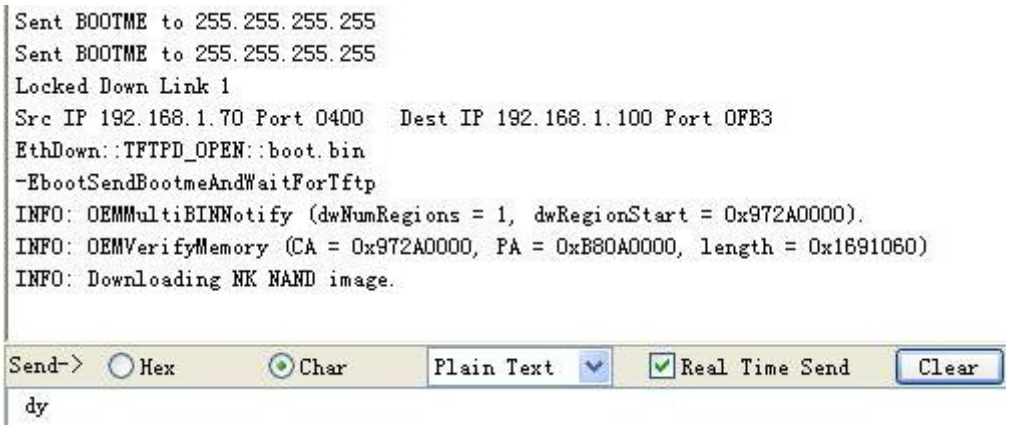
Send-> Hex Char Plain Text Real Time Send

dy

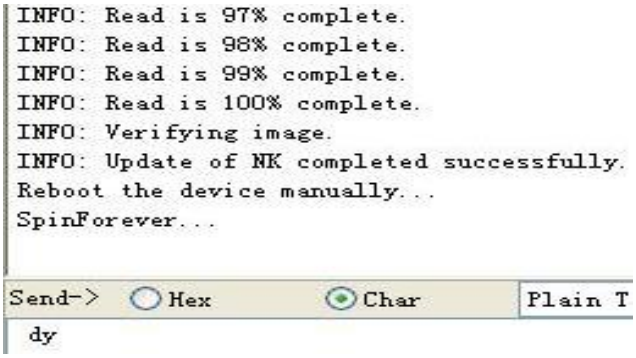
Double-click **WinCE_bin_load.bat**



AccessPort(*) output is below:
*AccessPort is a COM tool, you can also use HyperTerminal



Download is Completed.

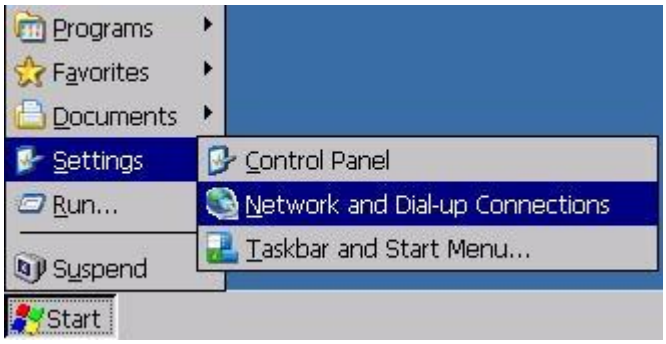


Power on again, you will launch the latest WinCE

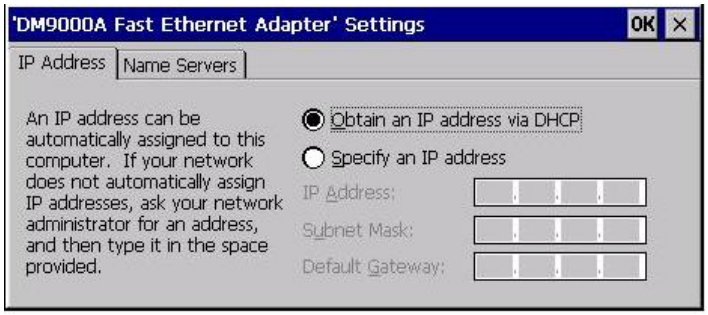
Appendix C: EX-9162M51A IP Setting

Please follow the steps to set the IP address.

1. Open

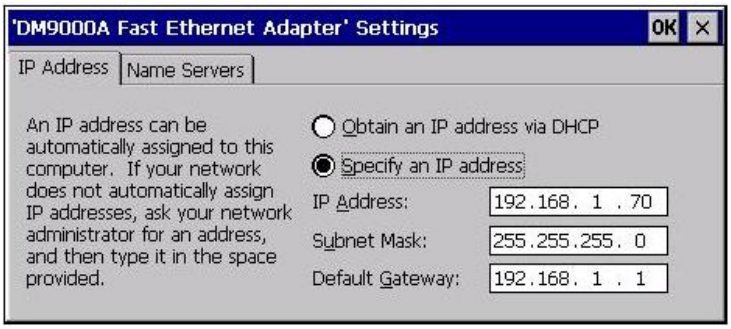


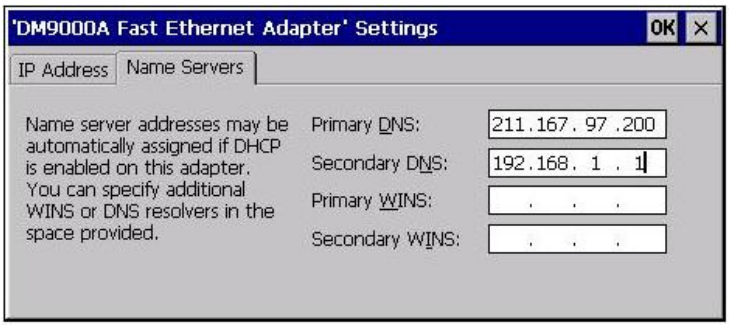
2. IP setting



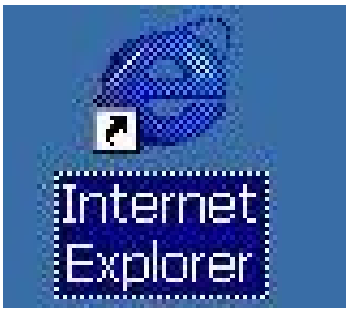
Select Keyboard

Set the IP address





3. Login network

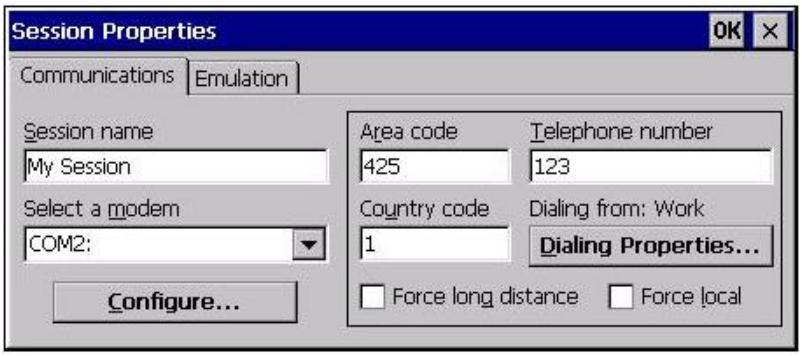


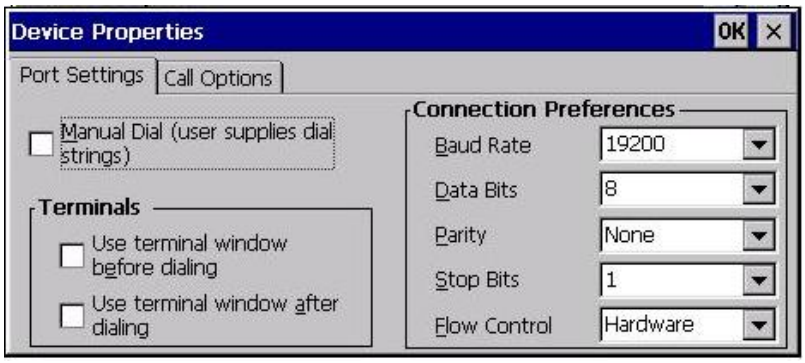
Appendix D: Terminal Tool Setting

Please set the terminal tools step by step.

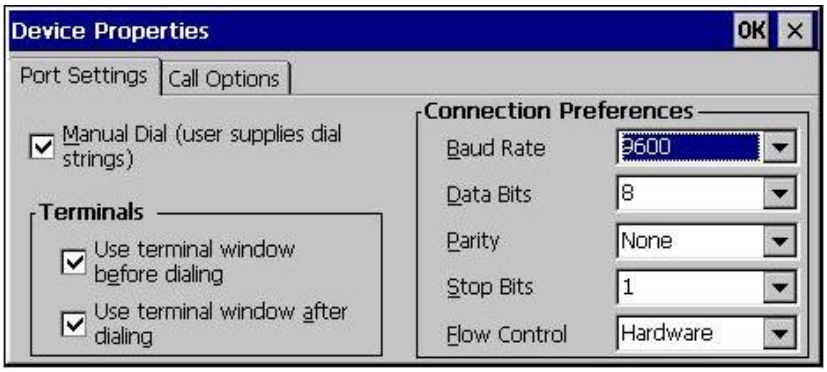
1. Open

2. Creating and setting





When setting is completed, a window will pop out as the right figure.



3. Close

You could double click to bring in a Terminal on successful creation.