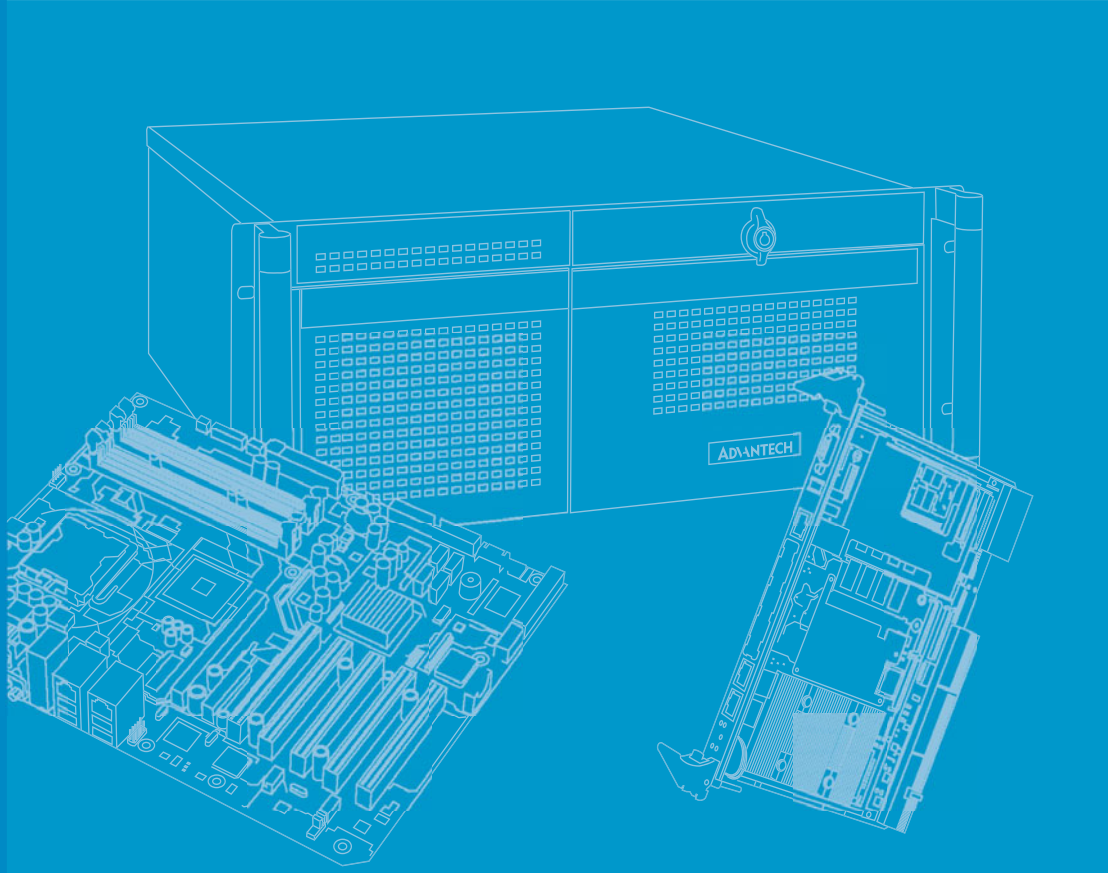

User Manual

RSB-4210 Evaluation Kit

Freescale i.MX53 Processor - ARM® Cortex™ A8 Architecture

ADVANTECH

Enabling an Intelligent Planet

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Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- RSB-4210 (P/N: RSB-4210CF-A78AAE)
- 7" LED PANEL 320N 4WR T/S 800X480(G), 97G070V1N0F-2, P/N: 96LEDK-A070WV32RB1)
- LCD Backlight Cable (P/N: 1700019577)
- LVDS Cable (P/N: 1700014418)
- Touch Cable (P/N: 1700000194)
- SQFlash SD Card SLC 2G, 2CH(-40 ~ 85° C) (P/N: SQF-ISDS2-2G-ETE)
- A CABLE SATA 15P/1*4P-2.5 35cm for AIMB-213 (P/N: 1700018785)
- M Cable SATA 7P/SATA 7P 8CM C=R 180/180 (P/N:1700004711)
- Mini USB Host Cable (P/N: 1700019076)
- Mini USB Client Cable (P/N: 1700019077)
- USB Type-A Cable (P/N: 1700019129)
- ADAPTER 100-240 V 65 W 19 V 3.42 A 9NA0651256 (P/N: 1757003734)
- A Cable 2*8P-2.0/SPEAKER*2+DC JACK*3 40CM(P/N: 1700019546-11)
- F Cable IDE#2 10P-2.0/D-SUB 9P(M) 25CM (P/N: 1700100250)
- Terminal connector 9P Female (P/N: 1654909900)
- DVD-ROM for RSB-4210 Evaluation Kit (P/N: 2062421011)
- RS-232 and RS-485 cable (P/N: 1700019474)
- RS-422 cable (P/N: 1700019476)

Power Cord (Optional)

- 3 pin Power Cord for USA standard (P/N: 1700001524)
- 3 pin Power Cord for Europe standard (P/N: 170203183C)
- 3 pin Power Cord for UK standard (P/N: 170203180A)

Charger Board & Battery (Optional)

- A cable 1*6P-2.5/1*6P-2.5 140 mm (P/N: 1700018394)
- A cable 2*4P-2.0/2*4P-2.0 90 mm (P/N: 1700018395)
- PCM-739 Battery charger Board (P/N: 969K073900E)
- Battery 11.1 V 6300 mAh 3S3P (P/N: 1760001300)

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment does not work well, or you cannot get it to work according to the user's manual.
    - The equipment has been dropped and damaged.
    - The equipment has obvious signs of breakage.

Contents

Chapter 1

Overview

This chapter briefly introduces the RSB-4210 Platform and RSB-4210 Evaluation Kit.

1.1 Introduction

In order to offer potential RISC-based Design-to-Order-Service (DTOS) project customers with a more efficient and low risk evaluation tool, Advantech provides a variety of RISC-based evaluation kits. Before DTOS projects kick-off, customers can check their designs with these kits in detail more easily. The evaluation kits are already equipped with all of the necessary H/W and S/W parts which customers will need, thus reducing design effort and speeding up application development.

The RSB-4210 is designed as a single board computer (SBC) solution, with a Freescale i.MX53 processor based on ARM® Cortex™ A8 architecture, which is a complete 32-bit, up to 1GHz speed SoC engine. It provides customers with a high performance board subsystem based on ARM® Cortex™ A8 which is ready-to-run, compact, and easy-to-expand in order to meet customers' versatile needs. With flexible I/O interfaces and complete hardware and software solutions, RSB-4210 is a fast time-to-market platform for customers to develop their applications and products easily without considering system integration.

The RSB-4210 Evaluation Kit is a complete system designed for customers to evaluate RSB-4210. It integrates all of the solutions that developers will need into a package for project evaluation, application development, and solution feasibility testing that decreases lead-time and lowers initial expense. All the functions included in the kit have been certified under Linux, ensuring that project development is more simple, less risky and easier to implement.

1.2 Features

RSB-4210 incorporates a Freescale i.MX53 Processor - ARM® Cortex™ A8 architecture as its SoC solution. The main features of this platform are a heatsink-less and compact design, and great reliability and power management making it suitable for the following applications:

- Economical HMI (Human Machine Interface)
- Self Service / Access Control
- Fleet management / Navigation
- Hand-held data collector

And the main features of Freescale i.MX53 processor are shown as follows:

- ARM® Cortex™-A8 1GHz high performance processor
- Supports OpenGL ES 2.0 and OpenVG® 1.1 hardware accelerators
- Supports full HD 1080p video decode and HD 720p video encode hardware engine Freescale Smart Speed® Technology support low power consumption
- I/O through 3.3 V I/O voltage and wide working temperature by industrial design concept
- Rich I/O for high expansion capability: UART(5), Dual LVDS, Audio, USB Host, USB OTG, Dual LAN, SD(2), SATA(1), GPIO(20), I2C(2), SPI(1), I2S(1), CAN(1), Keypad 6X6, Touch, Mini PCI-E and System Bus
- Supports SATA storage interface and CAN bus for vehicle application
- Supports Android2.3, Embedded Linux2.6 and Windows Embedded Compact 7
- Support wide working temperature -40 ~ 85° C operation temperature (optional)

1.3 Hardware Specifications

Item	Description
Kernel	
CPU	Freescale i.MX53 1GHz (ARM Cortex A8)
2D/3D Accelerators	Support OpenGL ES 2.0 and OpenVG™ 1.1 hardware accelerators
System RAM	512 MB (Optional: 256 MB)
Onboard Flash	2 GB (Optional: None)
RTC	Yes
Watchdog Timer	Yes
Reset	H/W reset & S/W reset
I/O	
COM	COM 1, RS-232, 2–wire(TX/RX), Pin header, (Debug port) COM 2, RS-232, D-Sub9 Connector(TX/RX/RTS/CTS) COM 3, RS-485, 2-pin Phoenix Connector COM 4, 3.3 V TTL, 4–wire(TX/RX/RTS/CTS), Pin header COM 5, RS-232, 4–wire(TX/RX/RTS/CTS), Pin header
Ethernet LAN	2 x 10/100 BASE-T (RJ-45)
USB Port	3 x USB 2.0 (High speed)
USB OTG	1 x USB 2.0 OTG (High speed)
SD/MMC	2 x SDIO/MMC interface (SD slot x 1+ pin header x 1)
Mini PCI-E	1 x (Controlled by USB interface only)
SIM Card slot	1
SATA	1
Touch Screen	1 x 4 - wire resistive type interface
System Bus	Yes (Address: 25 pins, data: 16 pins)
I^2C Interface	2
I^2S Interface	1
SPI Interface	1
CAN BUS	1
Hotkey/ Matrix keypad	Support 6 x 6 matrix keypad
GPIO	20 pins 3.3 V TTL level GPIOs
Buzzer control	Yes
Multimedia	
Graphic Chip	CPU internal LCD controller
LCD Resolution	Default: 800 x 480 7” WVGA Optional: 320 x 240 ~ 1920 x 1080
Dual LVDS	2 x 24-bit LVDS
HDMI	1 x (Co-lay with VGA)
VGA	1 x (Co-lay with HDMI)
Brightness/ Backlight Control	Yes
Audio	Line-in(Stereo),Line-out(Stereo),Speak-Out(Stereo)&Mic-in(Mono)
Power	
DC-input	9 ~ 24 V 5%
Battery Support	Yes (With external battery and charger board thru connector)

Power Consumption	Normal Run ~2.3 W Full Run ~3.8 W
Power Control	1 x Power ON/OFF Pin header 1 x H/W reset Pin header 1 x Suspend Pin header
Power Management	-Standard mode -Idle mode
Mechanical and Environmental	
Board size	146 x 102 x 20 mm (PCB thickness 1.6 mm; 8 layer)
Weight	110 g
Operation Temperature	0 ~ 60° C (32 ~ 140° F) (-40 ~ 85° C by component change)
Operating Humidity	5% ~ 95% Relative Humidity, non condensing
Vibration	3.5 G, 1000 times
Others	
RoHS	Yes
Certification	CE/FCC Class A
O.S	Embedded Linux 2.6.35 (Default), Android 2.3.4, and Windows Embedded Compact 7

1.4 Board Block Diagram

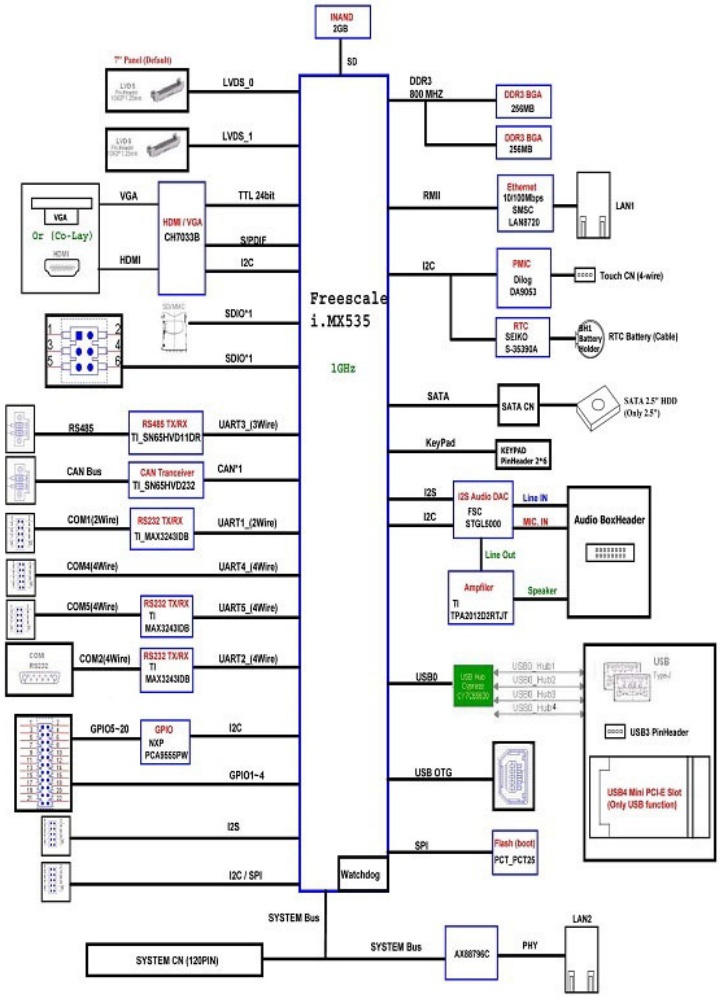


Figure 1.1 RSB-4210 Board Block Diagram

Chapter 2

H/W Installation

This chapter introduces the setup procedures of the RSB-4210 hardware, including instructions on setting jumpers and connecting peripherals, switches, indicators and mechanical drawings.

Be sure to read all safety precautions before you begin this installation procedure.

2.1 Development Kit H/W Installation

The Figure 2-1 is RSB-4210 Evaluation Kit Assembly, and the detail descriptions with Advantech P/N are shown as below.

Item	Description	Advantech P/N
Part-A	RSB-4210	(P/N: RSB-4210CF-A78AAE)
Part-B1	7” LCD-LED Backlight, LVDS, 800x480, T/S, 97G070V1N0F-2	(P/N: 96LEDK-A070WV32RB1)
Part-B2	LCD Backlight Cable	(P/N: 1700019577)
Part-B3	LVDS Cable	(P/N: 1700014418)
Part-B4	Touch Cable	(P/N: 1700000194)
Part-C	SQFlash SD Card, SLC 2GB, (-40~85°C)	(P/N: SQF-ISDS2-2G-ETE)
Part-D	SATA Power Cable	(P/N: 1700018785)
Part-E	SATA Cable	(P/N: 1700004711)
Part-F	Mini USB Host Cable	(P/N: 1700019076)
Part-G	Mini USB Client Cable	(P/N: 1700019077)
Part-H	USB Type-A Cable	(P/N: 1700019129)
Part-I	Mini Jumper	(P/N:1653302122)
Part-J	Null modem cable	(P/N: 1700091002)
Part-K	ADAPTER, 100-240V, 19V, 3.42A.	(P/N: 1757003734)
Part-L	3 pin Power Cord (USA Standard) [Optional] 3 pin Power Cord (Europe standard) [Optional] 3 pin Power Cord (UK standard) [Optional]	(P/N: 1700001524) (P/N: 170203183C) (P/N: 170203180A)
Part-M	Speaker & Audio Cables	(P/N: 1700019546-11)
Part-N1	Power Cable for Charger Board [Optional]	(P/N: 1700018394)
Part-N2	Signal Cable for Charger Board [Optional]	(P/N: 1700018395)
Part-N3	Charger Board [Optional]	(P/N: 969K073900E)
Part-N4	Battery [Optional]	(P/N: 1760001300)
Part-O1	8*8 Keypad Cable [Optional]	(P/N: 1703200180)
Part-O2	8*8 Keypad [Optional]	(P/N: 96969315A0E)
Part-P	Suspend/Reset button cable [Optional]	(P/N:1700003414)
Part-Q	COM Port Cable	(P/N: 1700100250)
Part-R	RS-232 Loopback	(P/N: 1654909900)
Part-S	Terminal Block for CAN/RS-485	(P/N: 1652002209)

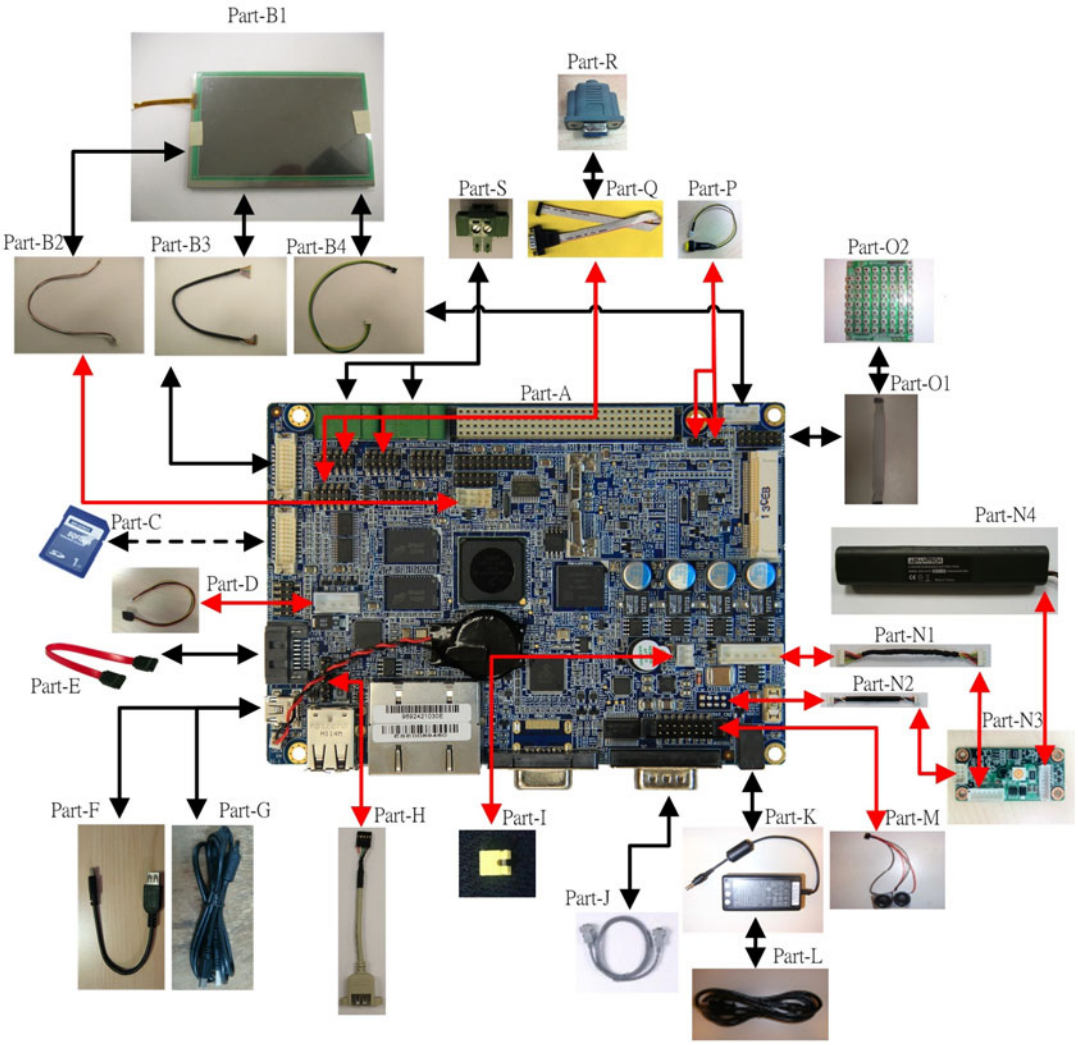


Figure 2.1 RSB-4210 Development Kit Assembly

2.1.1 RSB-4210 (Part-A)

RSB-4210 is a cost-effective, low-power, and high-performance SBC (Single Board Computer) without a heatsink, geared to satisfy the needs of industrial computing applications. Based on the Freescale i.MX53 Processor - ARM® Cortex™ A8 architecture, RSB-4210 comes with DDR3, and iNAND flash. RSB-4210 offers convenient connector layout, simple assembly, multiple common I/Os, and includes dual 10/100Mbps Ethernet, three USB (Universal Serial Bus) 2.0 connectors and five serial ports for easy system expansibility.

2.1.2 7" LVDS LCD Module (Part-B1)

The 7.0 inch Color TFT-LCD Module uses a 4-wire resistive type touch sensor. The module is designed with a wide viewing angle; wide operating temperature and long life LED backlight which is well suited for Industrial Applications. An LED driving board for backlight unit is included in this panel and the structure of the LED units is replaceable. It also has a built in timing controller and LVDS interface. The display supports the WVGA (800 (H) x 480(V)) screen format and 16.2 M colors (RGB 24bits) or 262 K (RGB 18 bits) selectable.

2.1.3 LCD Backlight Cable (Part-B2)

The LVDS backlight cable connects RSB-4210 (CN11) with the LCD backlight connector of 7" LVDS LCD Module.

2.1.4 LVDS Cable (Part-B3)

The LVDS cable connects RSB-4210 LVDS0 connector (CN8) with the LCD signal connector of 7" LVDS LCD Module.

2.1.5 Touch Cable (Part-B4)

The touch cable connects RSB-4210 (CN1) with the touch connector of 7" LVDS LCD Module.

2.1.6 SQFlash SD Card (Part-C)

The SQFlash SD card is a standard SD device. It is the flash-based solid-state drive available and uses SLC NAND flash memory, making it ideal as an embedded SSD solution. It connects on SD1 of RSB-4210.

2.1.7 SATA Power Cable (Part-D)

The SATA power cable provides the power signal for SATA HDD by connecting RSB-4210 (CN16) and the SATA HDD.

2.1.8 SATA Cable (Part-E)

The SATA cable provides the control signal with SATA HDD by connecting RSB-4210 (SATA_CN1) with the SATA HDD.

2.1.9 Mini USB Host Cable (Part-F)

The mini USB Host cable connects RSB-4210 (USB_OTG1) with one USB client device. For example, USB mouse/keyboard.

2.1.10 Mini USB Client Cable (Part-G)

The mini USB Client cable connects RSB-4210 (USB_OTG1) with PC or NB.

2.1.11 USB Type-A Cable (Part-H)

The USB extend cable provide Type-A for USB device. For example, USB mouse/keyboard.

2.1.12 Jumper (Part-I)

When plug-in the adapter with the wafer (CN17) shorted by this jumper, the system will power-on.

2.1.13 Null modem cable (Part-J)

The null modem cable connects RSB-4210 COM ports with a serial device.

2.1.14 19 V Power Adapter (Part-K)

The AC-to-DC power device provides a 19 V DC output (65 W max) with constant voltage sources (100 V ~ 240 V).

2.1.15 Power Cord (Part-L)

3P Power Cord (USA, Europe or UK standard) for 19 V Power Adapter AC input.

2.1.16 Speaker & Audio Cables (Part-M)

The cable connects with RSB-4210 (AUDIO1) and LINE-OUT, LINE-IN, MIC-IN and L&R Speakers.

2.1.17 Power Cable for Charger Board (Part-N1)

The cable provides the power for charger board. It connects RSB-4210 (BAT_CN1) with the charger board (CN2).

2.1.18 Signal Cable for Charger Board (Part-N2)

The cable provides the control signal for charger board. It connects RSB-4210 (BAT_CN2) with the charger board (CN1).

2.1.19 Charger Board (Part-N3)

The charger board provides 12v power to charge the battery when plug-in a 19v adapter, and RSB-4210 can read the battery status through this charger board.

Note! *It is necessary to use 19v adapter for charger board rather than 12v.*

2.1.20 Battery (Part-N4)

The battery can provide the power with RSB-4210 without any adapter.

2.1.21 Keypad Cable (Part-O1)

The keypad cable connects RSB-4210 (KEYPAD1) with the keypad.

2.1.22 Keypad (Part-O2)

8*8 arrays of 64 normally open single-pole switches. (6*6 region of keypad are available when using RSB-4210.)

2.1.23 Cable for Suspend/Reset Button (Part-P)

The cable is used to extend the Suspend/Reset function by a specific button.

2.1.24 COM Port Cable (D-SUB 9P to Housing) (Part-Q)

The cable is used to extend COM port 9pin header from RSB-4210 to D-SUB 9P serial port connector.

2.1.25 RS-232 Loopback (Part-R)

The terminal connector 9P female is used to test RS-232 loopback function.

2.1.26 Terminal Block for CAN/RS-485 (Part-S)

The terminal block can be extended with extra two cables to connect RSB-4210 CAN/RS-485 function with the others CAN/RS-485 devices.

2.2 RSB-4210 Connectors

The following table shows the connector list of RSB-4210.

Connector	Description
CN 1	Wafer for 4-wire Resistive Type Touch Screen
CN 2	Phoenix Connector for CAN Bus
CN 3	Phoenix Connector for COM3, RS-485
CN 4	System Bus
CN 5	Pin Header for COM5, RS-232 (TX/RX/RTS/CTS)
CN 6	Pin Header for COM4, 3.3V TTL (TX/RX/RTS/CTS)
CN 7	Pin Header for I2S
CN 8	LVDS0 LCD Connector
CN 9	Pin Header for COM1, RS-232 (TX/RX)
CN 10	Pin Header for SD2
CN 11	Wafer for Backlight Power and Controller
CN 12	MiniPCIe Connector-Latch
CN 13	MiniPCIe Connector
CN 14	LVDS1 LCD Connector
CN 15	Pin Header for Jtag
CN 16	Wafer for SATA Power
CN 17	Wafer for Power ON/OFF
CN 18	Ethernet LAN1&2 Connector
CN 19	Wafer for Coin Battery
CN 20	SIM Card Slot
RST_BTN1	Pin Header for Reset
SUS_BTN1	Pin Header for Suspend
KEYPAD1	Pin Header for Matrix Keypad
CN21	Pin Header for I2C/SPI
GPIO1	Pin Header for 20x pins GPIO
SATA_CN1	SATA Connector
USB1	Pin Header for USB_HUB1
BAT_CN1	Wafer for Battery Charger Board – Power
BAT_CN2	Wafer for Battery Charger Board – Control Signal
USB_OTG1	USB OTG MINI-AB Connector
USB2	USB_HUB_2&3 (Standard Type-A)
CRT1	VGA Connector
HDMI_CN1	HDMI Connector
AUDIO1	Box Header for LINE-OUT, LINE-IN, MIC-IN and L&R Speakers
COM1	D-Sub9 Connector for COM2, RS-232 (TX/RX/RTS/CTS)
DCIN1	DC-IN Power Jack
SD1	SD Card Slot

2.2.1 Wafer for 4-wire Resistive Type Touch Screen (CN1)

The touch screen interface performs all sampling, averaging, ADC range checking, and control for a wide variety of analog resistive touch screens. This controller only interrupts the processor when a meaningful change occurs.

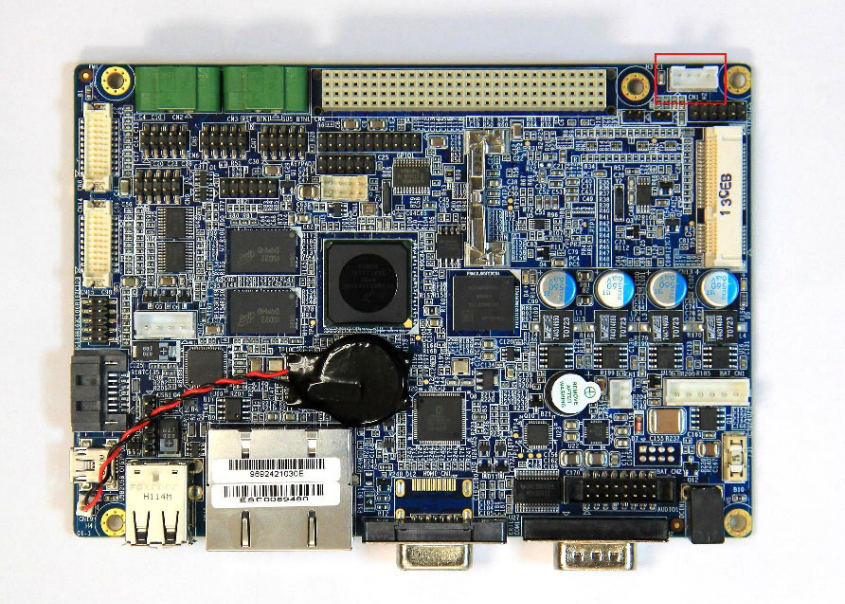


Figure 2.2 Wafer for 4-wire Resistive Type Touch Screen

Pin	Description	Pin	Description
1	Touch_Y-	2	Touch_Y+
3	Touch_X-	4	Touch_X+

2.2.2 Phoenix Connector for CAN Bus (CN2)

RSB-4210 supports one CAN bus, while CN2 is a phoenix connector for CAN bus.

Note! *For CAN applications, the two ends of the cable will have a termination resistor connected across the two wires. Without termination resistors, reflections of fast driver edges can cause multiple data edges that can cause data corruption. Please refer to Figure 2.4 and Figure 2.5 to adding a termination resistor (120 ohms) on your end device (R271 of RSB-4210, default is none) to avoid this situation.*

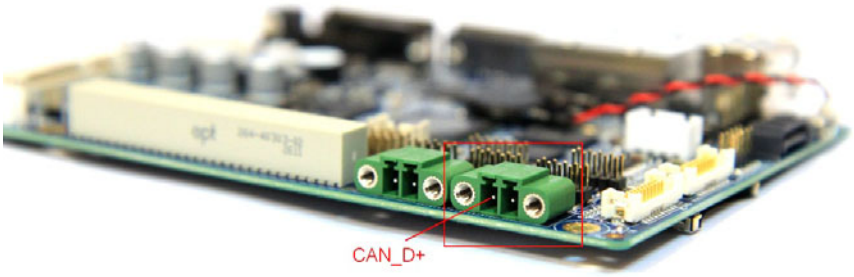


Figure 2.3 Phoenix Connector for CAN Bus

Pin	Description	Pin	Description
1	CAN_D+	2	CAN_D-

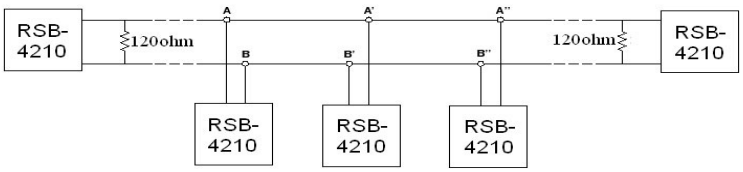


Figure 2.4 CAN Application

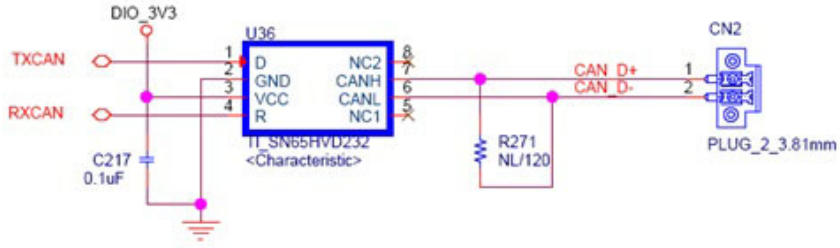


Figure 2.5 Schematics of CAN on RSB-4210

2.2.3 Phoenix Connector for COM3, RS-485 (CN3)

RSB-4210 supports one RS-485 interface, while CN3 is a phoenix connector for RS-485.

Note! *For RS-485 applications, the two ends of the cable will have a termination resistor connected across the two wires. Without termination resistors, reflections of fast driver edges can cause multiple data edges that can cause data corruption. Please refer to Figure 2.7 and Figure 2.8 to adding a termination resistor (120 ohms) on your end device (R289 of RSB-4210, default is 120 ohms) to avoid this situation.*

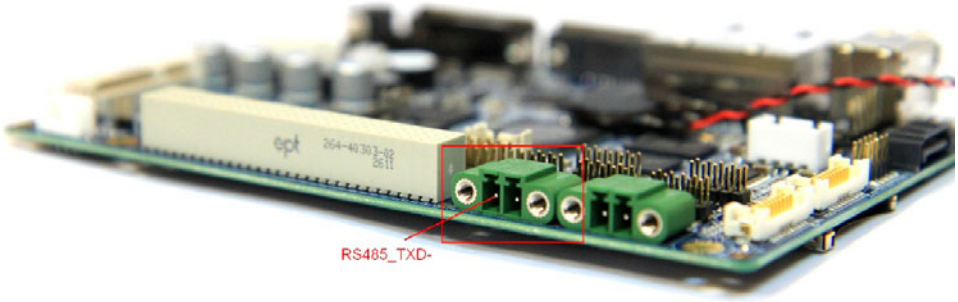


Figure 2.6 Phoenix Connector for COM3, RS-485

Pin	Description	Pin	Description
1	RS485_TXD-	2	RS485_TXD+

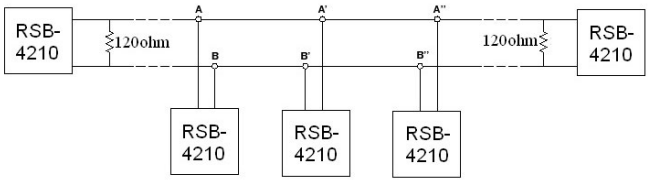


Figure 2.7 RS-485 Application

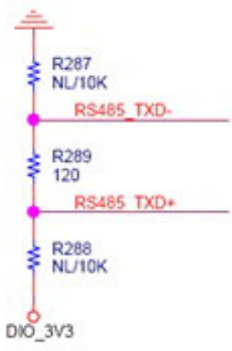


Figure 2.8 Schematics of RS-485 on RSB-4210

2.2.4 System Bus (CN4)

The RSB-4210 provides system bus via PCI104+ connector for extended device use. The pin assignments are shown below in Fig 2.9.

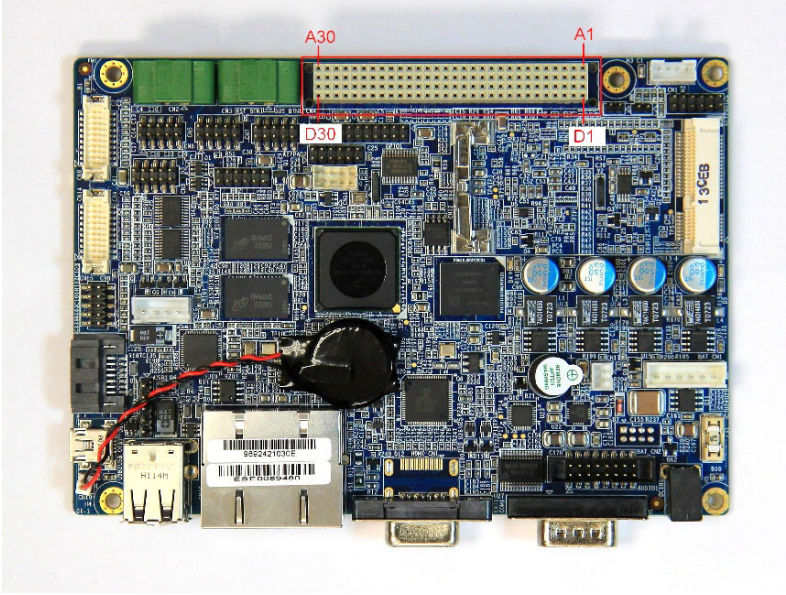


Figure 2.9 System Bus

Pin	Description	Pin	Description	Pin	Description	Pin	Description
A1	N/C	B1	GND	C1	N/C	D1	N/C
A2	GND	B2	N/C	C2	DIO_3V3	D2	DIO_3V3
A3	EX_GPIO_8	B3	IMX_GPIO4	C3	IMX_GPIO3	D3	IMX_GPIO2
A4	N/C	B4	N/C	C4	DIO_3V3	D4	DIO_3V3
A5	SysBus_A0	B5	SysBus_A1	C5	SysBus_A15	D5	SysBus_A14
A6	SysBus_A2	B6	SysBus_A3	C6	SysBus_A13	D6	SysBus_A12

A7	SysBus_A4	B7	SysBus_A5	C7	SysBus_A11	D7	SysBus_A10
A8	SysBus_A6	B8	SysBus_A7	C8	SysBus_A9	D8	SysBus_A8
A9	SysBus_A16	B9	SysBus_A17	C9	SysBus_A24	D9	N/C
A10	SysBus_A18	B10	SysBus_A19	C10	N/C	D10	SysBus_OE
A11	SysBus_A20	B11	SysBus_A21	C11	SysBus_RW	D11	GND
A12	SysBus_A22	B12	SysBus_A23	C12	N/C	D12	N/C
A13	DIO_3V3	B13	N/C	C13	SysBus_CS0	D13	SysBus_CS1
A14	SysBus_D0	B14	SysBus_D1	C14	SysBus_D15	D14	SysBus_D14
A15	SysBus_D2	B15	SysBus_D3	C15	SysBus_D13	D15	SysBus_D12
A16	SysBus_D4	B16	SysBus_D5	C16	SysBus_D11	D16	SysBus_D10
A17	SysBus_D6	B17	SysBus_D7	C17	SysBus_D9	D17	SysBus_D8
A18	N/C	B18	N/C	C18	N/C	D18	N/C
A19	N/C	B19	N/C	C19	N/C	D19	N/C
A20	N/C	B20	N/C	C20	N/C	D20	N/C
A21	N/C	B21	N/C	C21	N/C	D21	N/C
A22	N/C	B22	N/C	C22	SysBus_BCLK	D22	GND
A23	N/C	B23	N/C	C23	N/C	D23	GND
A24	N/C	B24	N/C	C24	SysBus_EB1	D24	DIO_3V3
A25	N/C	B25	N/C	C25	N/C	D25	DIO_3V3
A26	SysBus_nEB0	B26	N/C	C26	N/C	D26	N/C
A27	N/C	B27	SysBus_LBA	C27	5 V_EXT	D27	5V_EXT
A28	SysBus_WP	B28	N/C	C28	SysBus_Wait	D28	N/C
A29	N/C	B29	N/C	C29	N/C	D29	N/C
A30	SysBus_Wait	B30	N/C	C30	GND	D30	N/C

2.2.5 Pin Header for COM5, RS-232 (TX/RX/RTS/CTS) (CN5)

CN5 is a 4-wire (TX/RX/RTS/CTS) RS-232 port which provides connections between serial devices (For example, GPS, GSM and Bluetooth devices etc.) or a communication network.

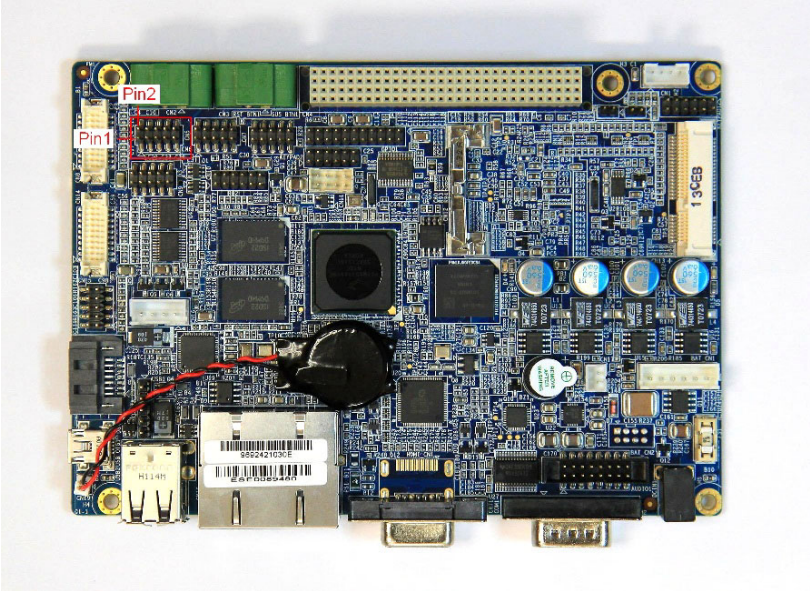


Figure 2.10 Pin Header for COM5, RS-232 (TX/RX/RTS/CTS)

Pin	Description	Pin	Description
1	N/C	2	N/C
3	COM5_RXD	4	COM5_RTS
5	COM5_TXD	6	COM5_CTS
7	N/C	8	N/C
9	GND	10	N/C

2.2.6 Pin Header for COM4, 3.3V TTL (TX/RX/RTS/CTS) (CN6)

CN6 is a 4-wire (TX/RX/RTS/CTS) 3.3 V TTL signal which provides connections between serial devices (For example, GPS, GSM and Bluetooth devices etc.) or a communication network.

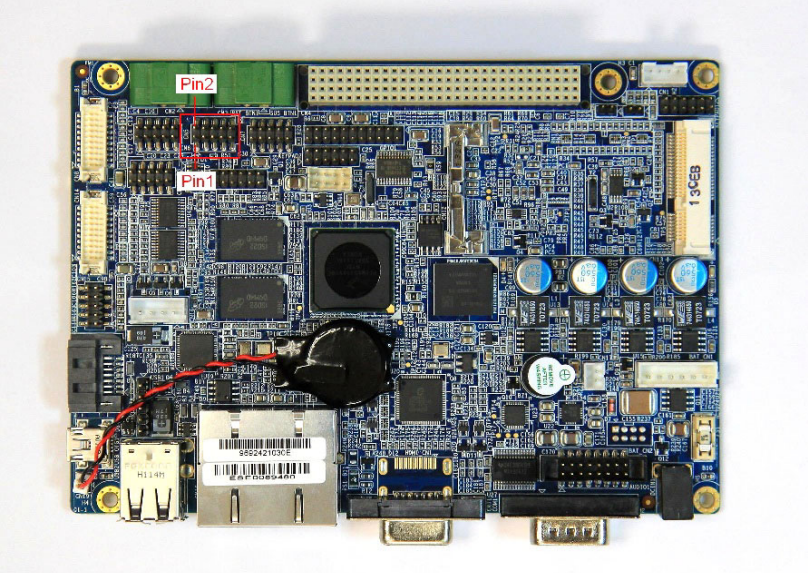


Figure 2.11 Pin Header for COM4, 3.3V TTL (TX/RX/RTS/CTS)

2.2.7 Pin Header for I2S (CN7)

RSB-4210 provides one I2S interface for users to expand their applications, and CN7 is the pin header for the I2S interface.

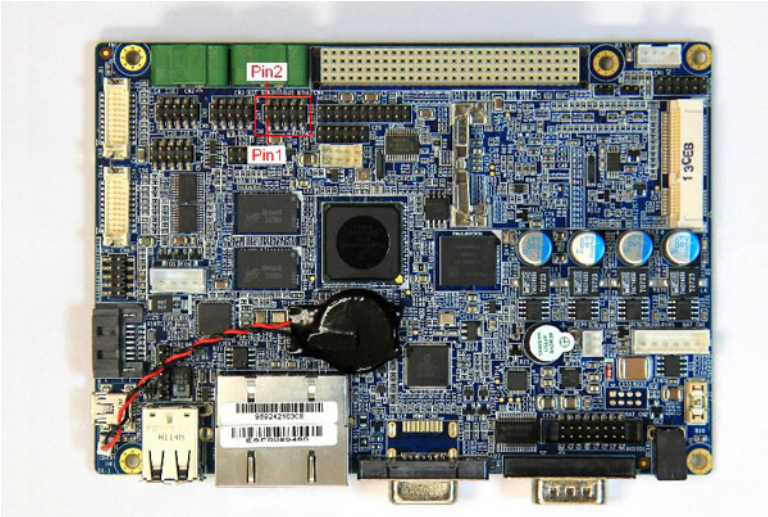


Figure 2.12 Pin Header for I2S

Pin	Description	Pin	Description
1	AUDIO_CLK	2	AUD3_TXD
3	AUD3_TXC	4	N/C
5	AUD3_TXFS	6	N/C
7	AUD3_RXD	8	N/C
9	GND	10	DIO_3V3

2.2.8 LVDS0 LCD Connector (CN8)

RSB-4210 supports dual LVDS LCD Interfaces (24+24 bit), in which CN8 is LVDS0 (24-bit) while CN14 is LVDS1 (24-bit). The pin assignment of LVDS0 (CN8) is shown as below.

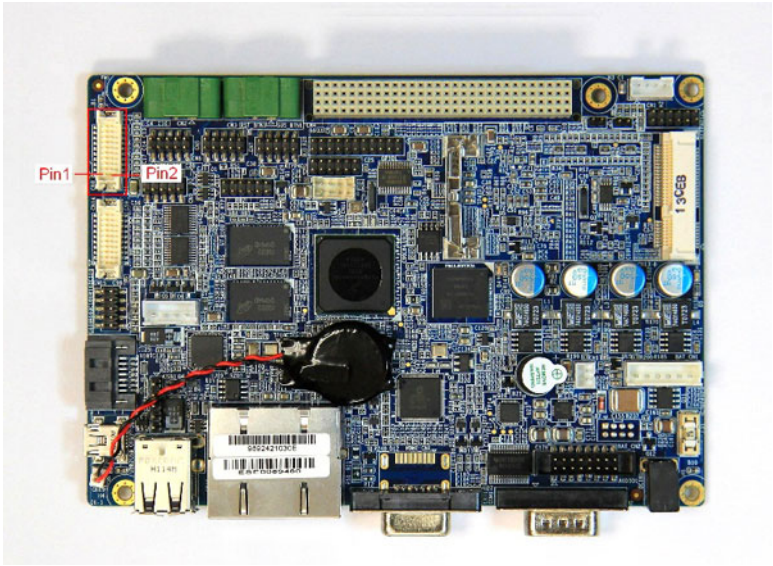


Figure 2.13 LVDS0 LCD Connector

Pin	Description	Pin	Description
1	3.3 V	2	3.3 V
3	3.3 V	4	3.3 V
5	LVDS0_TX0-	6	LVDS0_TX0+
7	GND	8	LVDS0_TX1-
9	LVDS0_TX1+	10	GND
11	LVDS0_TX2-	12	LVDS0_TX2+
13	GND	14	LVDS0_CLK-
15	LVDS0_CLK+	16	GND
17	3.3 V	18	N/C
19	LVDS0_TX3-	20	LVDS0_TX3+

2.2.9 Pin Header for COM1, RS-232 (TX/RX) (CN9)

CN9 is a 2-wire (TX/RX) RS-232 port which provides connections between serial devices (For example, GPS, GSM and Bluetooth devices etc.) or a communication network.

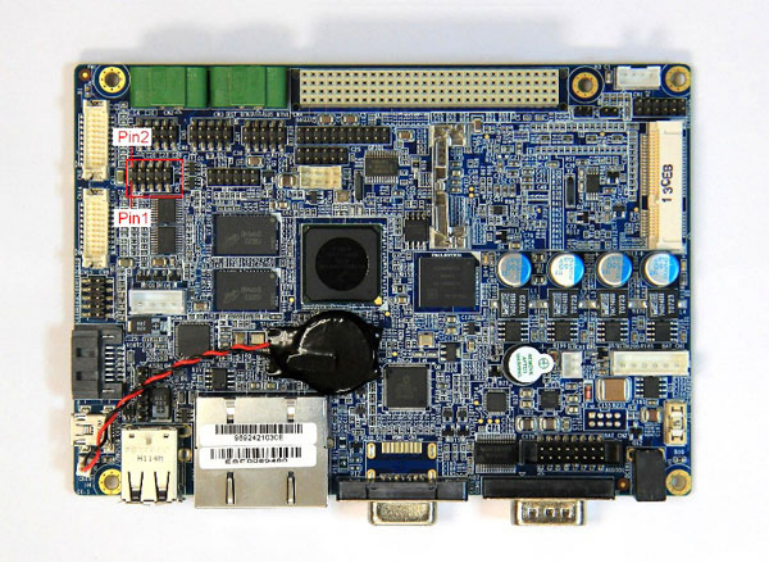


Figure 2.14 Pin Header for COM1, RS-232 (TX/RX)

Pin	Description	Pin	Description
1	N/C	2	N/C
3	COM1_RXD	4	N/C
5	COM1_TXD	6	N/C
7	N/C	8	N/C
9	GND	10	N/C

2.2.10 Pin Header for SD2 (CN10)

The SD/MMC Slots are 3.3 V powered, which are able to be extended for SD slot module and SDIO interface module with the following features:

- Fully compatible with the MMC system specification version 3.2
- Compatible with the SD Memory Card specification 1.01, and SD I/O specification 1.1 with 1/4 channel(s)
- Block-based data transfer between MMC card and SDHC (stream mode not supported)
- 100 Mbps maximum data rate in 4-bit mode, SD bus clock up to 25MHz

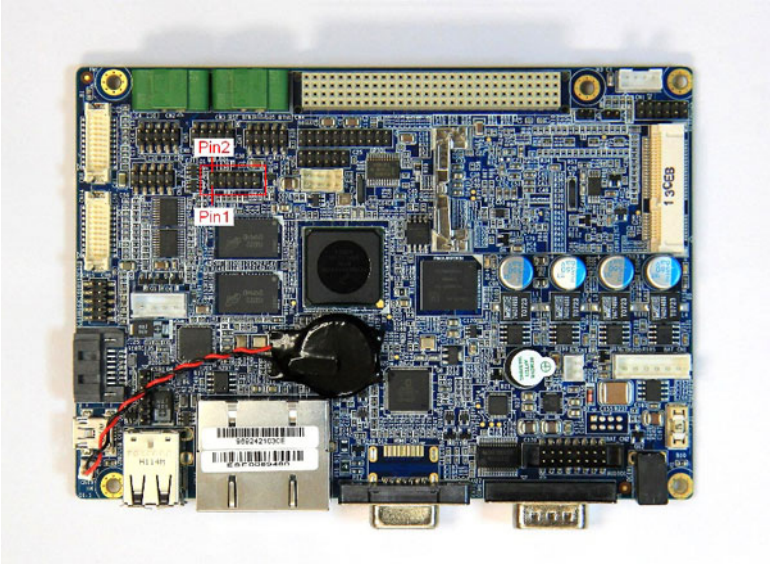


Figure 2.15 Pin Header for SD2

Pin	Description	Pin	Description
1	GND	2	GND
3	SD4_DATA1	4	SD4_CLK
5	SD4_DATA0	6	SD4_CMD
7	SD4_DATA3	8	SD4_CD
9	SD4_DATA2	10	3V3
11	N/C	12	N/C

2.2.11 Wafer for Backlight Power and Controller (CN11)

This wafer provides DC +12 V, DC +5 V, back-light on/off control signal and 0 ~ 5 V PWM dimming control to inverter. We suggest users choose an inverter so that dimming control is by PWM to fit development kit design.

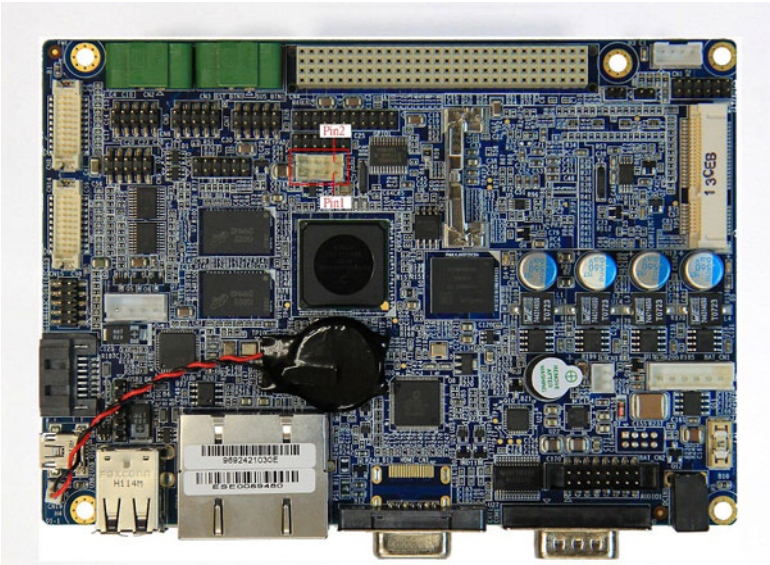


Figure 2.16 Wafer for Backlight Power and Controller

Pin	Description	Pin	Description
1	GND	2	GND
3	BLK_PWR_EN	4	BLK_PWR_EN
5	Brightness	6	PWM1
7	12 V	8	5 V

2.2.12 MiniPCIe Connector-Latch (CN12) and Connector (CN13)

RSB-4210 supports a MiniPCIe Interface. The pin assignment is shown below.

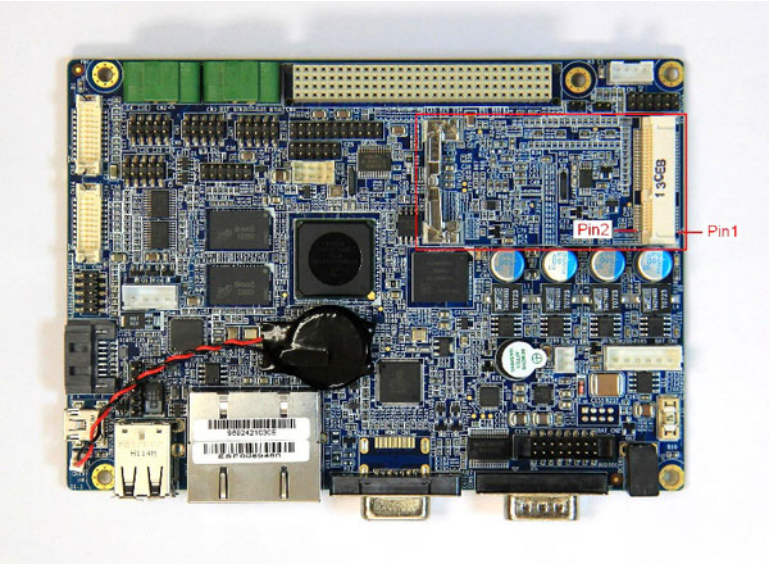


Figure 2.17 MiniPCIe Connector-Latch (CN12) and Connector (CN13)

Pin	Description	Pin	Description
1	nWAKE	2	DIO_3V3
3	N/C	4	N/C
5	N/C	6	IO_1V5
7	nCLKREQ	8	UIM_PWR
9	GND	10	UIM_DATA
11	PCIe_CLK_N	12	UIM_CLK
13	PCIe_CLK_P	14	UIM_RESET
15	GND	16	UIM_VPP
17	N/C	18	GND
19	N/C	20	N/C
21	GND	22	nRESET_OUT
23	PCIe_RX0_N	24	DIO_3V3
25	PCIe_RX0_P	26	GND
27	GND	28	IO_1V5
29	GND	30	PCIe_SMBCLK
31	PCIe_TX0_N	32	PCIe_SMBDAT
33	PCIe_TX0_P	34	GND
35	GND	36	USB_HUB4_D-
37	GND	38	USB_HUB4_D+

39	N/C	40	GND
41	N/C	42	LED_WWAN
43	GND	44	LED_WLAN
45	N/C	46	LED_WPAN
47	N/C	48	IO_1V5
49	N/C	50	GND
51	N/C	52	DIO_3V3
53	N/C	54	N/C
55	GND	56	GND

2.2.13 LVDS1 LCD Connector (CN14)

RSB-4210 supports dual LVDS LCD Interfaces (24+24bit), in which CN8 is LVDS0 (24 bit) while CN14 is LVDS1 (24 bit). The pin assignment of LVDS1 (CN14) is shown below.

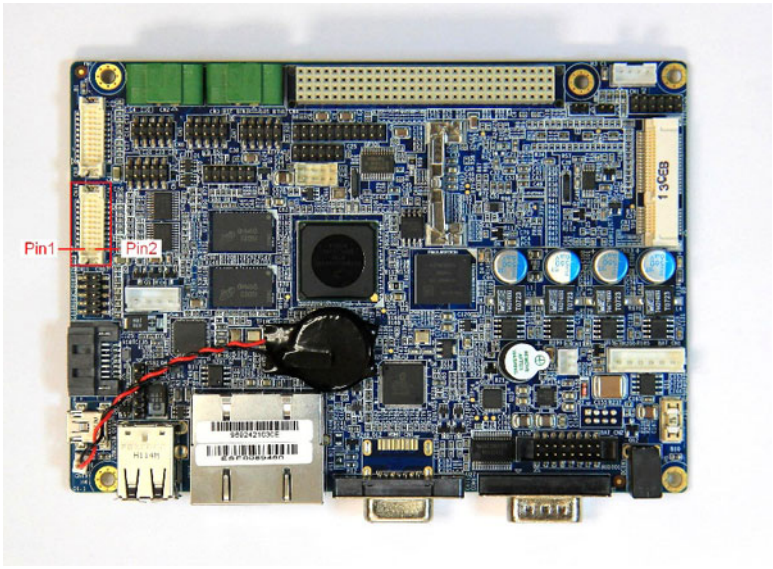


Figure 2.18 LVDS1 LCD Connector

Pin	Description	Pin	Description
1	5 V	2	5 V
3	5 V	4	5 V
5	LVDS1_TX0-	6	LVDS1_TX0+
7	GND	8	LVDS1_TX1-
9	LVDS1_TX1+	10	GND
11	LVDS1_TX2-	12	LVDS1_TX2+
13	GND	14	LVDS1_CLK-
15	LVDS1_CLK+	16	GND
17	N/C	18	N/C
19	LVDS1_TX3-	20	LVDS1_TX3+

2.2.14 Pin Header for Jtag (CN15)

RSB-4210 provides one Jtag interface for debugging CPU. CN15 is the pin header for Jtag interface.

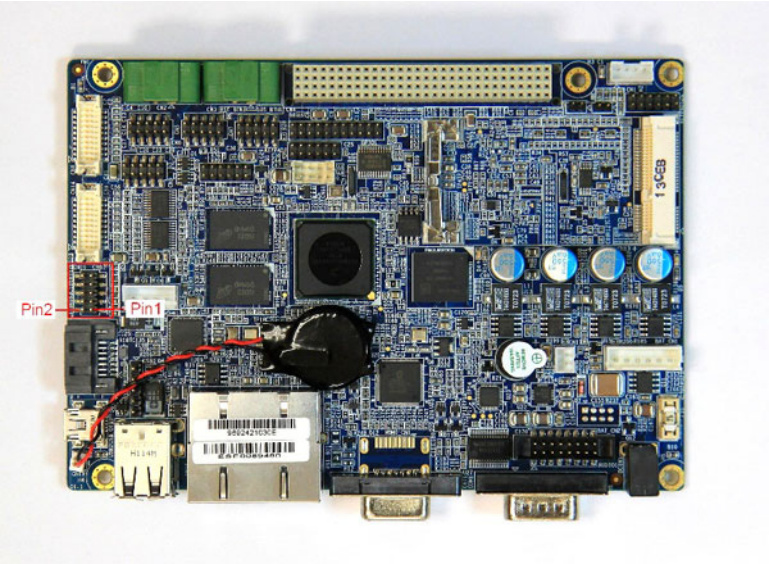


Figure 2.19 Pin Header for Jtag

Pin	Description	Pin	Description
1	JTAG_TCK	2	GND
3	JTAG_TMS	4	GND
5	JTAG_TDO	6	GND
7	JTAG_TDI	8	IO_3V3
9	JTAG_TRST	10	N/C

2.2.15 Wafer for SATA power (CN16)

CN16 provides DC +5 V for SATA device. The pin assignment is shown as below.

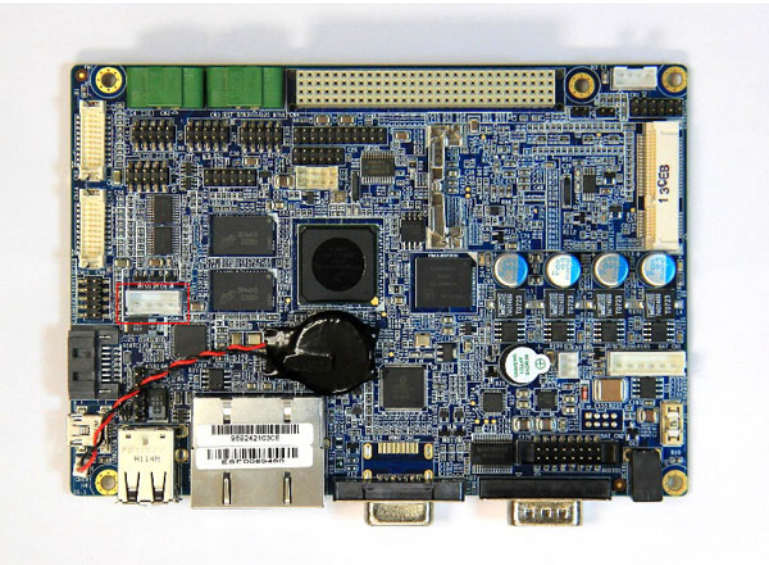


Figure 2.20 Wafer for SATA power

Pin	Description	Pin	Description
1	SATA_5 V	2	GND
3	GND	4	N/C

2.2.16 Wafer for Power ON/OFF (CN17)

When plug-in the adapter with CN17 shorted by a jumper, the system will power-on. Or you can connect this wafer with an external button to control the power ON/OFF.

Note! *If your system cannot power-on with an adapter, please check this wafer in advance. There should be a jumper or external power switch on the wafer.*

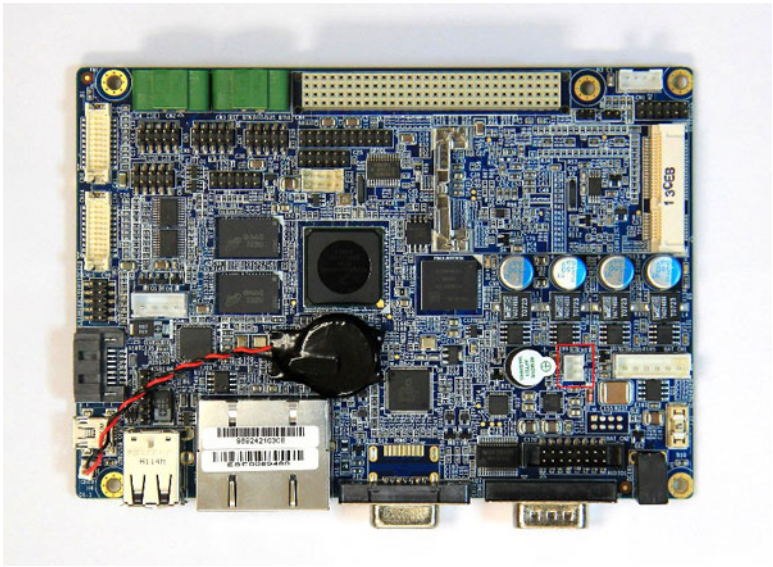


Figure 2.21 Pin Header for Power Button

Pin	Description	Pin	Description
1	PWR_BTN+	2	PWR_BTN-

2.2.17 Ethernet LAN1&2 Connector (CN18)

RSB-4210 supports dual LAN. One is extended from CPU module board directly and another is extended from system bus. Both of them support 10/100 Mbps transfer rates and are compliant with IEEE 802.3.

Note! *LAN connector with LED indicator: green LED indicates Ethernet active, while yellow LED indicates Ethernet speed 10/100.*

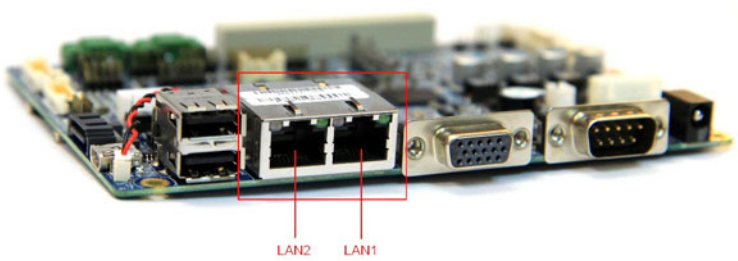


Figure 2.22 Ethernet LAN1 & LAN2 Connector

2.2.18 Wafer for Coin Battery (CN19)

CN19 is used for a coin battery. The pin assignment is shown as below.

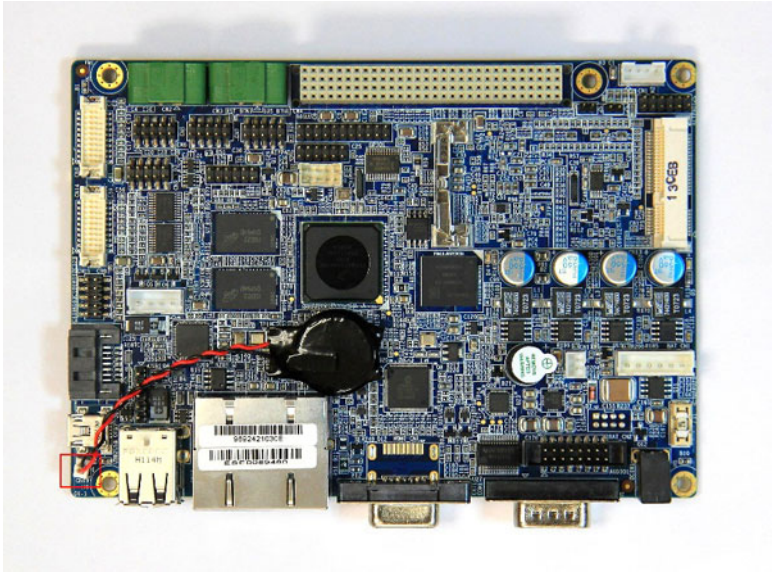


Figure 2.23 Wafer for Coin Battery

Pin	Description	Pin	Description
1	COIN_RTC	2	GND

2.2.19 SIM Card slot (CN20)

RSB-4210 provides a SIM card slot for MiniPCIe devices.

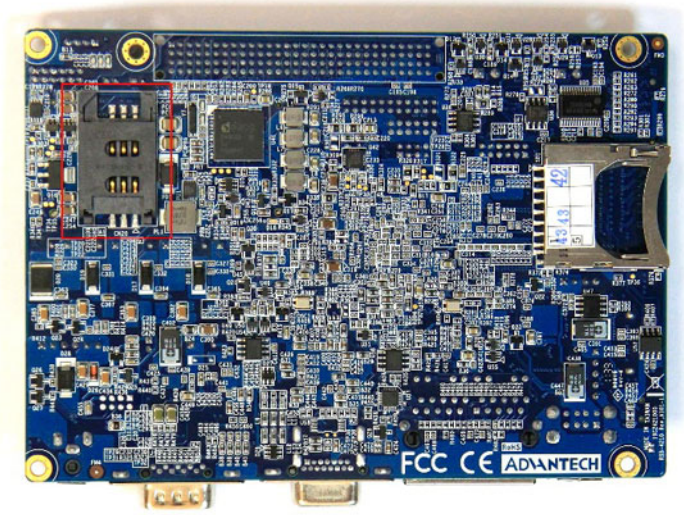


Figure 2.24 SIM Card slot

2.2.20 Pin Header for Reset (RST_BTN1)

RST_BTN1 is used for resetting the system. You can connect it with an external button for application. The pin assignment are shown below.

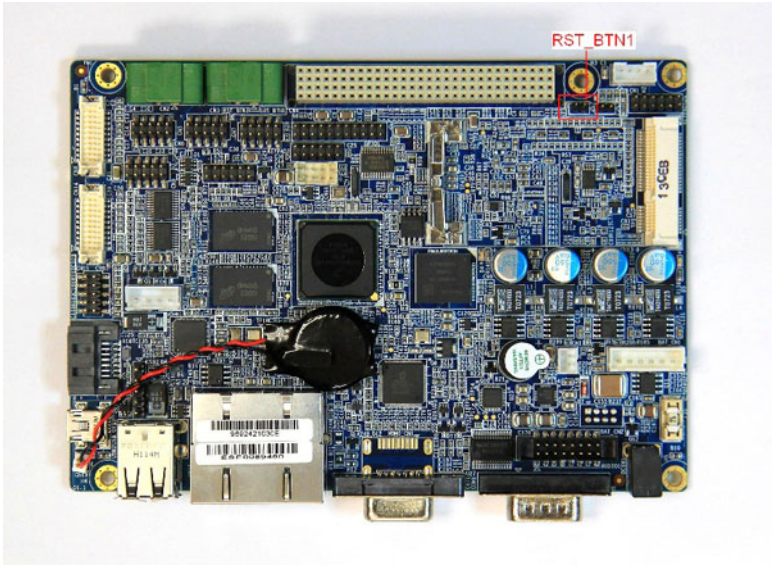


Figure 2.25 Pin Header for Reset

Pin	Description	Pin	Description
1	nRESET	2	GND

2.2.21 Pin Header for Suspend (SUS_BTN1)

SUS_BTN1 is used to making system entering into suspend mode or resume from suspend mode. You can connect it with an external button for applications. The pin assignment is shown as below.

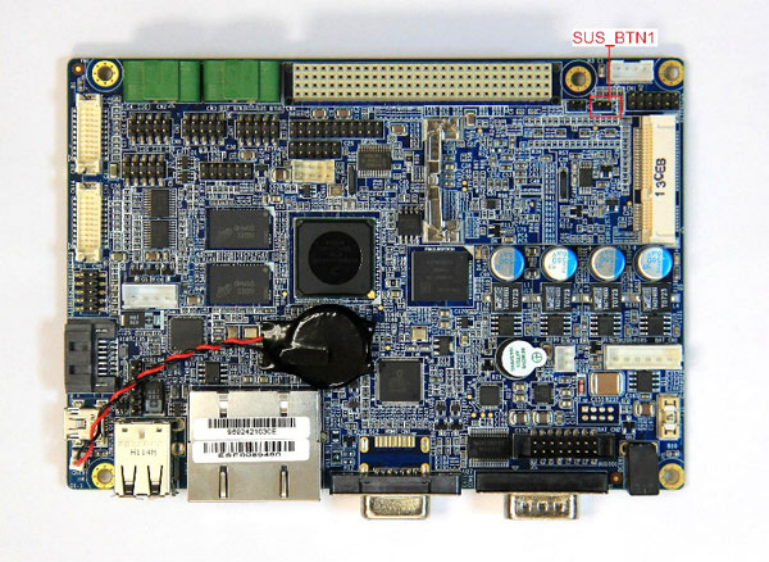


Figure 2.26 Pin Header for Suspend

Pin	Description	Pin	Description
1	nSUSPEND	2	GND

2.2.22 Pin Header for Matrix Keypad (KEYPAD1)

The keypad circuitry scans a 6*6 array of 36 normal-open, single-pole switches. Any one or two keys depressed will be de-bounced and decoded. An interrupt is generated whenever a stable set of depressed keys is detected. The keypad interface:

- Provides scanning, de-bounce, and decoding for a 36-key switch array
- Scans a 6-row by 6-column matrix
- May decode 2 keys at once
- Generates an interrupt when a new stable key is determined
- Generates a 3-key reset interrupt as well

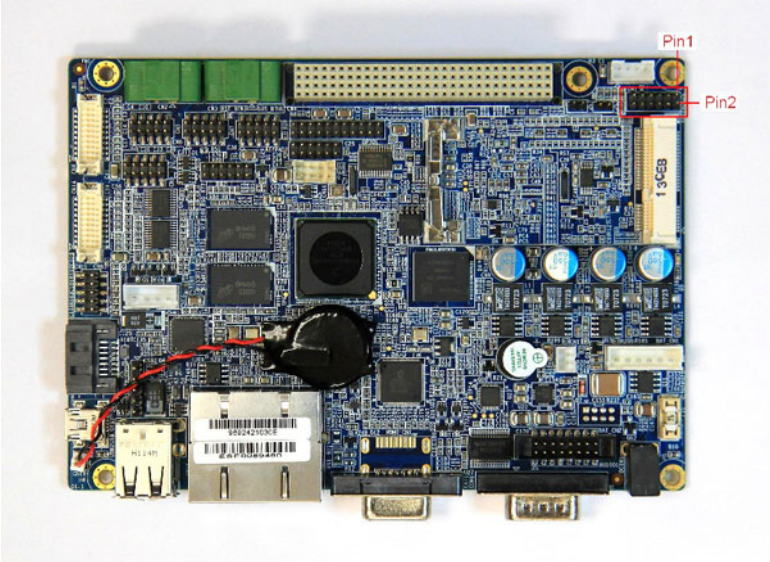


Figure 2.27 Pin Header for Matrix Keypad

Pin	Description	Pin	Description
1	KEY_COL2	2	KEY_ROW2
3	KEY_COL3	4	KEY_ROW3
5	KEY_COL4	6	KEY_ROW4
7	KEY_COL5	8	KEY_ROW5
9	KEY_COL6	10	KEY_ROW6
11	KEY_COL7	12	KEY_ROW7

2.2.23 Pin Header for I2C/SPI (CN21)

RSB-4210 provides two I2C and one SPI interface with user to expand their applications. CN21 is the pin header for I2C/SPI interface. The pin assignment is shown as below.

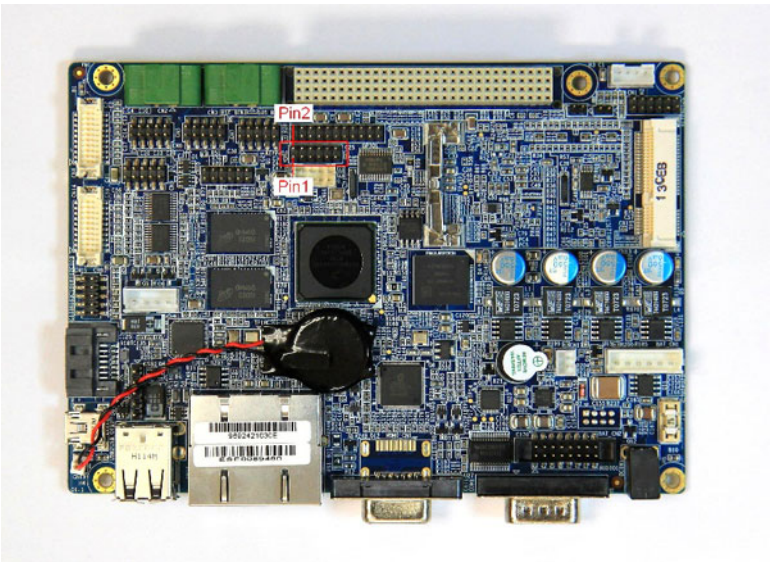


Figure 2.28 Pin Header for I2C/SPI

Pin	Description	Pin	Description
1	GND	2	SPI_IRQ
3	I2C1_SCL	4	SPI_MISO
5	I2C1_SDA	6	SPI_MOSI
7	I2C3_SCL	8	SPI_CS0
9	I2C3_SDA	10	SPI_CLK
11	DIO_3V3	12	DIO_3V3

2.2.24 Pin Header for 20x pins GPIO (GPIO1)

GPIO1 is extended for 20x pins 3.3V TTL Level GPIO. GPIO1~4 pins are coming from CPU directly while GPIO5~20 pins are extended from IC PCA9555. The pin assignment is shown as below.

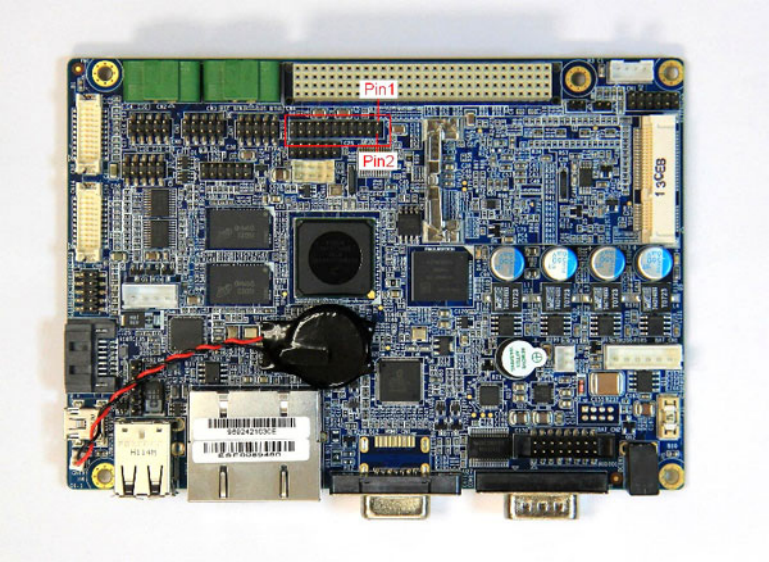


Figure 2.29 Pin Header for GPIO

Pin	Description	Pin	Description
1	GND	2	DIO_3V3
3	IMX_GPIO1	4	IMX_GPIO2
5	IMX_GPIO3	6	IMX_GPIO4
7	EX_GPIO_5	8	EX_GPIO_6
9	EX_GPIO_7	10	EX_GPIO_8
11	EX_GPIO_9	12	EX_GPIO_10
13	EX_GPIO_11	14	EX_GPIO_12
15	EX_GPIO_13	16	EX_GPIO_14
17	EX_GPIO_15	18	EX_GPIO_16
19	EX_GPIO_17	20	EX_GPIO_18
21	EX_GPIO_19	22	EX_GPIO_20

2.2.25 SATA Connector (SATA_CN1)

RSB-4210 supports one SATA Interface thru SATA_CN1. (Both SATA DOM and SATA HDD support.) The pin assignment is shown in Fig 2.30 below.

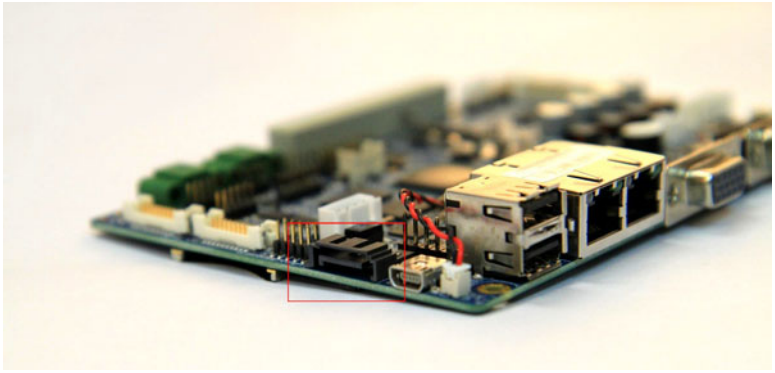


Figure 2.30 SATA Connector

Pin	Description	Pin	Description
1	GND	2	SATA_TX+
3	SATA_TX-	4	GND
5	SATA_RX-	6	SATA_RX+
7	GND		

2.2.26 Pin Header for USB_HUB1 (USB1)

The USB port is extended from USB_HUB1. The pin assignment is shown below.

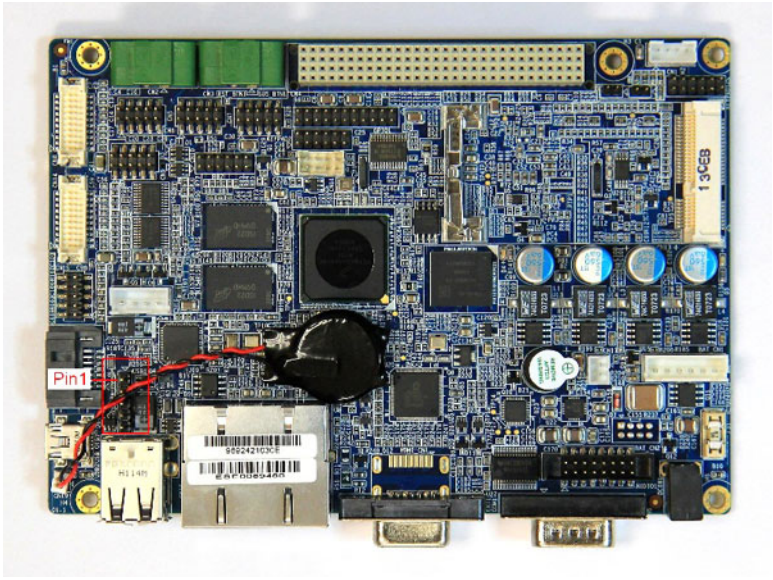


Figure 2.31 Pin Header for USB_HUB1

Pin	Description	Pin	Description
1	5V	2	CSB_HUB1_Data -
3	CSB_HUB1_Data +	4	GND
5	GND (Chassis Ground)		

2.2.27 Wafer for Battery Charger Board - Power (BAT_CN1)

BAT_CN1 provides the power with battery charger board. +VIN_ADP is the voltage from adapter to battery charge board; +VIN is the voltage from battery charge board to RSB-4210. The pin assignment is shown below.

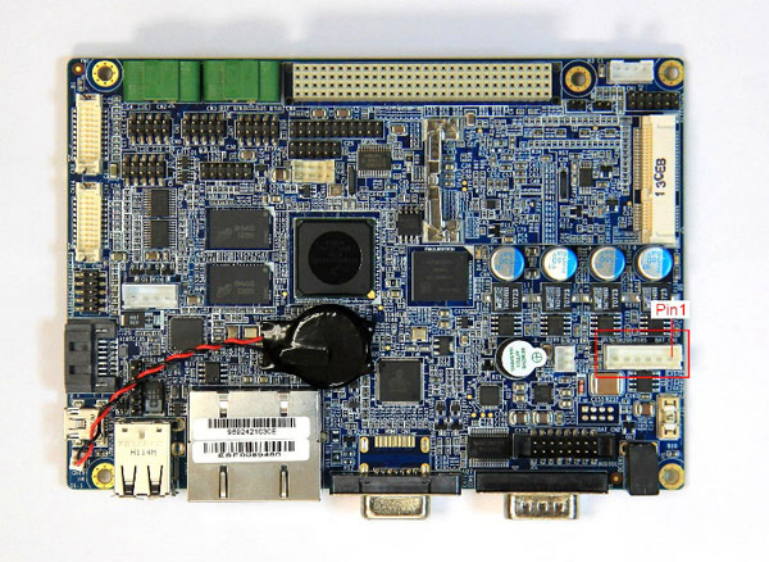


Figure 2.32 Wafer for Battery Charger Board - Power

Pin	Description	Pin	Description
1	+VIN_ADP (For Battery)	2	+VIN_ADP (For Battery)
3	GND	4	GND
5	+VIN (For RSB-4210)	6	+VIN (For RSB-4210)

2.2.28 Wafer for Battery Charger Board -Control Signal (BAT_CN2)

BAT_CN2 provides the I2C control signal with battery charger board. The pin assignment is shown below.

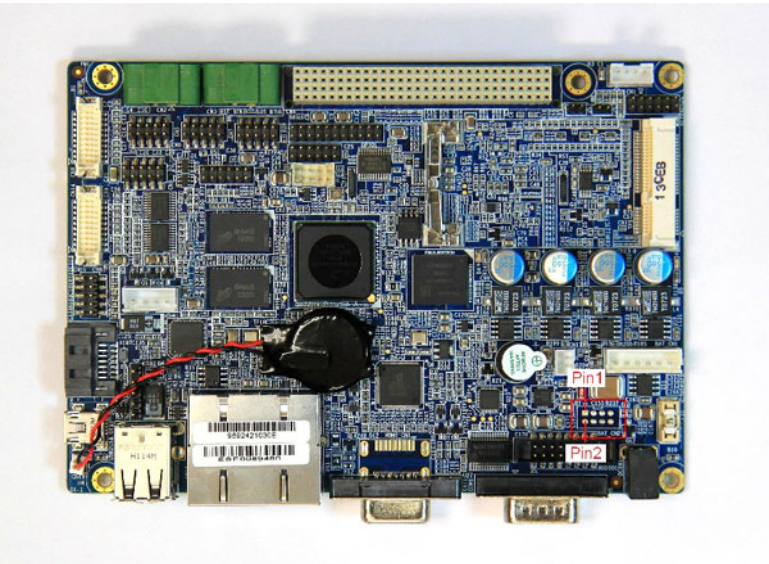


Figure 2.33 Wafer for Battery Charger Board - Control Signal

Pin	Description	Pin	Description
1	3.3 V_STB	2	GND
3	I2C3_SCL_BAT	4	N/C
5	I2C3_SDA_BAT	6	N/C
7	Charger_board_IN#	8	N/C

2.2.29 USB OTG MINI-AB Connector (USB_OTG1)

The RSB-4210 has a single USB OTG mini-AB port which can be used as a USB client to link with PC or a USB host device. For USB client applications, users could upload or download files to any folder in Windows CE and create a synchronous folder between PC and RSB-4210 thru this connector. For USB host applications, users can connect with USB devices, for example, USB mouse and USB keypad.

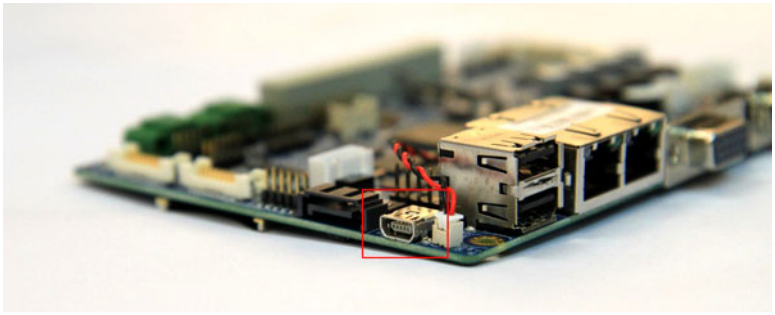


Figure 2.34 USB OTG MINI-AB Connector

Pin	Description	Pin	Description
1	5V	2	Data -
3	Data +	4	USBOTG_ID
5	GND		

2.2.30 USB HUB_2&3 (Standard Type-A) (USB2)

The USB interface provides full speed serial communications ports, which includes the following features:

- Compliance with the USB 2.0 specification
- Transceiver buffers integrated, over-current protection on ports
- Supports power management
- Operates as a master on the bus

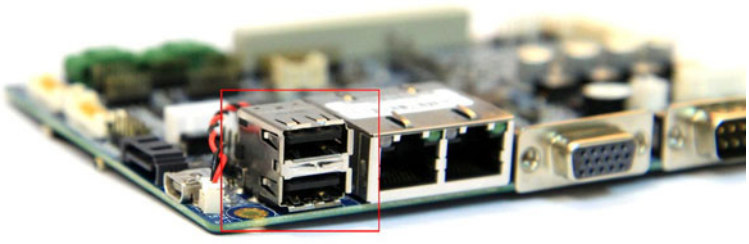


Figure 2.35 USB CSB_HUB_2&3 (Standard Type-A)

2.2.31 VGA Connector (CRT1)

RSB-4210 supports a standard VGA Interface (D-SUB15). The pin assignment is shown below.

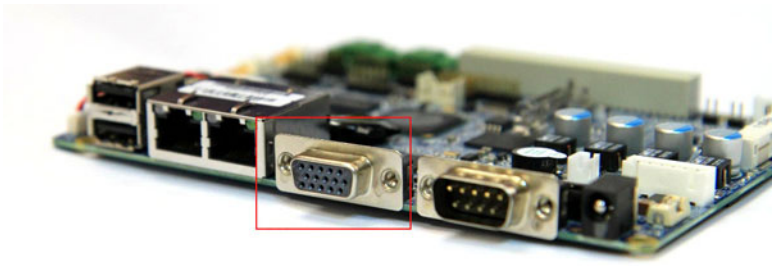


Figure 2.36 VGA Connector (D-SUB15)

Pin	Description	Pin	Description
1	CRT_R	2	CRT_G
3	CRT_B	4	N/C
5	GND	6	GND
7	GND	8	GND
9	+5 V	10	GND
11	N/C	12	DDC_SD_CRT
13	HSYNC	14	VSYNC
15	DDC_SC_CRT		

2.2.32 HDMI Connector (HDMI_CN1)

RSB-4210 supports a standard HDMI Interface. The pin assignment is shown below.

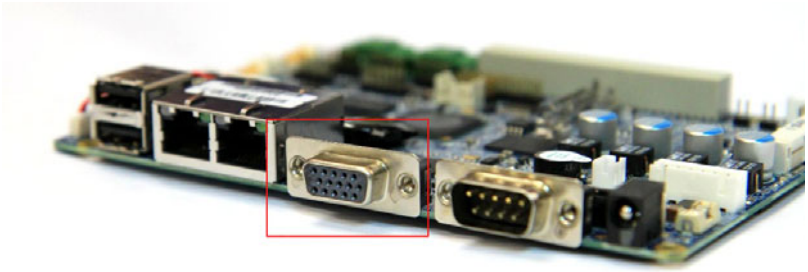


Figure 2.37 HDMI Connector

Pin	Description	Pin	Description
1	HDMI_TD2+	2	GND
3	HDMI_TD2-	4	HDMI_TD1+
5	GND	6	HDMI_TD1-
7	HDMI_TD0+	8	GND
9	HDMI_TD0-	10	HDMI_CLK+
11	GND	12	HDMI_CLK-
13	HDMI_CEC	14	HDMI_Reserved
15	DDC_SC_HD	16	DDC_SD_HD
17	GND	18	+5V_HDMI
19	HPD		

2.2.33 Box Header for LINE-OUT, LINE-IN, MIC-IN and L&R Speakers (AUDIO1)

The box header is used for audio input / output signal port, and the speaker-out uses a 2W amplifier. The pin assignment is shown below.

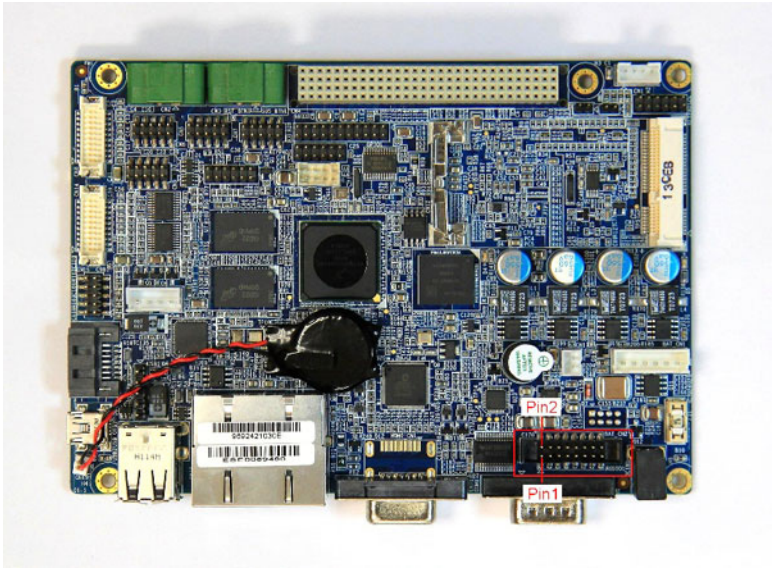


Figure 2.38 Box Header for LINE-OUT, LINE-IN, MIC-IN and L&R Speakers

Pin	Description	Pin	Description
1	LINE_OUT_R	2	SPK_R-
3	LINE_OUT_L	4	SPK_L-
5	SPK_R+	6	SPK_L+
7	N/C	8	AGND
9	LINE_IN_R	10	LINE_IN_L
11	N/C	12	AGND
13	N/C	14	N/C
15	MIC_IN	16	AGND

2.2.34 D-Sub9 Connector for COM2, RS-232 (TX/RX/RTS/ CTS) (COM1)

COM1 port supports RS-232 (TX/RX/RTS/CTS). The pin assignment is shown below.

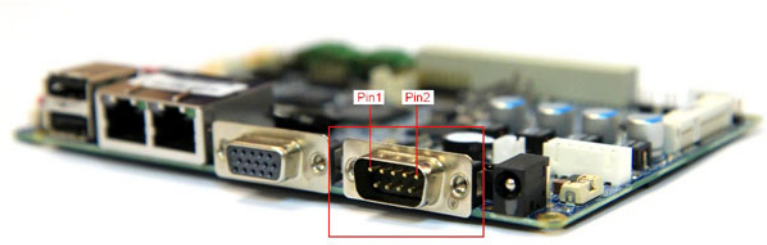


Figure 2.39 D-Sub9 Connector for COM2, RS-232 (TX/RX/RTS/CTS)

Pin	Description	Pin	Description

1	N/C	2	COM2_RXD
3	COM2_TXD	4	N/C
5	GND	6	N/C
7	COM2_RTS	8	COM2_CTS
9	N/C		

2.2.35 DC-IN Power Jack(DCIN1)

The DC-in power jack DCIN1 provides the power with RSB-4210 (+9 ~ 24 V).

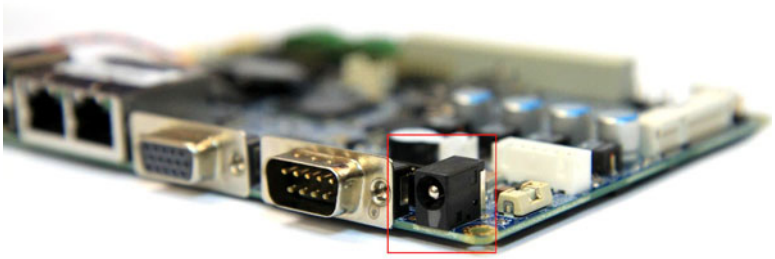


Figure 2.40 DC-IN Power Jack

2.2.36 SD Card Slot (SD1)

The SD card Slot (SD1) is powered with 3.3 V, which includes the following features:

- Fully compatible with the MMC system specification version 3.2
- Compatible with the SD Memory Card specification 1.01, and SD I/O specification 1.1 with 1/4 channel (s)
- Block-based data transfer between MMC card and SDHC (stream mode not supported)
- 100 Mbps maximum data rate in 4-bit mode, SD bus clock up to 25 MHz

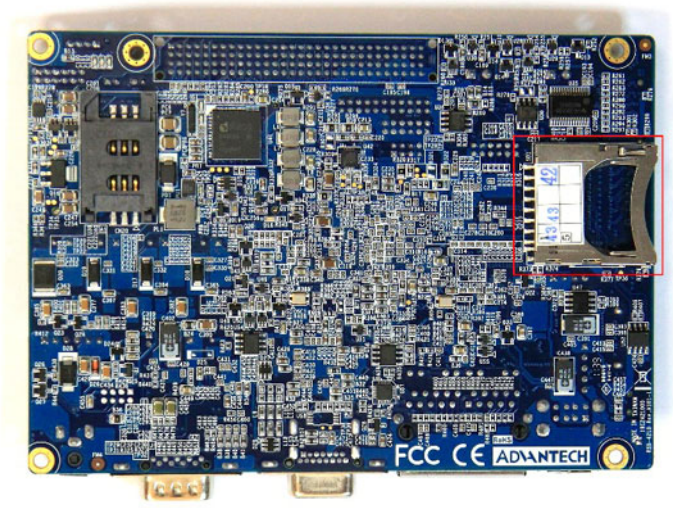


Figure 2.41 SD card Slot

2.3 Mechanical

2.3.1 Connector Location

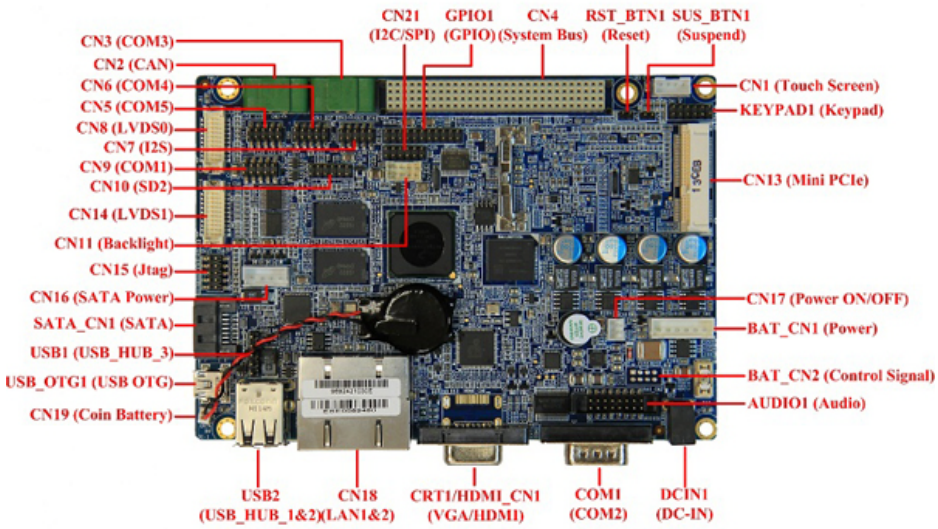


Figure 2.42 RSB-4210 Connector Position (Top)

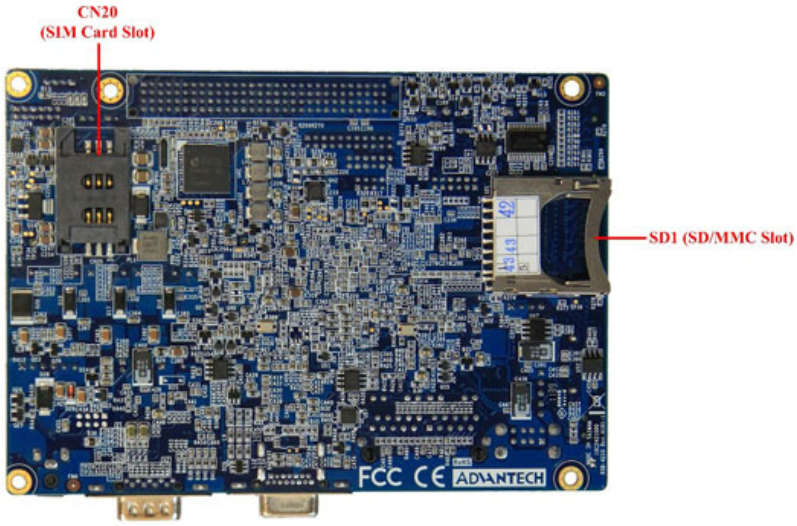


Figure 2.43 RSB-4210 Connector Position (Bottom)

2.3.2 RSB-4210 Board Dimension

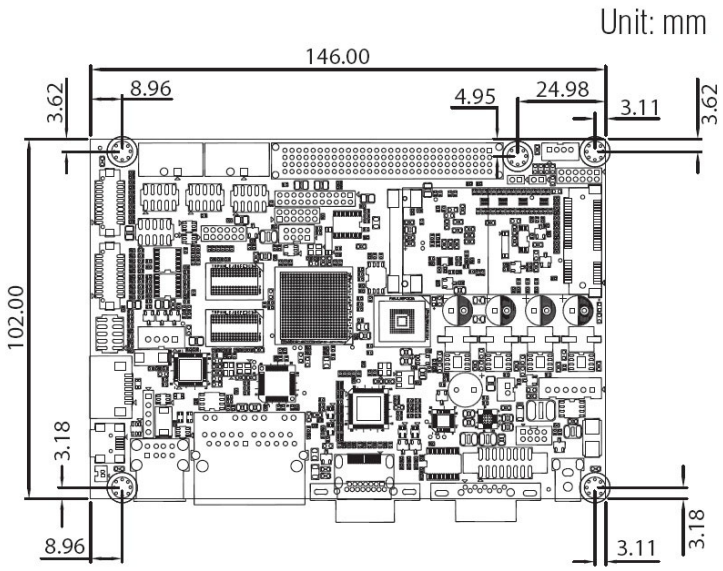


Figure 2.44 RSB-4210 Board Dimension

Chapter 3

Software Functionality

This chapter details the Linux operating system on RSB-4210 platform.

The RSB-4210 platform is one embedded system with Windows Embedded Compact 7 (WinEC7). The WinEC7 architecture is a variation of the Windows operating system for minimalistic computers and embedded systems. The preconfigured kernel is allowed to write applications without creating own operating system kernels. It offers the possibility to reduce the time to market phase. The purpose of this chapter is to introduce you how to boot up WinEC7 and some basic utilities on RSB-4210 platform.

3.1 The Bootloader

The main task of the bootloader is to download a WINCE-Image to the platform and starting WinCE on it. The bootloader can be services to achieve this work through a terminal running on a host PC. To do so, the host PC has to be connected to the serial port (UART Port 1) at the platform. There are two kinds of bootloader for RSB-4210 WinEC7. One is uboot, and another one is eboot. However, now uboot is the default bootloader for RSB-4210 WinEC7, eboot is an option bootloader if you want to use Ethernet KITL at WinEC7 environment.

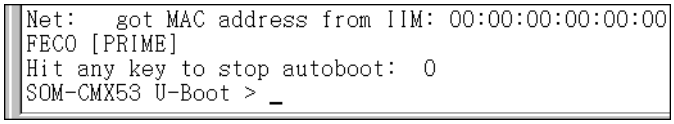
3.1.1 Communication settings

Please set the host PC's serial port communication and connect to target platform. A standard serial cable can be used to connect between UART port on the target platform and the development host PC. Any terminal emulation application can be used to display messages sent from the serial port of the target. Configure the terminal application with the following communications parameters:

Baudrate	115200 bps
Data bits	8
Stop bits	1
Parity	none
Handshake	none

3.1.2 Startup of the bootloader

You can put bootloader (default is uboot) in your favorite boot device including on board flash (iNand), SD Card, or SATA device. Power on platform will let bootloader startup, you can press "Enter" to get into uboot command mode as shown in below figure.



3.1.3 Change Display Output Resolution

RSB-4210 has a build-in CH7033B HDTV/VGA/DVI Encoder. With its advanced video encoder and flexible scaling engine, the CH7033B satisfies manufactures' products display requirements. There are 44 display panel types and auto mode can be chosen as default in RSB-4210. To set default display panel type, just enter uboot command mode and type below commands:

ch7033cfg set (setting value) : set display panel type

ch7033cfg get : get setting value

reset: reset platform

Example:

```
Hit any key to stop autoboot:  0
SOM-CMX53 U-Boot >  ch7033cfg set 2
SOM-CMX53 U-Boot >  ch7033cfg get
Current Setting:2
  2 - 1080P60       - HDMI 16 1920 x 1080 p 60Hz 148500KHz
SOM-CMX53 U-Boot > reset_
```

Below is 44 display panel types list table.

Value	Name	Value	Name	Value	Name
0	WUXGA60	15	1440x900RDC	30	720P60
1	UXGA60	16	1440x900P60	31	720P50
2	1080P60	17	WXGA75	32	WSVGA60
3	1080P50	18	WXGA60	33	WSVGA_YING
4	1080I60	19	1366x768P60	34	SVGA85
5	1080I50	20	1366x768CTM	35	SVGA75
6	WSXGA+60	21	1360x768P60	36	SVGA60
7	SXGA+75	22	1280x768P75	37	PAL-TV
8	SXGA+60	23	1280x768RDC	38	NTSC-TV
9	SXGA85	24	1280x768VESA	39	VGA85
10	SXGA75	25	1280x768TV	40	VGA75
11	SXGA60	26	XGA85	41	VGA72
12	SXGA50	27	XGA75	42	VGA60
13	1280x960P60	28	XGA70	43	720x400P85
14	1440x900P75	29	XGA60	44	640x400P85
255	auto mode				

Note! *Auto mode: 1280x720 HDMI/1024x768 VGA output, and LVDS output 1280x720 resolution.*

3.2 WinEC7 Startup Procedure

Windows CE image can be loaded from three devices including SD storage card, onboard flash chip, and SATA. There is only one device will be the default booting device. There are two major files that you need to boot WinEC7: u-boot.bin and NK.nb0. During boot up phase, u-boot will copy WinEC7 image (NK.nb0) to DRAM and launch it from DRAM from same bootup device. This chapter will introduce you to how to bootup WinEC7 on RSB-4210 from SD/MMC, on board flash, or SATA device.

Required Files (Please refer to released Software package):

Directory	Files	Note
01_First_WinCE_Boot_No_Hive	u-boot.bin ulogo.bmp NK_VGA_20120621_noHive.nb0	Platform might default be linux. Need to format on board flash to support Hive Based WinEC7
02_WinCE_Hive	u-boot.bin NK.nb0	The latest WinEC7 image and corresponding uboot
03_Cfimager	cfimager.exe flashSD.bat eboot.nb0 NK.nb0 NK_VGA_20120621_noHive.nb0 u-boot.bin	Freescale Flash tool to support eboot and KITL function.
04_Others	--	Other backup files
iMX53_WinEC7_NewArch_bootup_SOP: i.MX53 WinEC7 bootup SOP		

Note! *The u-boot in different folder has different functionality, do not use u-boot.bin in 01_First_WinCE_Boot_No_Hive folder to boot image in 02_WinCE_Hive folder, vice versa.*

3.2.1 WinEC7 Bootup Steps

Please follow bellow steps to boot WinEC7.

1) Platform might default be Linux. Need to format on board flash to support Hive Based WinEC7.

- Insert a boot SD Card to your host pc, and format it to FAT32 Files System.

- Copy 3 files: u-boot.bin, ulogo.bmp, and NK_VGA_20120621_noHive.nb0 from directory 01_First_WinCE_Boot_No_Hive to your boot SD Card.

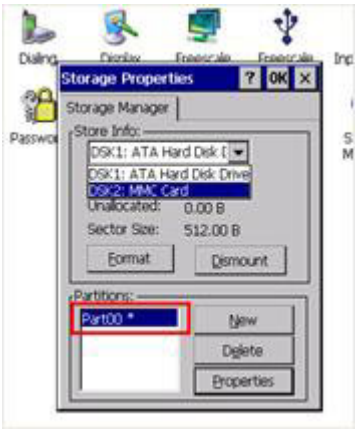
- Open the Hyperterminal or your telnet program at your working PC.
- Setting serial port

- Insert this bootup SD Card to i.MX53 platform and power on platform.
- Enter uboot command mode. Set uboot variables >>setenv bootos 'win'; saveenv;
- Restart platform, then you can see uboot logo and WinEC7 bootup.

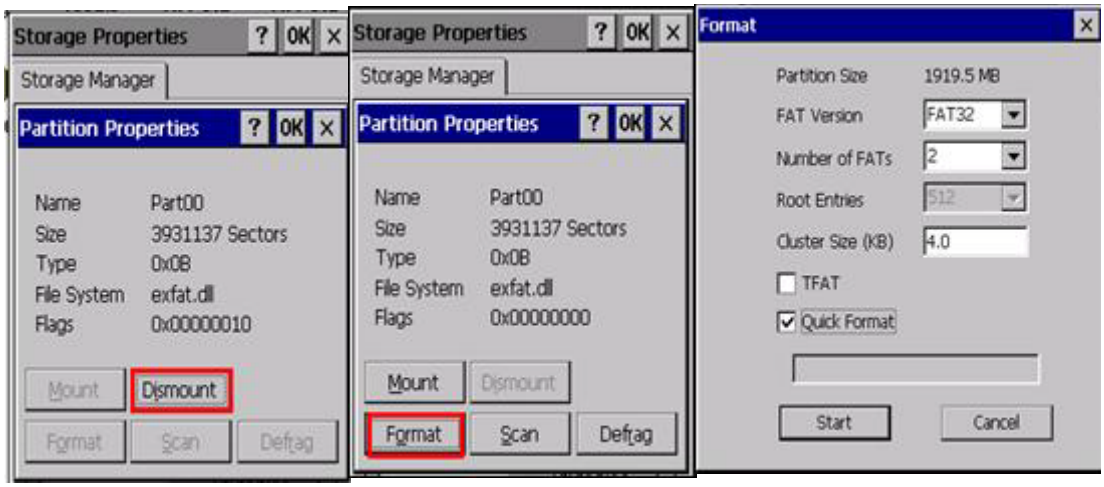
2) Format On Board Flash

- Choose the control panel

- Choose MMC Card (OnBoardFlash), and create a new partition. Select properties



- Dismount -> Format -> Mount



- You can see MMCMemory device on your platform

- Now, you can use Hive-based WinEC7 image.

Note! *If you want to bootup WinEC7 without logo, remove ulogo.bmp from your boot device.*

3) Boot Hive-based WinEC7 image

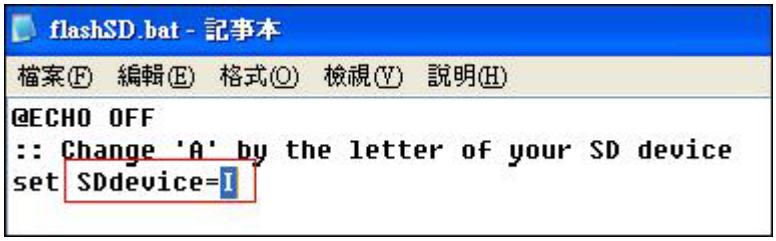
- Copy u-boot.bin and nk.nb0 from 02_WinCE_Hive to your bootup SD Card.

Restart platform, then you can see uboot logo and WinEC7 bootup.

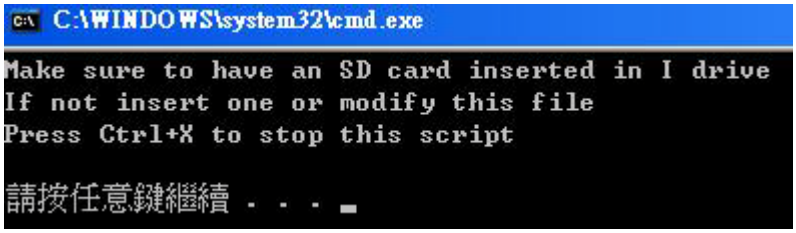
4) If you want to use KITL function. You need to use Freescale flash tool to flash bootup SD Card.

- Check your SD Slot symbol.

- Change folder to 03_Cfimager. Edit the flashSD.bat. Modify the SDdevice = "your SD slot symbol"



- Excute the flashSD.bat
- User can see the below window. And please press any key to continue



- The SD card will be formatted. Press any key to continue.
- Please check if the "u-boot.bin", "NK.nb0", and "NK_VGA_20120621_noHive.nb0" had been copied to your SD card successfully.
- Now you can use this bootup SD card to try KITL function.
- For more detail about KITL usage, please contact Advantech RISC Team.

3.2.2 Booting form On Board Flash or SATA

If you can boot WinEC7 from SD/MMC device, you can try to boot WinEC7 on board flash or SATA. Before you using these devices, remember to format it to FAT32 files system. Just copy u-boot.bin and NK.nb0 to on board flash or SATA and restart platform to achieve this task. SD/MMC is the highest priority boot device. On board flash is the lowest priority boot device.

3.3 Utilities

There are several useful utilities added in the released WinEC7 image.

3.3.1 Test Utility

The utility "Auto.exe" is an integrated test tool, which includes function validation for peripherals. You can use this tool to verify whether the peripheral function is working or not. Just copy this utility to storage device and then launch from WinCE by double clicking it. Please contact Adavantech FAEs to get this tool.

You should see a lot of test items in left window after launching this utility "Auto.exe". You can insert enough test items you want into the right window by pressing the ">>" button. The test items in right window will be executed. Also, you can remove test items from right window by clicking the "<<" button. After you've added the test items, you can go to function testing by pressing the "RUN ALL" button. By pressing the "Report" button, you will see the test results.

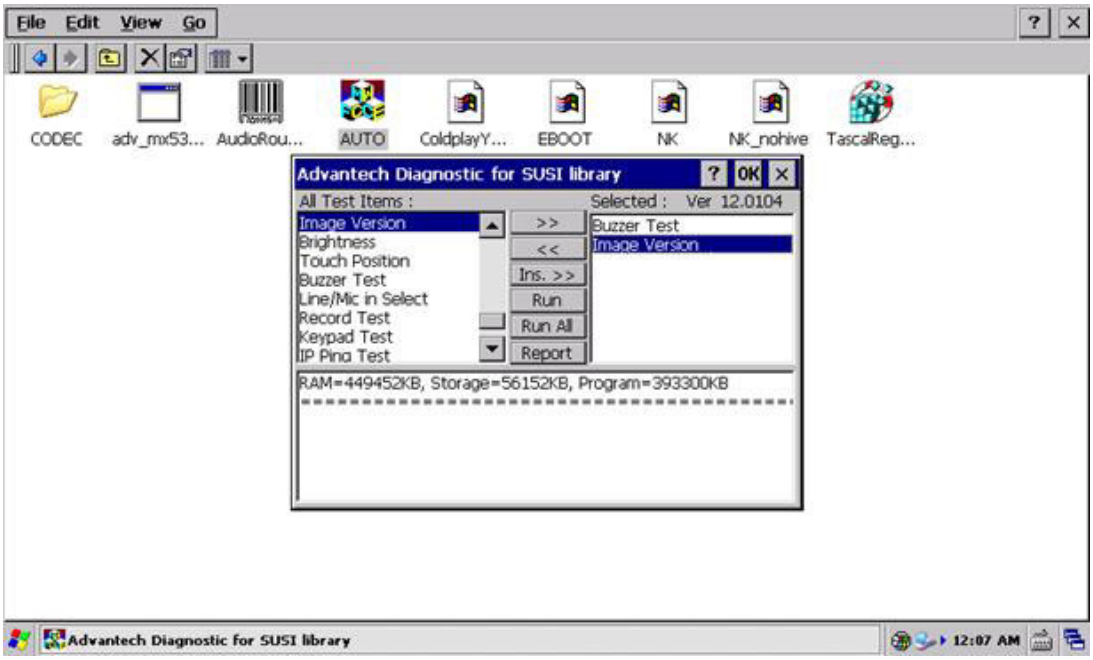


Figure 3.1 Test Utility

3.3.2 Startup Execution

The RSB-4210 platform has a useful function called "Startup execution". After the system boot up, the startup execution function would automatically perform. This function is useful for controlling the system to do the initialization processes or some other procedures. In RSB-4210 platform, follow below method to perform the "Startup" function.

Method:

Step 1. Create a folder named "Startup" in a storage media (onboard flash or SD storage card).

Step 2. Copy executable files to "Startup" folder that is created by Step 1.

Example:

Copy executable files "AdvRebootCounter.exe" in "\SD Memory\Startup", and then reboot the system. After the system boots up, the executable files would automatically execute.

3.3.3 Platform Setting

The Platform Setting utility is an outstanding utility designed by Advantech Windows® CE software team. It is an integrated environment where users can get useful system information as well as configure favorite system settings and apply system control functions on demand. The Platform Setting icon is on the desktop. The following sections illustrate the functions of Platform Setting.

3.3.3.1 General

'General' page shows the memory information including DRAM and iNAND. Platform name and System Software version are also in here.

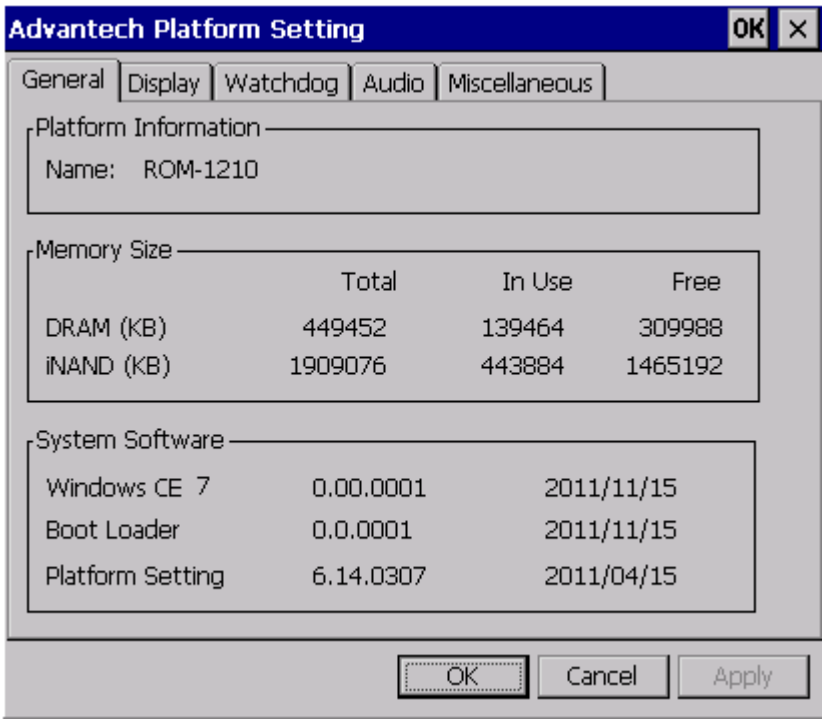


Figure 3.2 General Information

3.3.3.2 Display

From time to time it is unnecessary to turn on the display attached to the RSB-4210 all day long. The Display page provides several frequently used functions such as turning off the LCD and backlight to elongate the display repair period, adjusting brightness. Furthermore, users can click the "Turn Off" button to turn off the backlight of the display panel immediately without waiting. Once the backlight is off, there are three inputs to turn it on: (1) mouse; (2) keyboard; (3) touch-screen; users can use any one of them to turn on the display. The lower "Brightness" block has scroll bars by which users can fine tune the brightness levels of the LCD. You can also change resolution by selecting VGA group check button. However, this feature is only for Hive-based image and you need to restart platform to change resolution. To customize your own resolution, you need get Binary BSP from Advantech FAEs. The default custom resolution is 800x600 now.

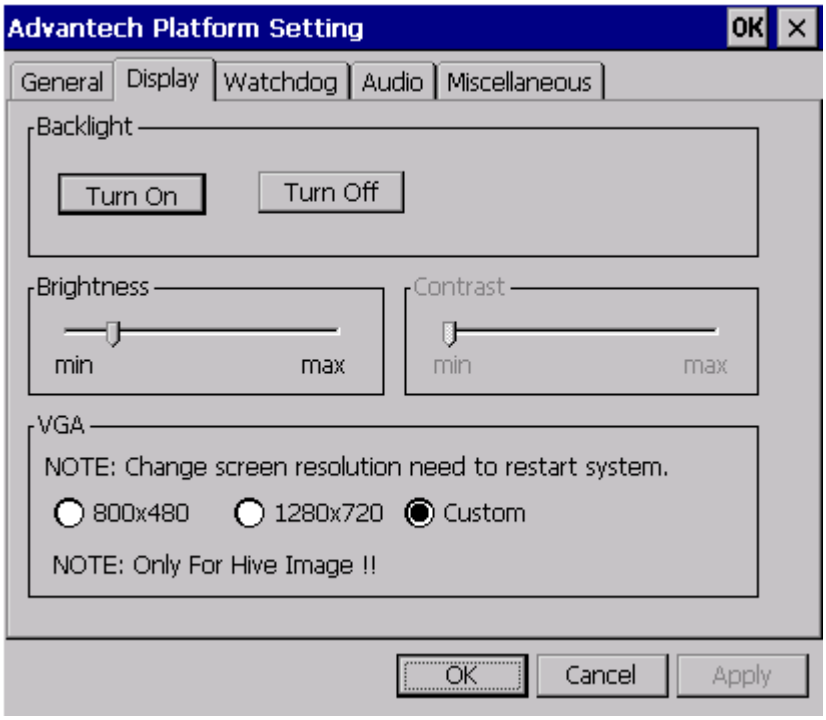


Figure 3.3 Display Configuration

3.3.3.3 WatchDog Timer

It is important in industrial applications that control systems rarely crash, or are capable of self-resetting if they hang or stop functioning. The Watchdog function for automatic system resetting is therefore provided in RSB-4210. There is a timer inside the watchdog function. User's AP could invoke the associated APIs in the Watchdog function to start the timer, then the Watchdog function would repeat the countdown of the specified period of time to reboot the system if the user's AP does not clear the timer in time periodically. The Watchdog function in the RSB-4210 provides eight different time intervals: 1 second, 5 seconds, 10 seconds, 15 seconds, 20 second, 25 seconds, and 30 seconds. The "Enable" button is used to start the Watchdog function. Pressing the "Sleep" button will cause the system into suspend mode. Pressing the "ReBoot" button will cause the system to cold boot.

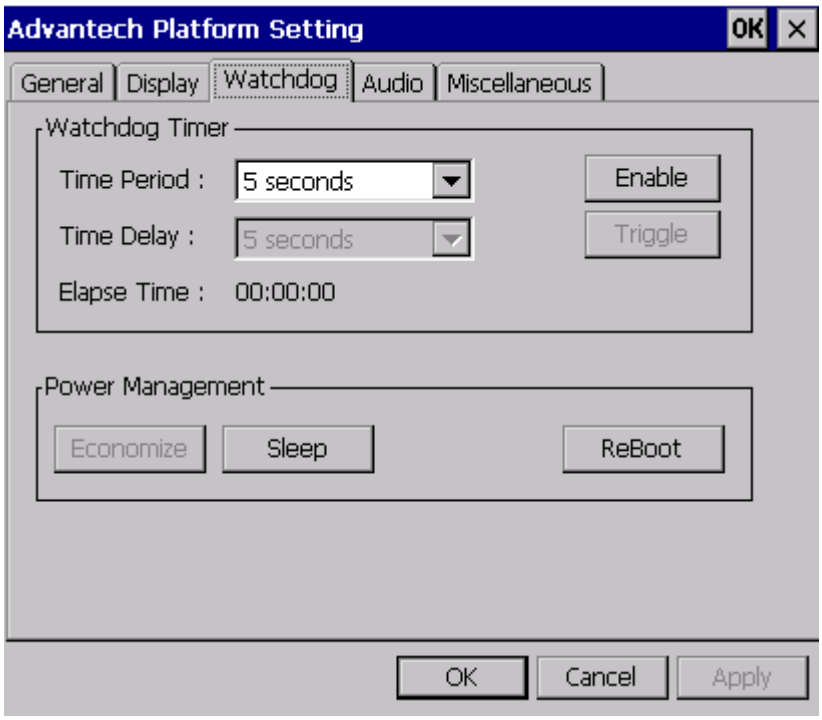


Figure 3.4 Watchdog Timer

3.3.3.4 Audio

User can adjust the playback and record volume here. And the input of record also can adjust here.

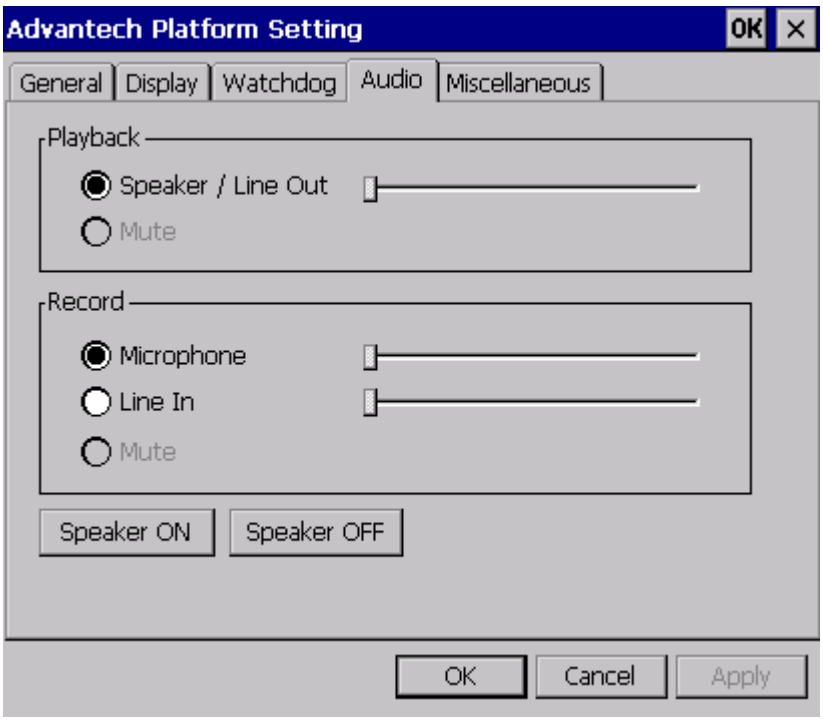


Figure 3.5 Audio Settings

3.3.3.5 Miscellaneous

The Misc page provides several functions as described below. The "Registry" block provides registry save and registry clean functions. Pressing the "Save" button, the registry settings will be saved to persistent storage as on-board flash. Pressing "Clean" button, the registry setting will return to default settings. The "Start Service" button invokes ActiveSync to the host computer. The "Ethernet Information" block shows the network MAC address. The Memory Management block will check if memory size needs to be allocated automatically during boot. Once this is checked, program memory will be allocated half, and storage memory will occupy the rest.

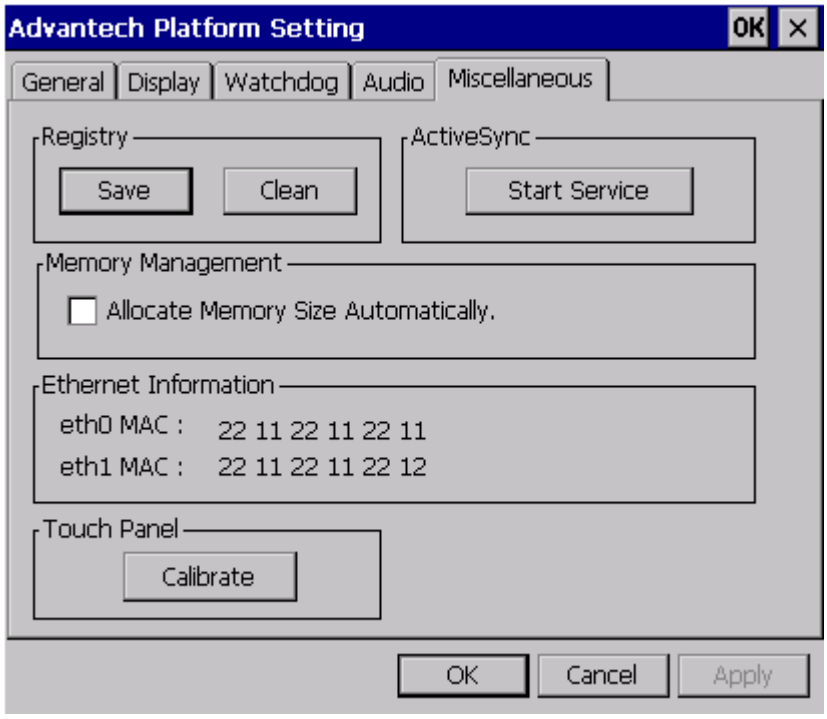


Figure 3.6 Miscellaneous Settings

3.4 Network

RSB-4210 has two builds in 10/100Base-T Ethernet controller. It appears at "Control Panel/Network and Dial-up Connections". User can configure its Ethernet support as follows:

1. Click "Start/Settings/Control Panel".
2. Double click "Network and Dial-up Connections".
3. If the RSB-4210 is a node of the LAN with DHCP servers, it is now available.

3.9.3. If the RSB-4210 is a node of the LAN with fixed IP, the user has to consult with MIS to get specific IP addresses. Then fill them into the associated fields of the Properties Dialog, then press the registry save button to save this changed registry. Reboot the system, and the Ethernet functions would be available as the previous configuration.

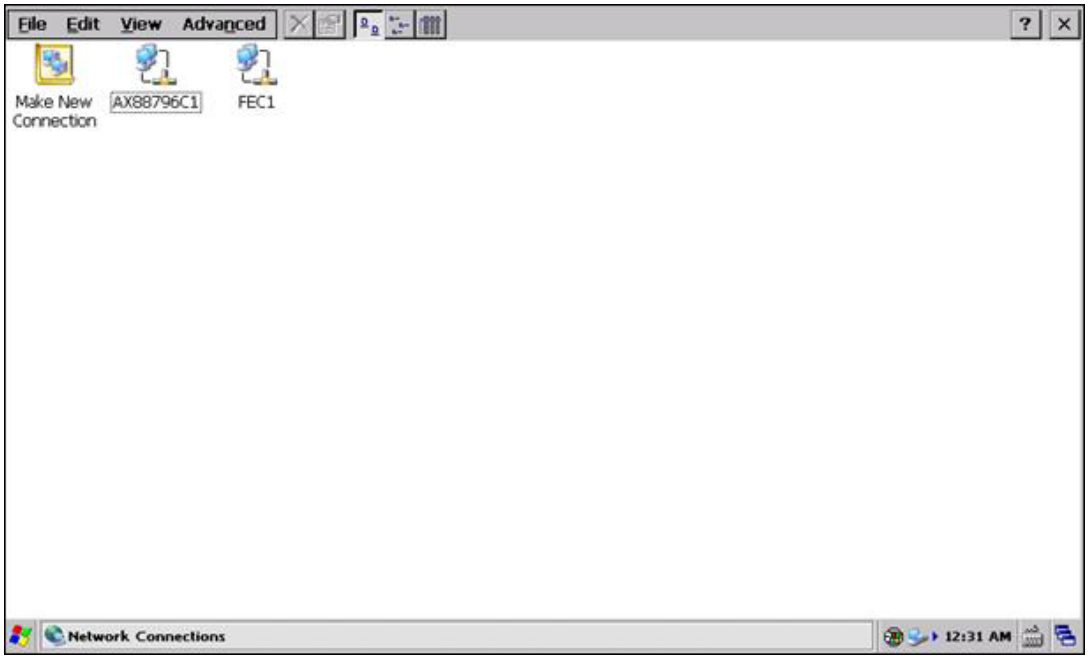


Figure 3.7 Networking via Ethernet

3.5 BSP Carried Tools

The Freescale board support package (BSP) is based on the Microsoft Windows Embedded Compact 7 operating system. It has some build-in tools to verify WinEC7 functionality and BSP's drivers. This section will introduce these tools.

3.5.1 Display and Video Testing Tools

The Windows Embedded Compact 7 BSP display driver is based on the Microsoft DirectDraw Graphics Primitive Engine (DDGPE) classes and supports the Microsoft DirectDraw interface. This driver combines the functionality of a standard LCD display with DirectDraw support.

3.5.1.1 Using The Display Driver Control Panel Application

A control panel application provides access to additional display driver functionality. Look for the icon shown in Figure 3.8 in Windows CE control panel.

The control panel application supports the following display driver features:

- Rotation between 0°, 90°, 180°, and 270°.
- Gamma correction configuration for a synchronous display device, The gamma value may be set between 0.5 and 3.5. The default gamma value is 1.0.
- Display mode configuration with a drop-down box listing all of the display modes supported by the display driver. Each display mode is listed as a combination of the mode width, height, and frequency. For example, 800×480@60Hz represents the WVGA panel LCD mode, and 720×480@50Hz represents NTSC TV mode. The resolution of the current mode is displayed in the box. **However, you can't change resolution when kernel running.** This application is located under \Startup\Settings\Control Panel\Freescale display driver.

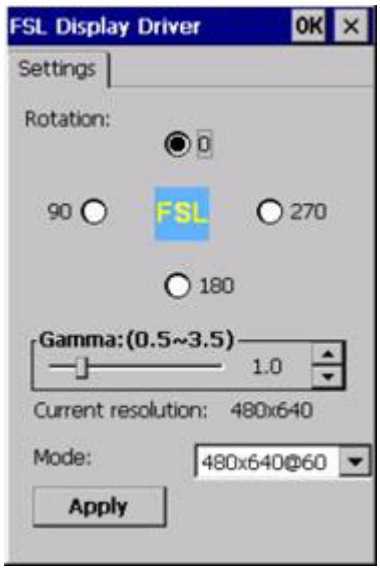
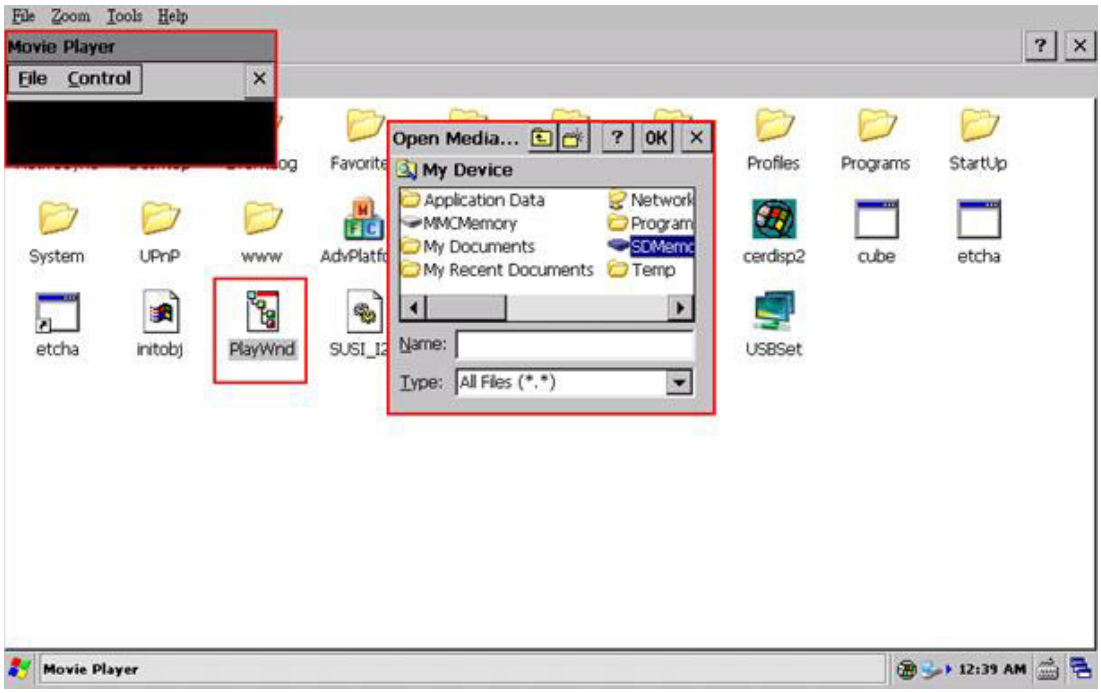


Figure 3.8 Display Driver GUI

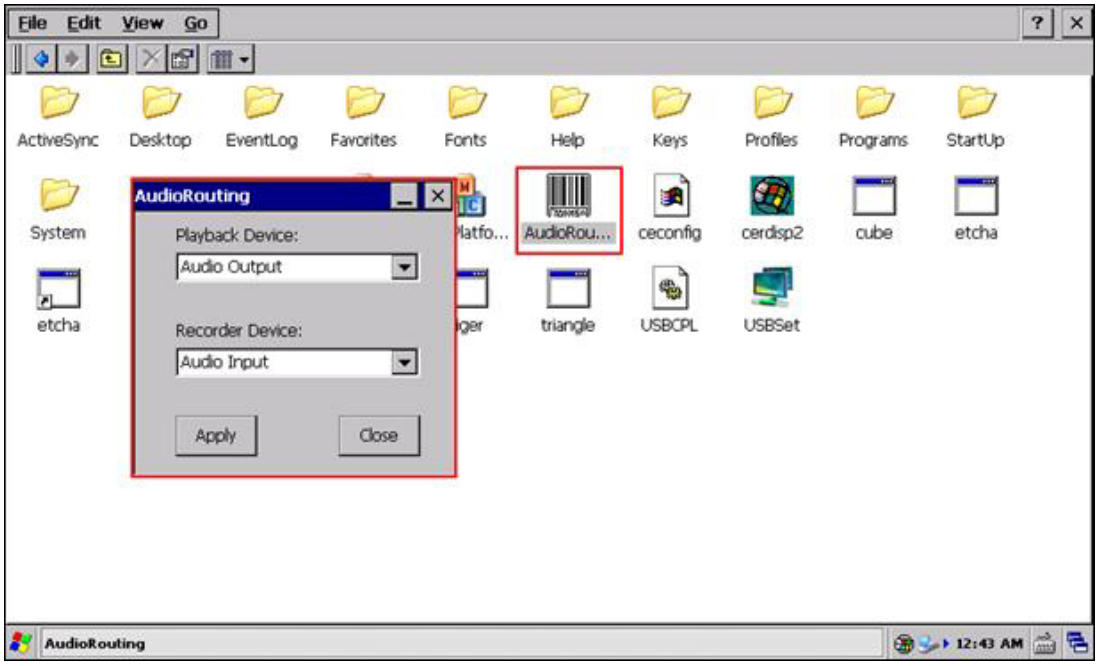
3.5.1.2 Running the PlayWnd tests

For PlayWnd testing, there are no build steps required. playwnd.exe always is included in the image. This sample is an interactive audio/video media file player. It uses DirectShow to play any supported audio or video media file (MPG, AVI, QT, WAV, AU, SND, MID, etc.). The video will appear in a window on the screen, and you can use a mouse to move the window. If the media has a video component, PlayWnd will read the video's default size and adjust the player's client area to allow the video to play at its exact default size (taking into account the size of caption bar & borders). When the media file is playing, the menu bar will disappear, giving you keyboard control with 'P' and 'S' for pause/play and stop/reset. This application is located under \Windows\ PlayWnd.exe.



3.5.2 AudioRouting

If both the SGTL5000 stereo audio driver and the SPDIF driver occur, the default audio device may be SGTL5000. The default audio device can be chosen by the AudioRouting application. Now SGTL5000 support input and output, and SPDIF only support output. This application is located under \Windows\ AudioRouting.exe.



3.5.3 Graphics Processing Unit Testing Tools

The Graphics Processing Unit (GPU) is a graphics accelerator targeting embedded 2D/3D graphics applications. The GPU3D (3D graphics processing unit) is based on the AMD Z430 core, which is an embedded engine capable of DirectX9 Shader Model 3.0+ program execution and accelerates user level graphics APIs such as OpenGL ES 1.1 and 2.0.. The GPU2D (2D graphics processing unit) is based on the AMD Z160 core, which is an embedded 2D and vector graphics accelerator targeting the OpenVG 1.1 graphics API and feature set The GPU driver is delivered only as binary code.

3.5.3.1 Tiger Test

This test application verifies the basic functionality of OpengVG 1.1. It is included into the release image and is located under \Windows\tiger.exe. Click to launch this test and a rotating tiger appears on the screen as shown in follow figure.

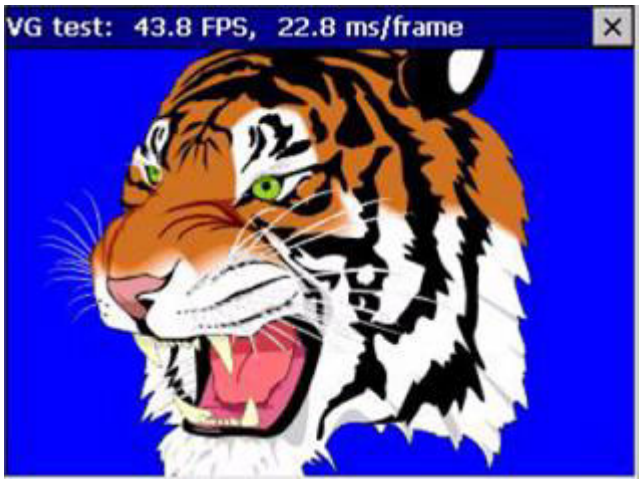


Figure 3.9 Tiger Test

3.5.3.2 Cube Test

This test application verifies the basic functionality of OpengGL ES 1.1. It is included in the release image and is located under \Windows\cube.exe. Click to launch this test and a rotating cube appears on the screen as shown in follow figure. Press ESC to exit this application.

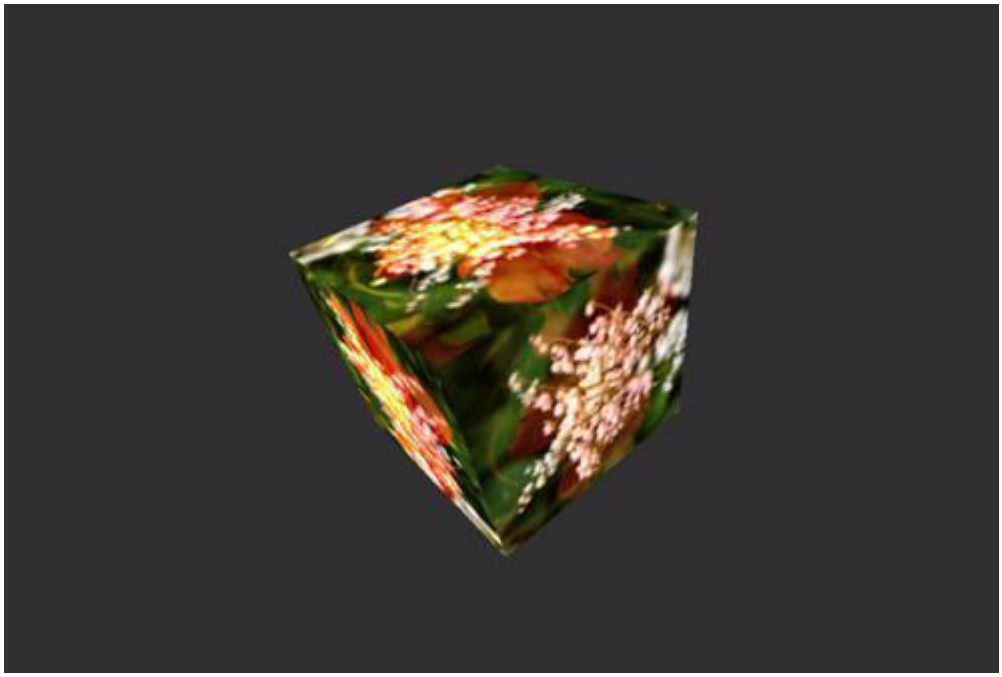


Figure 3.10 Cube Test

3.5.3.3 Triangle Test

This test application verifies the basic functionality of OpengGL ES 2.0. It is included in the release image and is located under \Windows\triangle.exe. Click to launch this test and a triangle appears on the screen as shown in follow figure. Press ESC to exit this application.

Figure 3.11 Triangle Test

3.5.4 Application Tool for USB Device Class Select

There are three types of USB device classes: ActiveSync, MSC and RNDIS. An application with a GUI is provided to switch between the three classes. Figure X shows the tool to switch the USB device class. Make sure the OTG port is operating under the USB device mode (by connecting the mini-B connector of the USB OTG cable to the OTG port in the board) before pressing the Apply button to switch USB device class.

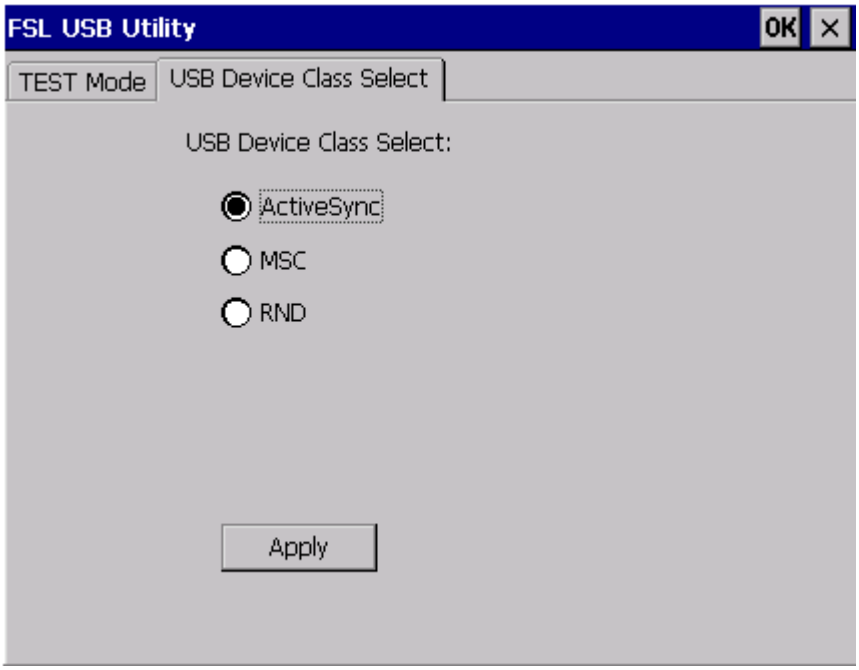


Figure 3.12 USB Device Class Switch User Interface

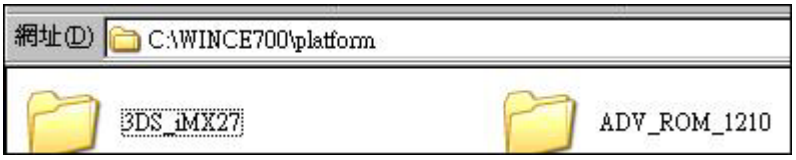
3.6 Binary BSP introduction

The purpose of this section is to show you how to use Advantech WinCE Binary BSP to develop your WinCE system for i.MX53 series platform. Before you begin this document's step, you need to check a development environment listed as below:

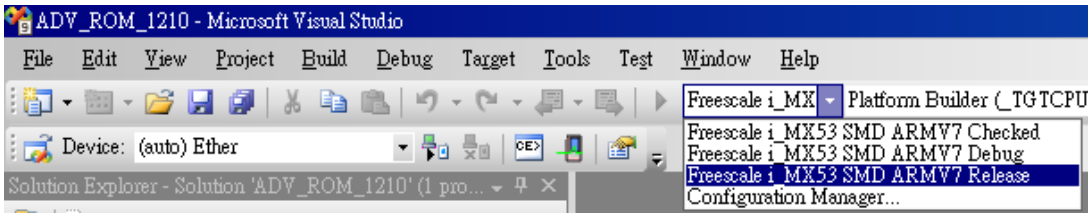
1. **PC development environment.**
- Visual Studio 2008
- Windows Embedded Compact 7
2. **SD Card.**
3. **Released BSP package contains following files:**
- **ADV_RSB_4210.pbxml (or ADV_ROM_1210.pbxml):** WinCE OSDesing Project file.
- **ADV_RSB_4210(or ADV_ROM_1210):** BSP Binary Package.
- **RSB_4210xx_x_(date)_S:** Image and bootup package
- **uboot_logo_(date):** uboot source code and programming guide package.
4. **A RSB-4210 Platform.**

3.6.1 Build WinEC7 OS Image

1. Assume default WinCE path is "C:\WINCE700".
2. Copy **ADV_RSB_4210 (or ADV_ROM_1210)** to "C:\WINCE700\PLATFORM", for example



3. Place **ADV_ROM_1210**.pbxml to OSDesigns\[create a sub-folder]\ , for example: C:\WINCE700\osdesigns\ADV_ROM_1210\ ADV_ROM_1210.pbxml
4. Double Click "ADV_ROM_1210.pbxml". Start a VS2008 WinCE Platform Builder. It will create OSDesigns files.
5. Select **Build** -> **Configuration Manager** from your Visual Studio 2008 menu bar. Choose "Freescale i_MX53 SMD ARMV7 Release"



- Make Run-Time Image: Select Build -> Build Solution from your Visual Studio 2008 menu bar. **Never Rebuild, or Clean solution !!**
- The WinEC7 image will be placed at "C:\WINCE700\osdesigns\ADV_ROM_1210\RelDir\Freescale_i_MX53_SMD_ARMV7_Release"

3.6.2 Windows CE Startup Procedure

Please refer to Section 3.2. Copy the compiled NK.nb0 image to your boot device. Follow Section 3.2 to boot up your platform.

3.6.3 U-boot development

Please refer to RSB-4210 Linux Eva-kit user manual and winec7-uboot-programing-guide_(date) to develop u-boot if you want to customize it.

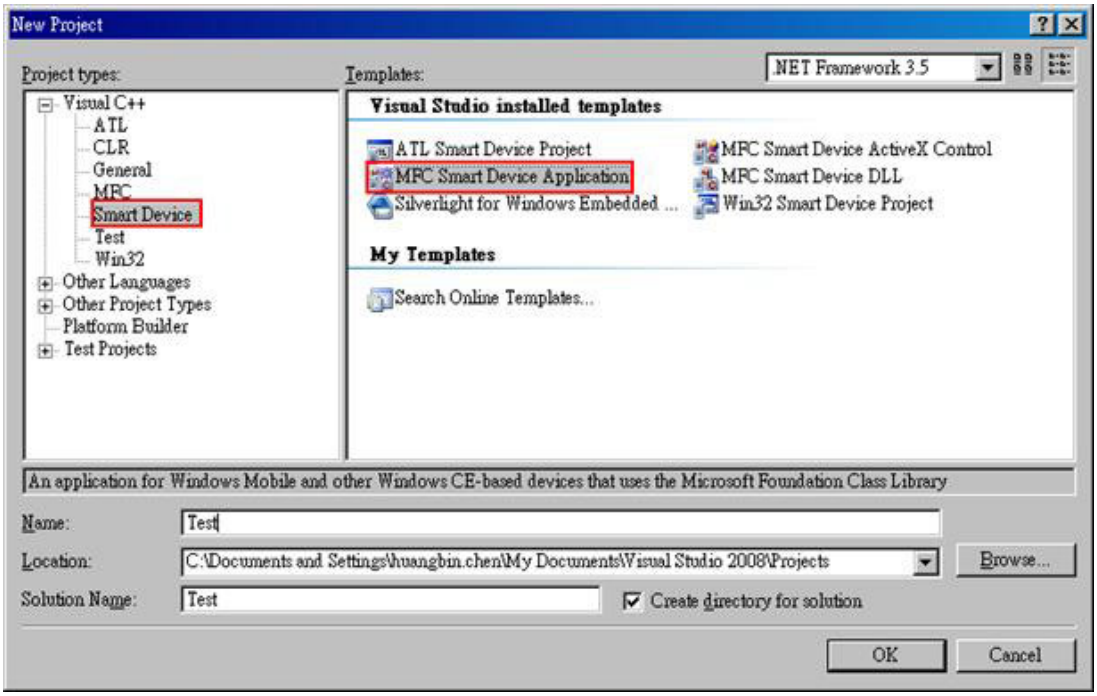
3.7 SDK introduction

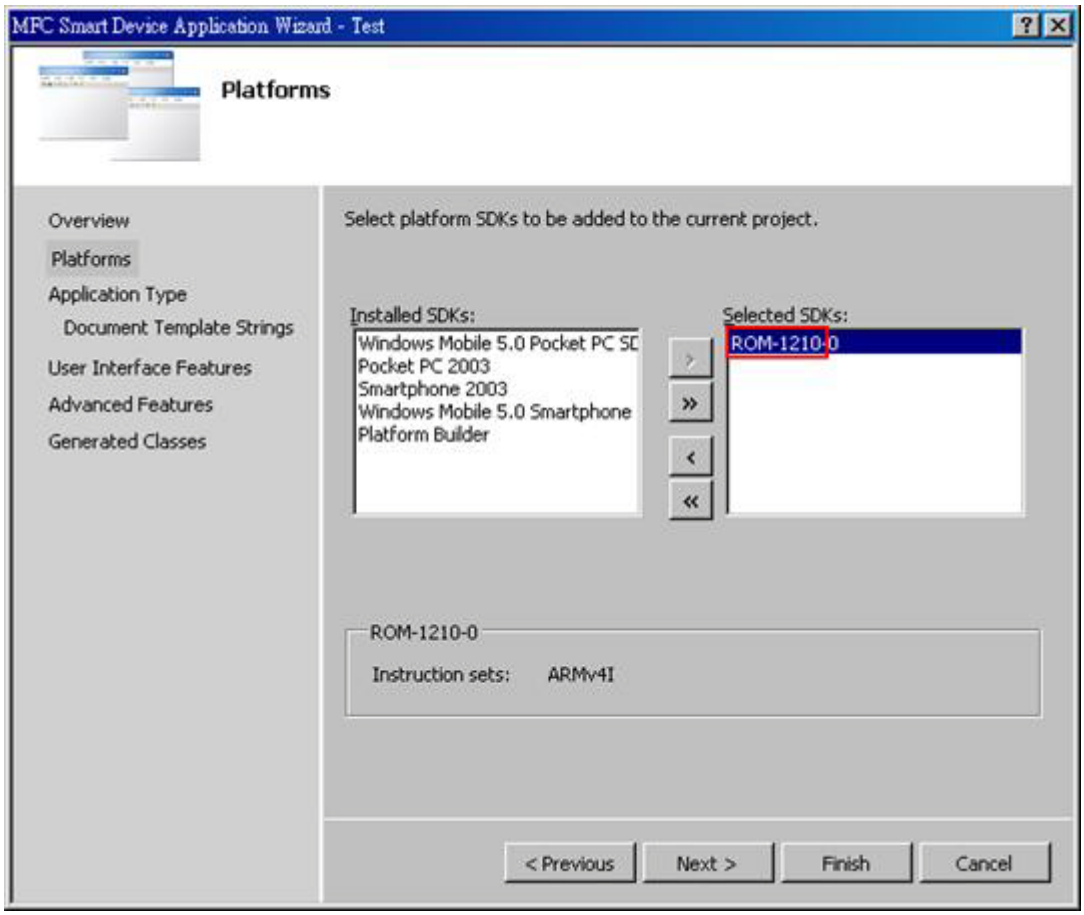
The purpose of this document is to introduce the method of remote debug a Visual C++ program of Windows Embedded Compact 7 (Windows EC7) Smart Device by using Activesync utility connection. Before you begin this document's step, you need to setup a development environment listed as below:

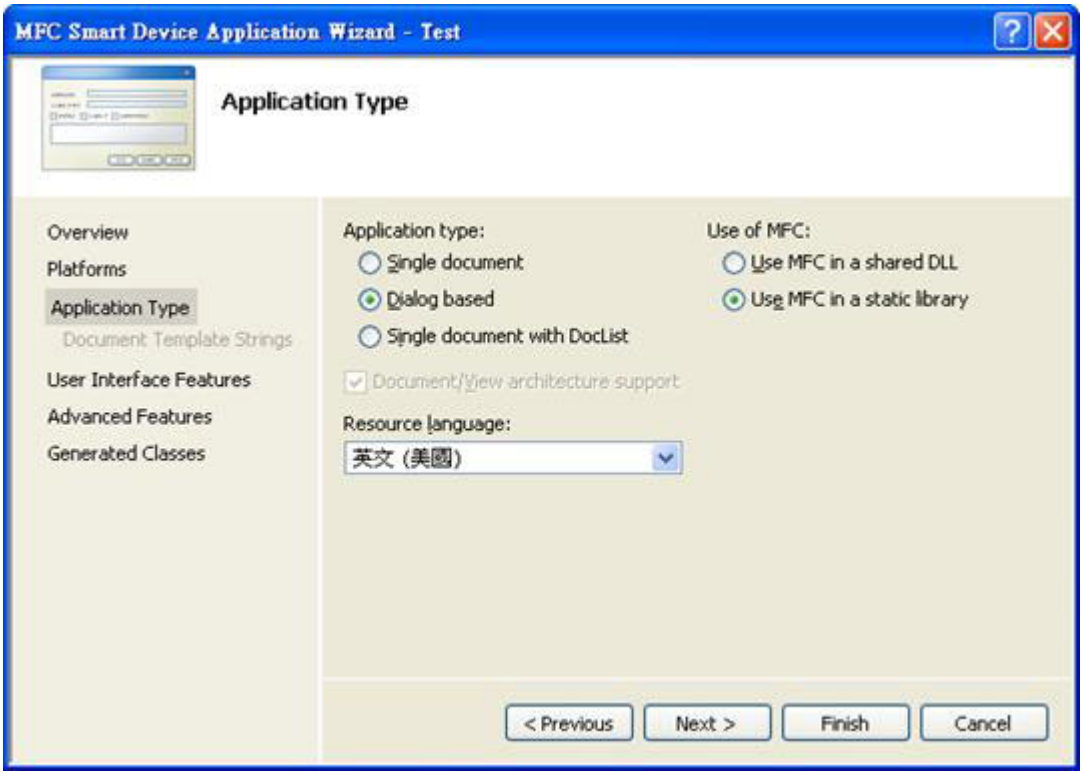
1. **Visual Studio 2008 development environment on your Desktop PC.**
   (Visual Studio 2008 SP1)
2. **Install target device SDK**
   (For example, ROM-1210.msi for RSB-4210 platform)
3. **Windows Embedded Compact 7.0 device.**

3.7.1 Create a new Windows EC 7 project

1. Select **File** -> **New** -> **Project...** from your Visual Studio 2008 menu bar.
2. Select Project Types: **Smart Device** of Visual C++.
3. Select Visual Studio Installed Templates: **MFC Smart Device Application**.
4. Type "Project Name"
5. Select Target platform SDK: **ROM-1210**.
6. Base on your application to choice Application Type, EX:"Dialog Based".



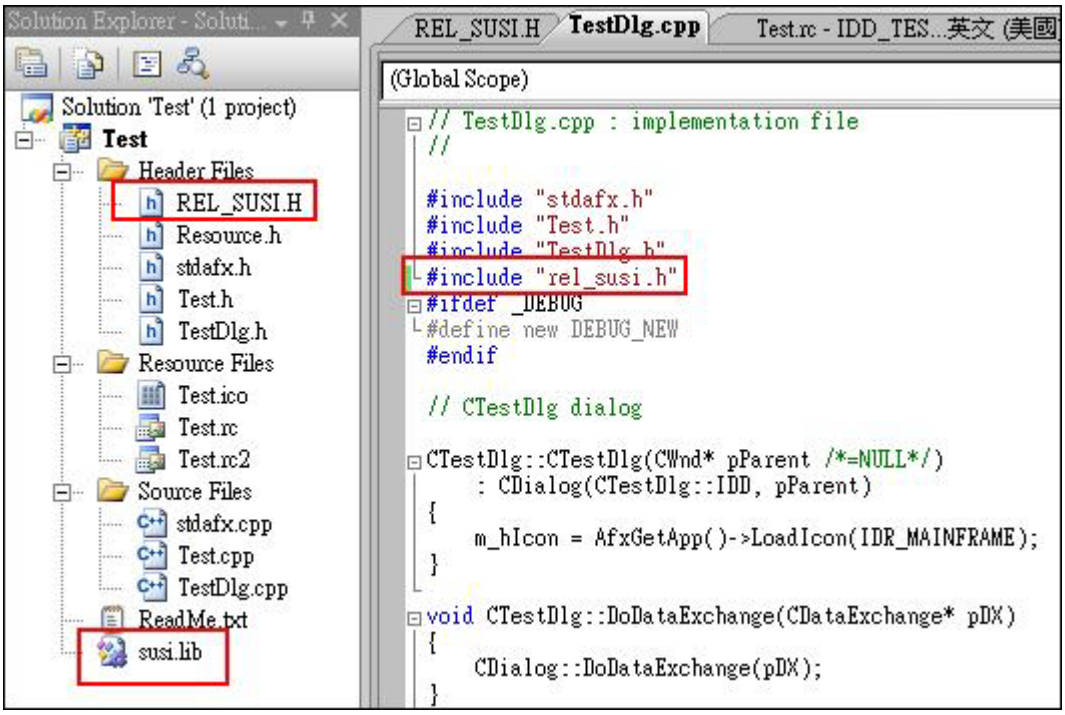

MFC Smart Device Application Wizard - Test
Platforms
Overview
Platforms
Application Type
Document Template Strings
User Interface Features
Advanced Features
Generated Classes
Select platform SDKs to be added to the current project.
Installed SDKs:
Windows Mobile 5.0 Pocket PC SD
Pocket PC 2003
Smartphone 2003
Windows Mobile 5.0 Smartphone
Platform Builder
Selected SDKs:
ROM-1210-0
ROM-1210-0
Instruction sets: ARMv4I
< Previous
Next >
Finish
Cancel


MFC Smart Device Application Wizard - Test
Application Type
Overview
Platforms
Application Type
Document Template Strings
User Interface Features
Advanced Features
Generated Classes
Application type:
Single document
Dialog based
Single document with DocList
Document/View architecture support
Use of MFC:
Use MFC in a shared DLL
Use MFC in a static library
Resource language:
英文 (美國)
< Previous
Next >
Finish
Cancel

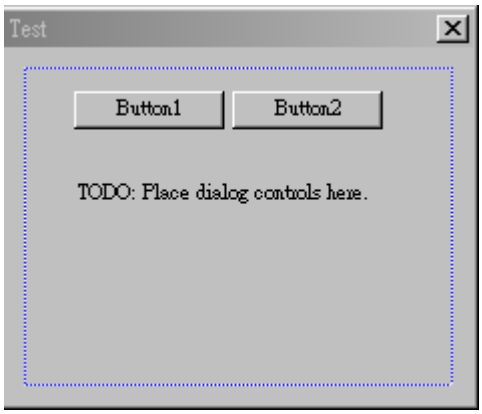
3.7.2 How to use SUSI

Here is a simple example show you how to use SUSI to control buzzer beep.

1. Copy REL_SUSI.H, and susi.lib to your application folder and add these files to your project.
2. Add #include "REL_SUSI.H" to your source file.



3. Draw 2 buttons in previous example in Section 2.



4. Add following code to enable SUSI init

```
BOOL Cbeep_testDlg::OnInitDialog()
{
    CDialog::OnInitDialog();

    // Set the icon for this dialog.  The framework does this automatically
    //  when the application's main window is not a dialog
    SetIcon(m_hIcon, TRUE);         // Set big icon
    SetIcon(m_hIcon, FALSE);        // Set small icon

    // TODO: Add extra initialization here
    int nRet;
    if((nRet = SusiDllInit())<0)
    {
        RETAILMSG(1, (TEXT("Initial failed!!\r\n")));
        CString text;
        text.Format(_T("Susi initialize failed: %d\n"), nRet);
        AfxMessageBox(text);
        //AfxMessageBox(_T("Susi is not supported for this platform !!"));
    }
    return TRUE;  // return TRUE  unless you set the focus to a control
}
```

```
int nRet;
        if((nRet = SusiDllInit())<0)
        {
                RETAILMSG(1, (TEXT("Initial failed!!\r\n")));
                CString text;
                text.Format(_T("Susi initialize failed: %d\n"), nRet);
                AfxMessageBox(text);
                //AfxMessageBox(_T("Susi is not supported for this platform !!"));
        }
```

5. Add following code to control buzzer

```
void Cbeep_testDlg::OnBnClickedButton1()
{
    // TODO: Add your control notification handler code here
    SusiCoreSetBuzzer(1);
}

void Cbeep_testDlg::OnBnClickedButton2()
{
    // TODO: Add your control notification handler code here
    SusiCoreSetBuzzer(0);
}
```

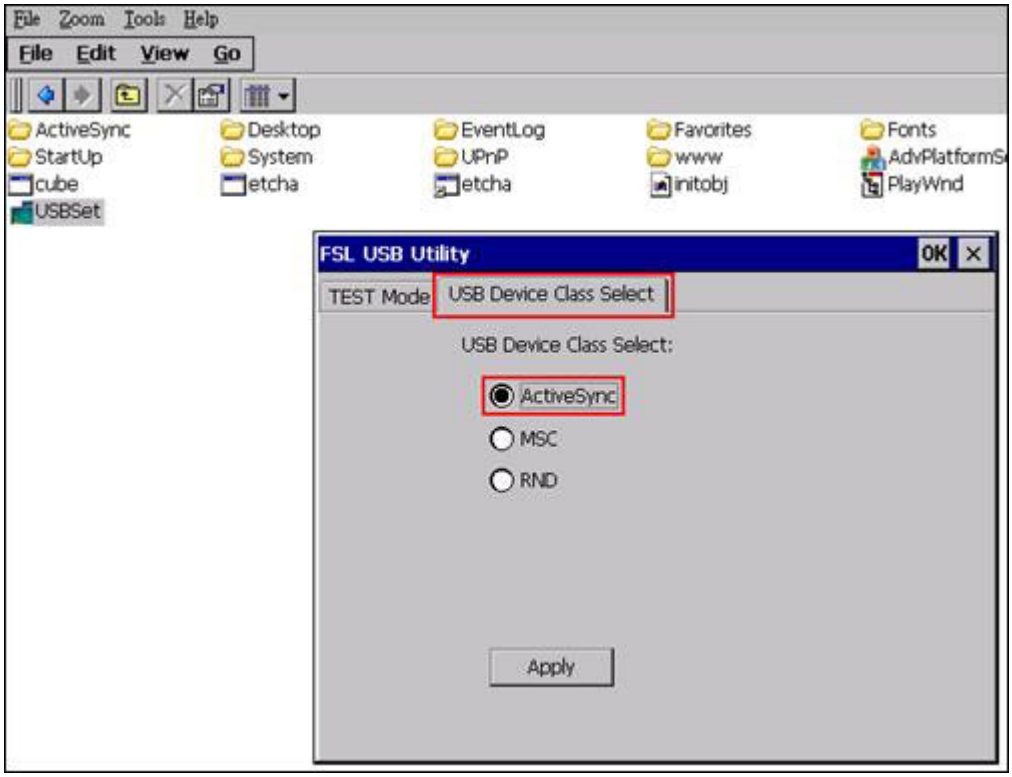
```
void Cbeep_testDlg::OnBnClickedButton1()
{
        // TODO: Add your control notification handler code here
        SusiCoreSetBuzzer(1);
}

void Cbeep_testDlg::OnBnClickedButton2()
{
        // TODO: Add your control notification handler code here
        SusiCoreSetBuzzer(0);
}
```

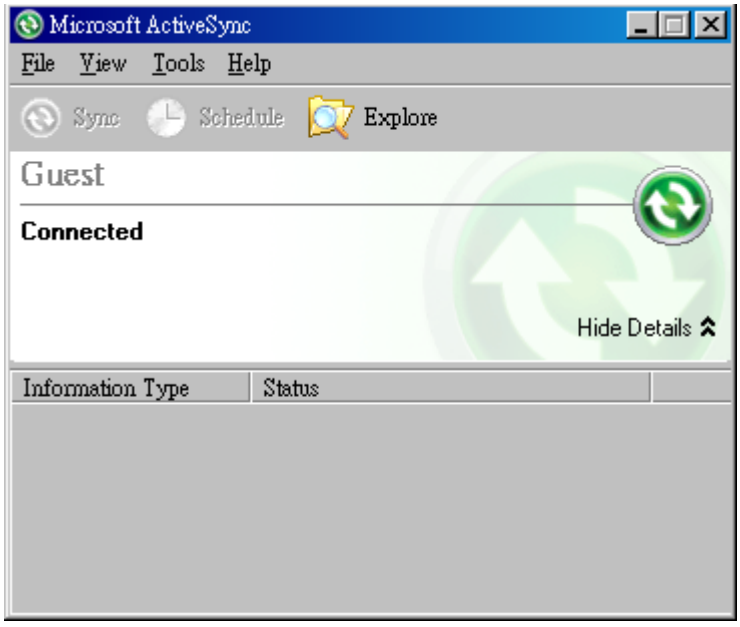
6. Then you can Start Debugging with ActiveSync to try SUSI API.
7. Other SUSI API please refer to RSB-4210-SUSI_User_Maunal document.

3.8 Connect Device with PC with Activesync

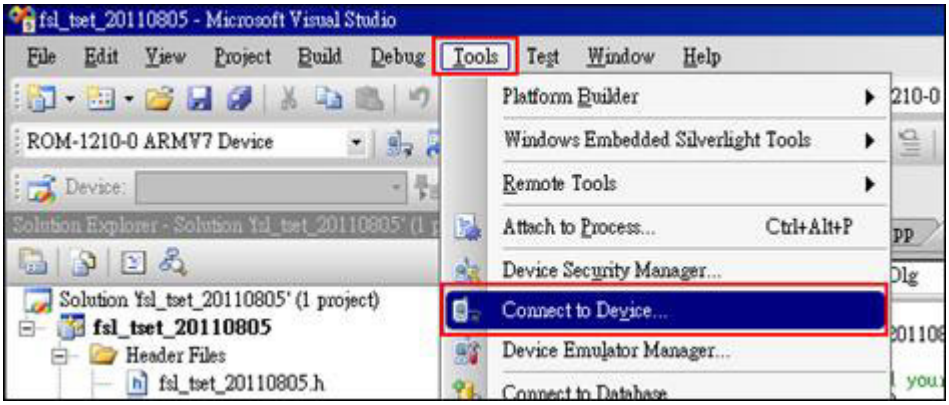
1. Install Activesync 3.9.3.5 on PC
2. Startup your WinEC7 platform. Go to Windows -> USBSet, Set USB Device Class Select to Active Sync.

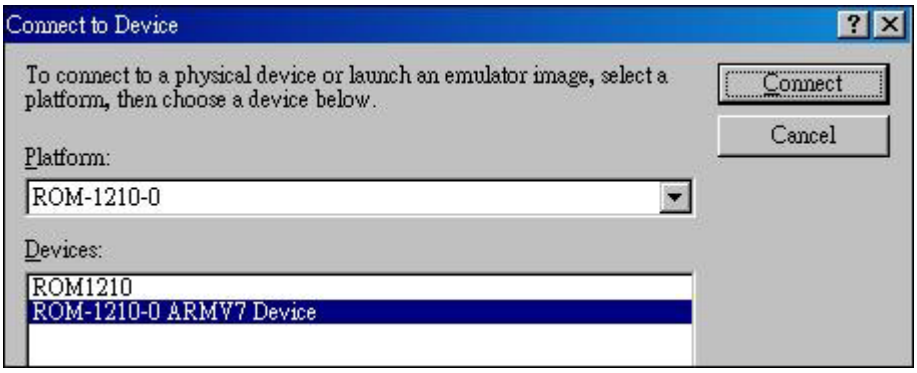


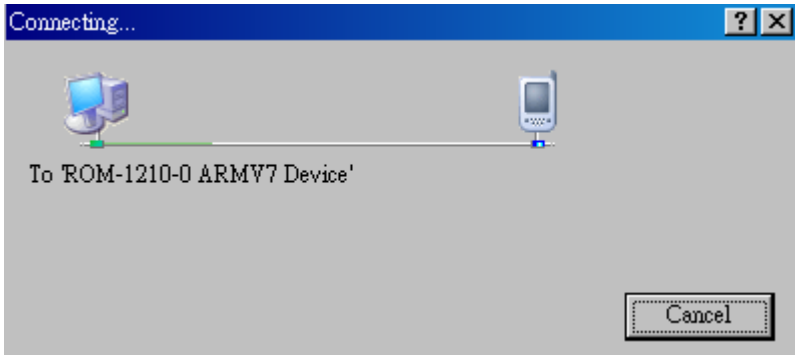
3. Connect device & PC via USB cable (RSB-4210 OTG client port is USB_ORG1)
4. Activesync will show "Connected"

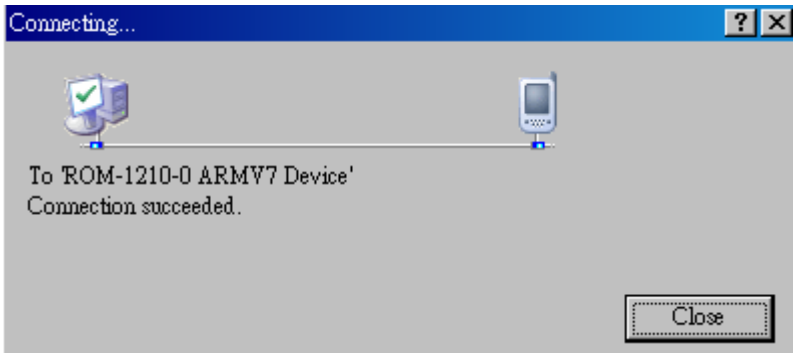


5. Select Tools -> Connect to Device (Then select your target device) from your Visual Studio 2008 menu bar. Then it will show "Connection succeeded"



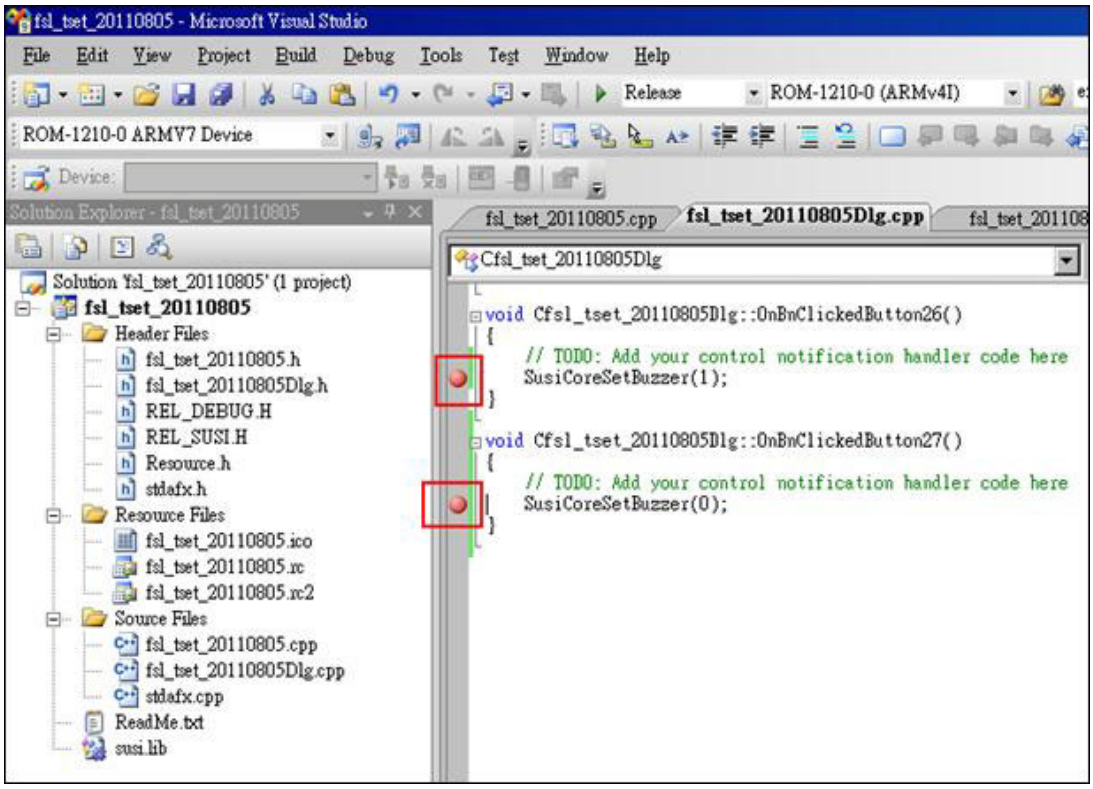


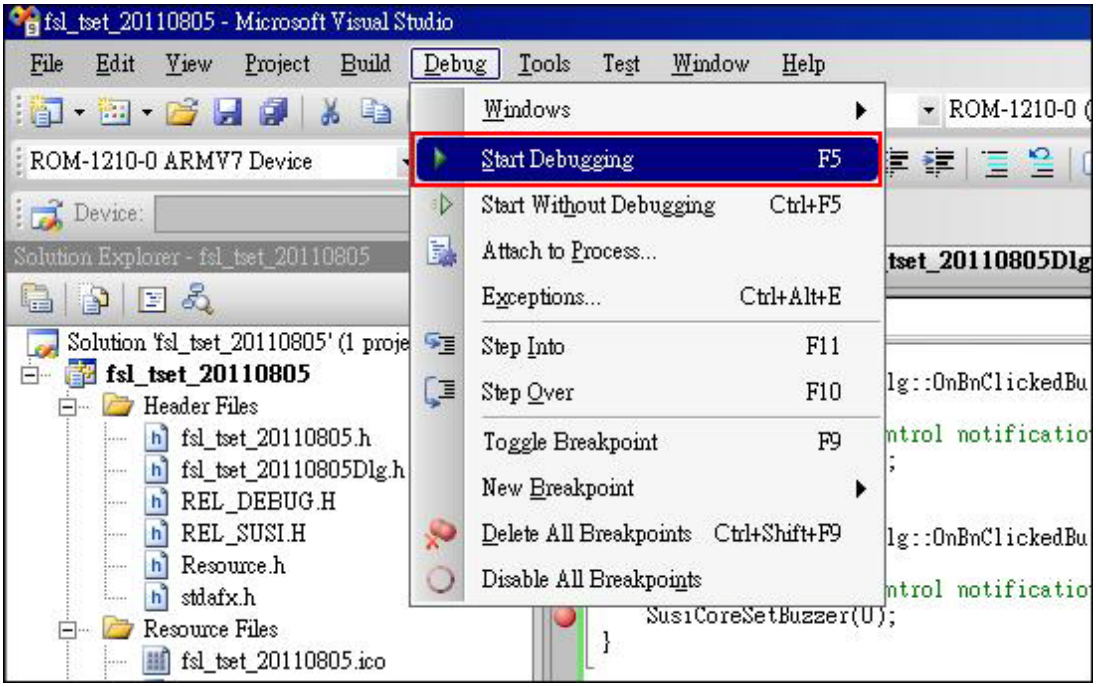


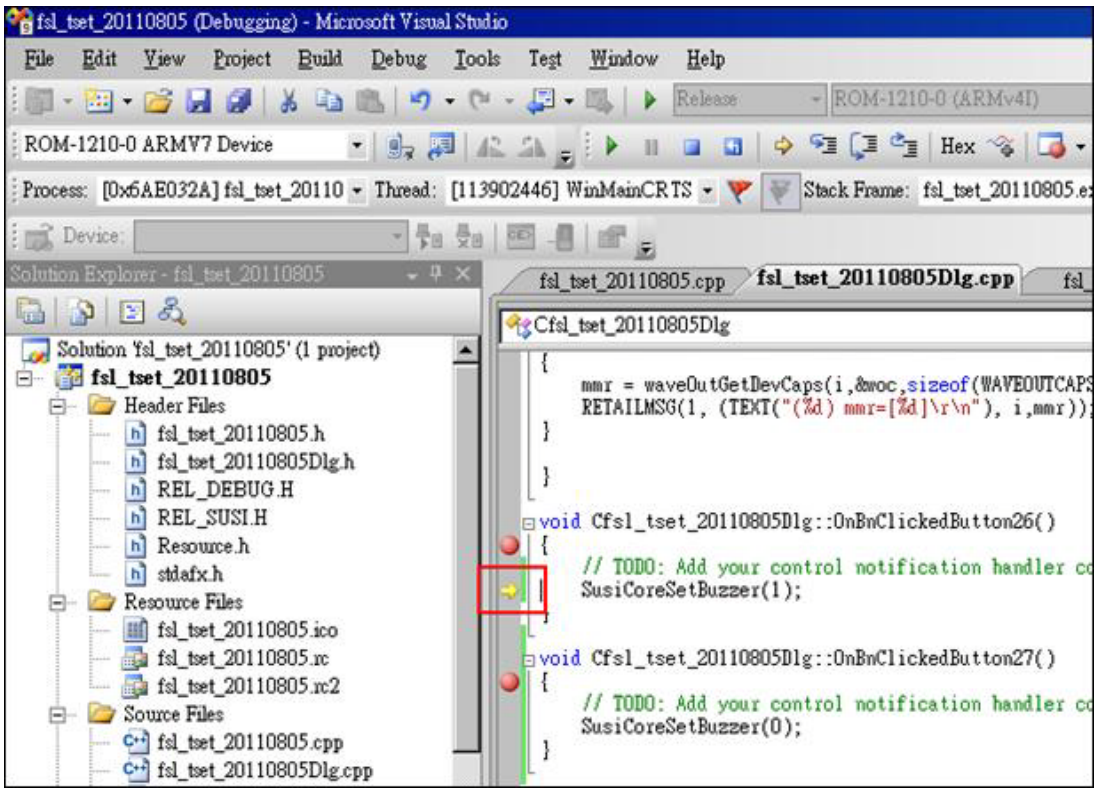


3.9 Implement Break Points

1. Set breakpoints at you code, for example, code lines- Cfsl_tset_20110805Dlg::OnBnClickedButton26; SusiCoreSetBuzzer(1);
2. Then press "F5' to Start Debugging
3. Then you can see that it will stop at the breakpoint you set.
4. Then press "F5' to Continues Debugging, it will go to next breakpoint you set.
5. Finally, you can see you AP shown at the LCD screen of device







3.10 SUSI Library

SUSI - A Bridge to Simplify & Enhance H/W & Application Implementation Efficiency

When developers want to write an application that involves hardware access, they have to study the specifications to write the drivers. This is a time-consuming job and requires lots of expertise.

Advantech has done all the hard work for our customers with the release of a suite of APIs (Application Programming Interfaces), called the Secured & Unified Smart Interface (SUSI).

SUSI provides not only the underlying drivers required but also a rich set of user-friendly, intelligent and integrated interfaces, which speeds development, enhances security and offers add-on value for Advantech platforms. SUSI plays the role of catalyst between developer and solution, and makes Advantech embedded platforms easier and simpler to adopt and operate with customer applications.

Benefits

- **Faster Time to Market**
  SUSI's unified API helps developers write applications to control the hardware without knowing the hardware specs of the chipsets and driver architecture.
- **Reduced Project Effort**
  When customers have their own devices connected to the onboard bus, they can either: study the data sheet and write the driver & API from scratch, or they can use SUSI to start the integration with a 50% head start. Developers can reference the sample program on the CD to see and learn more about the software development environment.
- **Enhances Hardware Platform Reliability**
  SUSI provides a trusted custom ready solution which combines chipset and library function support, controlling application development through SUSI enhances reliability and brings peace of mind.
- **Flexible Upgrade Possibilities**
  SUSI supports an easy upgrade solution for customers. Customers just need to install the new version SUSI that supports the new functions.

SUSI Contains 5 + 1 Categories of Features:

- **Control**
  Control the devices connected to GPIO and I2C.
- **Display**
  Adjust the brightness of LCD panels or turn on/off the power of display devices.
- **Monitor**
  Monitor the system status, including voltage, temperature, fan speed and Watchdog function to restart if the system freezes or crashes.
- **Power Saving**
  Power Saving utility and API for software developers.
- **Security**
  API for AES encryption, RNG (random number generator), SRAM mirror feature and security ID storage.
- **Debug**
  Easier debugging with SUSI; when a SUSI API call fails, error codes help programmers know what exactly the error is. All the possible errors have been listed.

SUSI-RISC supports Control, Display and Monitor functions.

- **Control**
  - **GPIO**

General Purpose Input/Output is a flexible parallel interface that allows a variety of custom connections. It supports various Digital I/O devices - input devices like buttons, switches; output devices such as cash drawers, LED lights etc. And, allows users to monitor the level of signal input or set the output status to switch on/off the device.

– **Programmable GPIO**

The Programmable GPIO API allows developers to dynamically set the GPIO input or output status, GPIO in/out status is usually defined in BIOS, if customers need to have different settings, they must modify the BIOS. Now with the new Programmable GPIO, customers can change the settings in their application by calling the SUSI API; greatly saving development time.

– **I^2C**

I^2C is a bi-directional two wire bus that was developed by Philips for use in their televisions in the 1980s. Today, I^2C is used in all types of embedded systems. The I^2C API allows a developer to interface a CE PC to a downstream embedded system environment and transfer serial messages using the I2C protocols, allowing multiple simultaneous device control.

■ **Monitor**

– **Watchdog**

A watchdog timer (WDT) is a device or electronic card that performs a specific operation after a certain period of time if something goes wrong with an electronic system and the system does not recover on its own.

A watchdog timer can be programmed to perform a warm boot (restarting the system) after a certain number of seconds during which a program or computer fails to respond following the most recent mouse click or keyboard action.

■ **Display**

– **Brightness Control**

The Brightness Control API allows a developer to interface Windows CE PC to easily control brightness.

– **Backlight**

The Backlight API allows a developer to control the backlight (screen) on/off in Windows CE.

3.10.1 Package Contents

SUSI-RISC currently supports one OS - Windows CE. Contents are listed below:

Operating System	**Location**	**Installation**
Windows CE	\Program Files\SUSI\V30	Image Built-in *
Directory	**Contents**	
User Manual	SUSI_User_Manual.pdf	
Library Files	Susi.lib	
	Function export	
	Susi.dll	
	Dynamic link library	
Include Files	Susi.h	
	ioctrl.h / REL_SUSI.h	
SusiDemo	AdvPlatformSetting.exe	
	Demo program execution file	
	Susi.dll	
	Dynamic link library	
SusiDemo\SRC\ C	Source code of SusiDemo program in EVC	

* Windows CE manual installation:

You can add the SUSI Library into the image by editing any bib file. First you open project.bib in the platform builder. Add this line to the MODULES section of project.bib Susi.dll $(_FLATRELEASEDIR)\Susi.dll NK SH

If you want to run the window-based demo, add the following line: AdvPlatformSetting.exe $(_FLATRELEASEDIR)\ AdvPlatformSetting.exe

Place the three files into any files directory.

Build your new Windows CE operating system.

3.10.2 Additional Programs

3.10.2.1 Demo Program

The SUSI demo program demonstrates how to incorporate SUSI library into the user's own applications. The program is written in EVC programming language and based on Windows Embedded Compact 7.

3.10.2.2 AdvPlatformSetting.exe

The execution file, AdvPlatformSetting.exe, released with source code can be run on Windows EC7.

The following pages are a detailed introduction to the AdvPlatformSetting program:

i. General

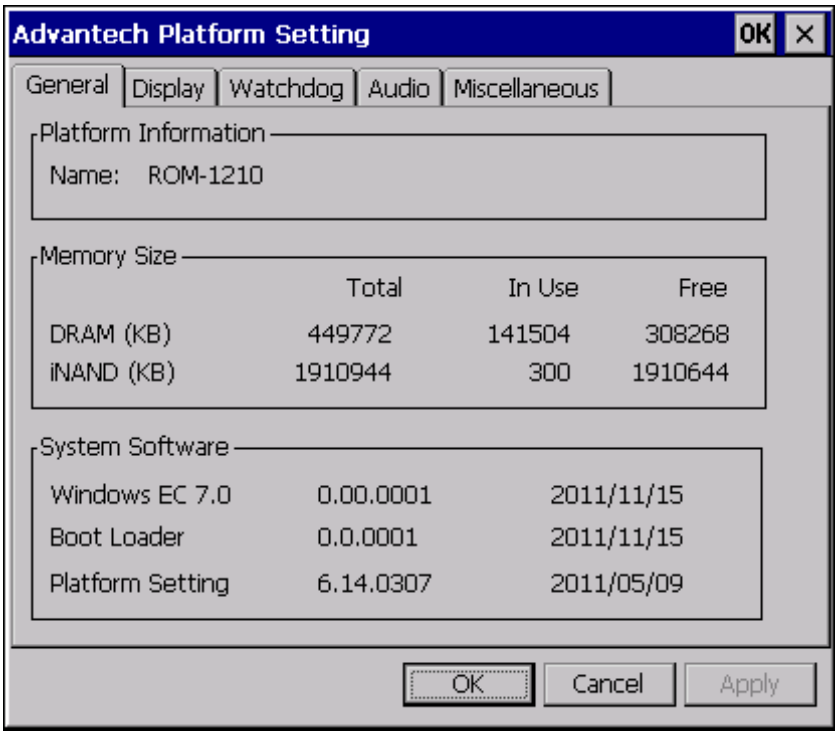


Figure 3.13 General Information

All platform information is showed in this page.

Platform Information

- Show H/W platform information.

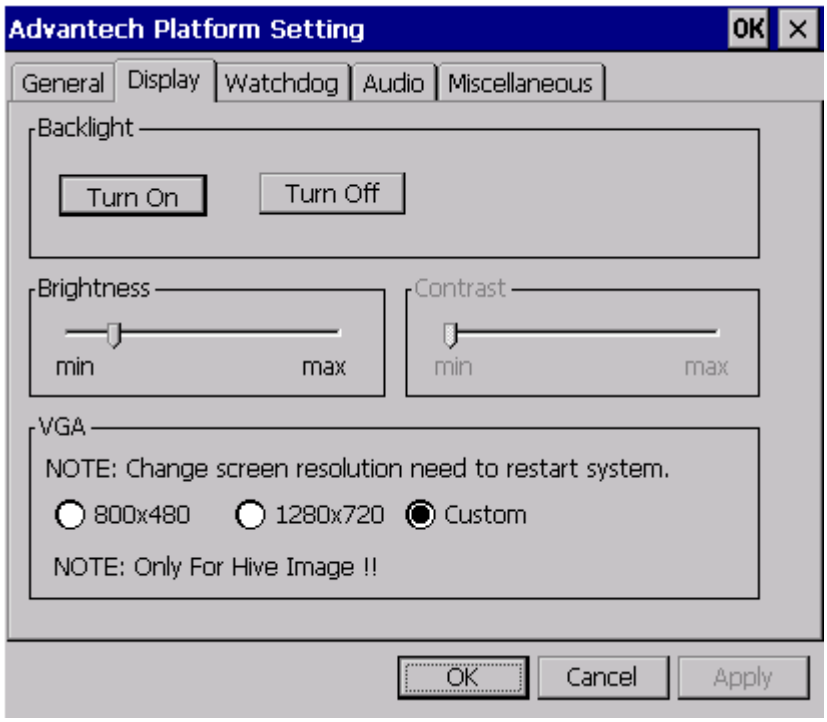
Memory Size

- Show memory information.
- Show NAND Flash information

System Software

- Show information about the Operating System
- Show information about Boot Loader.
- Show information about platform.

ii. Display



This page is about VGA control. You can control Backlight, Brightness and Screen resolution. ROM-1210 does not support to adjust contrast.

Backlight:

- Turn ON/OFF backlight.

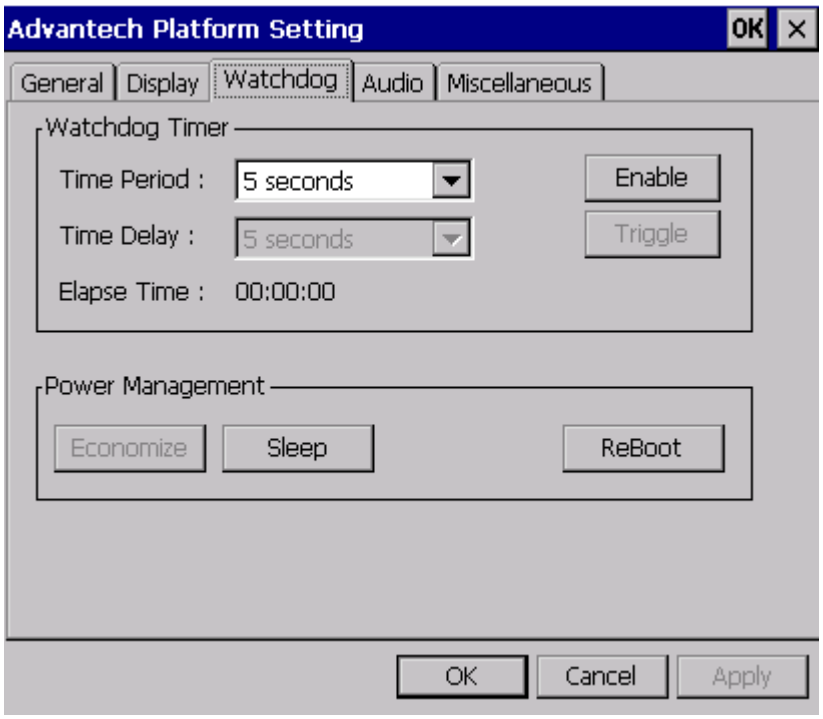
Brightness:

- Change the brightness from 0 up to 255.

VGA:

- Change screen resolution.

iii. Watchdog



This page contains "Watchdog" and "Power Management".

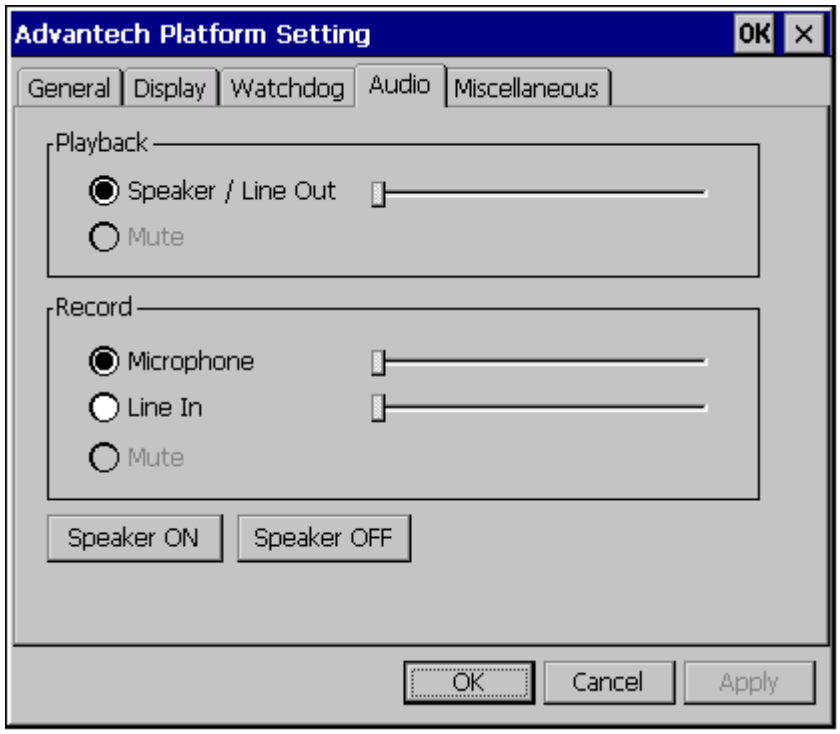
Watchdog Timer:

- A configurable time out counter with Time-out periods from 0.5 seconds up to 128 seconds.
- Time resolution of 0.5 seconds.
- Before the timer counts down, you may reset the timer by clicking the "Trigger" button. "Stop" function is not supported in SUSI-RISC.

Power Management:

- This part implements Sleep function and Reboot function.

iv. Audio



This page demonstrates audio control.

Playback:

- ROM-1210 only provides an audio output.

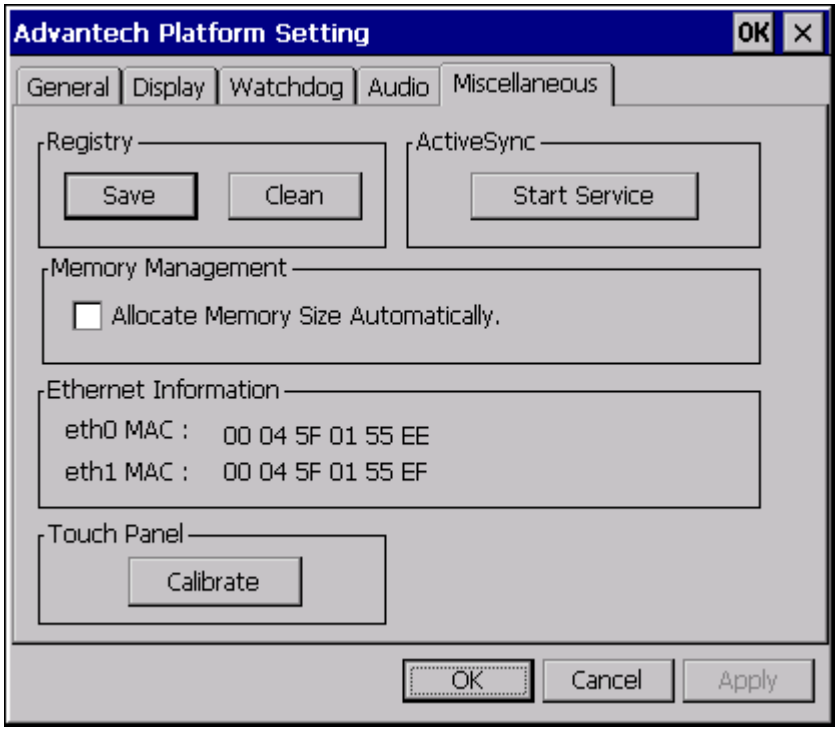
Record:

- You can choose two input source, Microphone or Line In.

Speaker:

- You can turn ON/OFF the speaker.

v. Miscellaneous



Miscellaneous page contains Registry Control, ActiveSync, Ethernet Information and Touch Panel Calibrate.

Registry:

- Our BSP supports hive-based registry. With the hive-based registry, you may save the changes in files on a storage device. For performance reasons, the registry changes saved after you had called "RegFlushKey".

ActiveSync:

- ActiveSync allows you to transfers files from your PC to the Windows Mobile platform, and opens up a gateway to synchronizing data from your phone with your desktop computer.

Ethernet Information:

- This part shows MAC Address of Ethernet chipset.

Touch Panel:

- You can calibrate the touch screen.

3.10.2.3 Programming Overview

Header Files

SUSI.H includes API declaration, constants and flags that are required for programming.

DEBUG.H / ERRDRV.H / ERRLIB.H are for debug code definitions.

DEBUG.H - Function index codes

ERRLIB.H - Library error codes ERRDRV.H - Driver error codes

Library Files

Susi.lib is for library import and Susi.dll is a dynamic link library that exports all the API functions.

Installation File

In Windows CE, the files and drivers mentioned above are already built-in to the image.

Dll functions

SusiDll- APIs are driver-independent, i.e. they can be called without any drivers. In Windows CE, after drivers having been installed, users have to call SusiDllInit for initialization before using any other APIs that are not SusiDll-prefixed. Before the application terminates, call SusiDllUnInit to free allocated system resources.

When an API call fails, use SusGetLastError to get an error report. An error value will be either

Function Index Code + Library Error Code, or

Function Index Code + Driver Error Code

The Function Index Code indicates which API the error came from and the library / Driver Error Code indicates the actual error type, i.e. whether it was an error in a library or driver. For a complete list of error codes, please refer to the Appendix.

Core functions

SusiCore- APIs are available for all Advantech SUSI-enabled platforms to provide board information such as the platform name and BIOS version. New

SusiCoreAccessBootCounter and SusiCoreAccessBootCounter APIs are Boot Logger features that enable monitoring of system reboot times, total OS run time and continual run time.

Watchdog (WD) functions

The hardware watchdog timer is a common feature among all Advantech platforms. In user applications, call SusiWDSetConfig with specific timeout values to start the watchdog timer countdown, meanwhile create a thread or timer to periodically refresh the timer with SusiWDTrigger before it expires. If the application ever hangs, it will fail to refresh the timer and the watchdog reset will cause a system reboot.

GPIO (IO) functions

There are two sets of GPIO functions. It is highly recommended to use the new one. With pin read and write, more flexibility has been added to allow easy pin direction change as needed, as well as the capability of reading output pin status.

GPIO function set:

Refer to Appendix for pin allocation and their default direction.

IIC functions

The APIs here cover IIC standard mode operations with a 7-bit device address:

The slave address is expressed as a 7-bit hex number between 0x00 to 0x7F, however the actual addresses used for R/W are 8?bit write address = 7?bit address <<1 (left shift one) with LSB 0 (for write)

8-bit read address = 7-bit address <<1 (left shift one) with LSB 1 (for read)

E.g. Given a 7-bit slave address 0x20, the write address is 0x40 and the read address is 0x41.

Here in all APIs, parameter SlaveAddress is the 8-bit address and users don't need to care about giving it as a read or write address, since the actual R/W is taken care by the API itself, i.e. you could even use a write address, say 0x41 for APIs with write operation and get the right result, and vice versa.

For more details on platform IIC/SMBus support, please refer to Appendix A.

VGA Control (VC) functions

SusiVC- functions support VGA signal ON/OFF on all SUSI-enabled platforms and also LCD brightness adjustment. One application of SusiVCScreenOn and SusiVCScreenOff is to have the display signal disabled when system idles after certain period of time to expand the panel life span.

3.10.3 SUSI API Programmer's Documentation

All APIs return the BOOL data type except Susi*Available and some special cases that are of type int. If any function call fails, i.e. a BOOL value of FALSE, or an int value of -1, the error code can always be retrieved by an immediate call to SusiGetLastError.

3.10.3.1 SusiDllInit

Initialize the Susi Library.

BOOL SusiDllInit(void)

Parameters

None.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

An application must call SusiDllInit before calling any other non SusiDll functions.

3.10.3.2 SusiDllUnInit

Unload the Susi Library.

BOOL SusiDllUnInit(void)

Parameters

None.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

Before an application terminates, it must call SusiDllUnInit if it has successfully called SusiDllInit. Calls to SusiDllInit and SusiDllUnInit can be nested but must be paired.

3.10.3.3 SusiDllGetVersion

Retrieve the version numbers of SUSI Library.

void SusiDllGetVersion(WORD *major, WORD *minor)

Parameters

major

[out] Pointer to a variable containing the major version number.

minor

[out] Pointer to a variable containing the minor version number.

Return Value

None.

Remarks

This function returns the version numbers of SUSI. It's suggested to call this function first and compare the numbers with the constants SUSI_LIB_VER_MJ and SUSI_LIB_VER_MR in header file SUSI.H to ensure the library compatibility.

3.10.3.4 SusiDllGetLastError

This function returns the last error code value.

int SusiDllGetLastError(void)

Parameters

None.

Return Value

The code of error reason for the last function call with failure.

Remarks

You should call the SusiDllGetLastError immediately when a function's return value indicates failure.

The return error code will be either

Function Index Code + Library Error Code, or

Function Index Code + Driver Error Code

The Function Index Code distinguishes which API the error resulted from and the library / Driver Error Code indicates the actual error type, i.e. if it is an error in a library or driver. For a complete list of error codes, please refer to the Appendix.

3.10.3.5 SusiCoreAvailable

Check if Core driver is available.

int SusiCoreAvailable (void)

Parameters

None.

Return Value

Value	Meaning
-1	The function fails.
0	The function succeeds; the platform does not support SusiCore- APIs.
1	The function succeeds; the platform supports Core.

Remarks

After calling SusiDllInit successfully, all Susi*Available functions are used to check if the corresponding features are supported by the platform or not. So it is suggested to call Susi*Available before using any Susi*- functions.

3.10.3.6 SusiCoreGetPlatformName

Get the current platform name.

BOOL SusiCoreGetPlatformName(TCHAR *PlatformName, DWORD *size)

Parameters

PlatformName

[out] Pointer to an array in which the platform name string is returned.

size

[in/out] Pointer to a variable that specifies the size, in TCHAR, of the array pointed to by the PlatformName parameter.

If PlatformName is given as NULL, when the function returns, the variable will contain the array size required for the platform name.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

Call the function twice, first by giving PlatformName as NULL to get the array size required for the string. Then allocate a TCHAR array with the size required and give the array with its size as parameters to get the platform name. Note that the platform name cannot be correctly retrieved if the BIOS is a release version.

3.10.3.7 SusiCoreSoftReset

Software reset function.

BOOL SusiCoreSoftReset(void)

Parameters

None.

Return Value

TRUE(1) indicates success; FALSE(0) indicates failure.

Remarks

Call this function to do software reset.

3.10.3.8 SusiCoreGetImageInfo

Get image information, including WinCE image version, WinCE image build date, Boot loader image version, and Boot loader image build date.

BOOL SusiCoreGetImageinfo(PIMGINFO pInfo)

Paramete

pInfo

[out] Retrieve image information

ImageInfo structure definition :

```
typedef struct {
    TCHAR    *WinCEImageVersion;
    TCHAR    *WinCEBuiltDate;
    TCHAR    *BootloaderVersion;
    TCHAR    *BootloaderDate;
    } PIMGINFO, *PIMGINFO
```

Return Value

TRUE(1) indicates success; FALSE(0) indicates failure.

Remarks

Programmer can adjust program memory size in Mbytes by using this function. The format of WinCEBuiltDate & BootloaderDate is yyyymmdd.

3.10.3.9 SusiCoreGetMACAddr

Get MAC Address of LAN chip.

BOOL SusiCoreGetMACAddr (BYTE *MACAddr)

Parameters

MACAddr

[out] Pointer to a byte array containing the MAC address of LAN chip.

Return Value

TRUE(1) indicates success; FALSE(0) indicates failure.

3.10.3.10 SusiCoreSetMACAddr

Set MAC Address of LAN chip.

BOOL SusiCoreSetMACAddr (BYTE *MACAddr)

Parameters

MACAddr

[in] Pointer to a byte array which is the new MAC address.

Return Value

TRUE(1) indicates success; FALSE(0) indicates failure.

3.10.3.11 SusiCoreRegistrySave

Save registry.

BOOL SusiCoreRegistrySave(void)

Parameters

None.

Return Value

TRUE(1) indicates success; FALSE(0) indicates failure.

Remarks

Call this function to save registry.

3.10.3.12SusiCoreRegistryClean

Clean registry to default.

BOOL SusiCoreRegistryClean(void)

Parameters

None.

Return Value

TRUE(1) indicates success; FALSE(0) indicates failure.

Remarks

Call this function to clean registry to default value, and then reset platform.

3.10.3.13SusiWDGetRange

Get the step, minimum and maximum values of the watchdog timer.

BOOL SusiWDGetRange(DWORD *minimum, DWORD *maximum, DWORD *stepping)

Parameters

Minimum

[out] Pointer to a variable containing the minimum timeout value in milliseconds

Maximum

[out] Pointer to a variable containing the maximum timeout value in milliseconds

Stepping

[out] Pointer to a variable containing the stepping timeout value in milliseconds

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

The values may vary from platform to platform; depending on the hardware implementation of the watchdog timer. For example, if the minimum timeout is 1000, the maximum timeout is 63000, and the step is 1000, it means the watchdog timeout will count 1, 2, 3 … 63 seconds.

3.10.3.14 SusiWDSetConfig

Start watchdog timer with specified timeout value.

```
BOOL SusiWDSetConfig(DWORD delay, DWORD timeout)
```

Parameters

delay

[in] Specifies a value in milliseconds which will be added to "the first" timeout period. This allows the application to have sufficient time to do initialization before the first call to SusiWDTrigger and still be protected by the watchdog.

timeout

[in] Specifies a duration in milliseconds for the watchdog timeout.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure

Remarks

Once the watchdog has been activated, its timer begins to count down. The application has to periodically call SusiWDTrigger to refresh the timer before it expires, i.e. reload the watchdog timer within the specified timeout or the system will reboot when it counts down to 0.

Actually a subsequent call to SusiWDTrigger equals a call to SusiWDSetConfig with delay 0 and the original timeout value, so if you want to change the timeout value, call SusiWDSetConfig with new timeout value instead of SusiWDTrigger.

Use SusiWDGetRange to get the acceptable timeout values.

3.10.3.15 SusiWDTrigger

Reload the watchdog timer to the timeout value given in SusiWDSetConfig to prevent the system from rebooting.

```
BOOL SusiWDTrigger(void)
```

Parameters

None.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

A watchdog protected application has to call SusiWDTrigger continuously to indicate that it is still working properly and prevent a system restart. The first call to SusiWDTrigger in the middle of a delay resulting from a previous call to SusiWDSetConfig causes the delay timer to be canceled immediately and starts the watchdog timer countdown from the timeout value. It is always a good choice for users to have a longer delay time in SusiWDSetConfig.

3.10.3.16SusiIOAvailable

Check if GPIO driver is available.

int SusiCoreAvailable (void)

Parameters

None.

Return Value

Value	Meaning
-1	The function fails.
0	The function succeeds; the platform does not support SusiIO- APIs.
1	The function succeeds; the platform supports GPIO.

Remarks

After calling SusiDllInit successfully, all Susi*Available functions are used to check if the corresponding features are supported by the platform or not. It is suggested to call Susi*Available before using any Susi*- functions.

3.10.3.17 SusiIOCountEx

Query the current number of input and output pins.

BOOL SusiIOCountEx(DWORD *inCount, DWORD *outCount)

Parameters

inCount

[out] Pointer to a variable in which this function returns the count of input pins.

outCount

[out] Pointer to a variable in which this function returns the count of output pins.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

The number of GPIO pins equals the number of input pins plus the number of output pins. The number of input and output pins may vary in accordance with the current pin direction.

3.10.3.18 SusiIOSetDirection

Set direction of one GPIO pin as input or output.

BOOL SusiIOSetDirection(BYTE PinNum, BYTE IO, DWORD *PinDirMask)

Parameters

PinNum

[in] Specifies the GPIO pin to be changed, ranging from 0 ~ (total number of GPIO pins minus 1).

IO

[in] Specifies the pin direction to be set.

PinDirMask

[out] Pointer to a variable in which the function returns the latest direction mask after the pin direction is set.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

Use an IO value of 1 to set a pin as an input or 0 to set a pin as an output.

The function can only set the direction of one of the pins that are direction configurable. If the pin number specified is an invalid pin or a pin that can only be configured as an input, the function call will fail and return FALSE.

3.10.3.19SusiIOReadEx

Read current status of one GPIO input or output pin.

BOOL SusiIOReadEx(BYTE PinNum, BOOL *status)

Parameters

PinNum

[in] Specifies the GPIO pin demanded to be read, ranging from 0 ~ (total number of GPIO pins minus 1).

status

[out] Pointer to a variable in which the pin status returns.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

If the pin is in status high, the value got in status will be 1. If the pin is in status low, it will be zero. The function is capable of reading the status of either an input pin or an output pin.

3.10.3.20SusiIOWriteEx

Set one GPIO output pin as status high or low.

BOOL SusiIOWriteEx(BYTE PinNum, BOOL status)

Parameters

PinNum

[in] Specifies the GPIO pin demanded to be written, ranging from 0 ~ (total number of GPIO pins minus 1).

status

[in]Specifies the GPIO status to be written.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

The function can only set the status of one of the output pins. If the pin number specified is an input pin or an invalid pin, the function call will fail and return with FALSE. A status with 1 to set the pin as output high, 0 to set the pin as output low.

3.10.3.21 SusiIICAvailable

Check if I2C driver is available and also get the IIC type supported.

int SusiIICAvailable()

Parameters

None.

Return Value

Value	Meaning
-1	The function fails.
0	The function succeeds; the platform does not support any SusiIIC - APIs.
SUSI_IIC_TYPE_PRIMARY (1)	The function succeeds; the platform supports only primary IIC.
SUSI_IIC_TYPE_SMBUS (2)	The function succeeds; the platform supports only SMBus implemented IIC.
SUSI_IIC_TYPE_BOTH (3)	The function succeeds; the platform supports both primary IIC and SMBus IIC.

Remarks

After calling SusiDllInit successfully, all Susi*Available functions are use to check if the corresponding features are supported by the platform or not. So it is suggested to call Susi*Available before using any Susi*- functions.

3.10.3.22SusiIICRead

Read bytes of data from the target slave device in the I2C bus.

SUSI_API BOOL SusiIICRead(DWORD IICType, BYTE SlaveAddress, BYTE *RegInx, BYTE *ReadBuf, DWORD ReadLen)

Parameters

IICType

[in]Specifies that I2C type, the value can either be

SUSI_IIC_TYPE_PRIMARY (1)

SUSI_IIC_TYPE_SMBUS (2)

SlaveAddress

[in] Specifies the 8-bit device address, ranging from 0x00 - 0xFF. Whether to give a 1 (read) or 0 (write) to the LSB of SlaveAddress could be ignored.

RegInx

[in] Registry Index.

ReadBuf

[out] Pointer to a variable in which the function reads the bytes of data.

ReadLen

[in] Specifies the number of bytes to be read.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

Call SusiIICAvailable first to make sure the support I2C type. For more information about how to use this API, and the relationship between IIC and SMBus, please refer to "Programming Overview", parts "SMBus functions" to "IIC versus SMBus - compatibility"

3.10.3.23 SusiIICWrite

Write bytes of data to the target slave device in the I2C bus.

BOOL SusiIICWrite(DWORD IICType, BYTE SlaveAddress, BYTE
BYTE *RegInx, *WriteBuf, DWORD WriteLen)

Parameters

IICType

[in] Specifies the I2C type, the value can either be

SUSI_IIC_TYPE_PRIMARY (1)

SUSI_IIC_TYPE_SMBUS (2)

SlaveAddress

[in] Specifies the 8-bit device address, ranging from 0x00 - 0xFF.

Whether to give a 1 (read) or 0 (write) to the LSB of SlaveAddress could be ignored.

RegInx

[in] Registry Index.

WriteBuf

[in] Pointer to a byte array which contains the bytes of data to be written.

WriteLen

[in] Specifies the number of bytes to be written.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

Call SusiIICAvailable first to make sure the support I2C type. For more information about how to use this API, and the relationship between IIC and SMBus, please refer to "Programming Overview", parts "SMBus functions" to "IIC versus SMBus - compatibility".

3.10.3.24SusiIICWriteReadCombine

A sequential operation to write bytes of data followed by bytes read from the target slave device in the I2C bus.

BOOL SusiIICWriteReadCombine(DWORD IICType, BYTE SlaveAddress, BYTE *RegInx, BYTE *WriteBuf, DWORD WriteLen, BYTE *ReadBuf,DWORD ReadLen)

Parameters

IICType

[in] Specifies the I2C type, the value can either be

SUSI_IIC_TYPE_PRIMARY (1)

SUSI_IIC_TYPE_SMBUS (2)

SlaveAddress

[in] Specifies the 8-bit device address, ranging from 0x00 - 0xFF.

Whether to give a 1 (read) or 0 (write) to the LSB of SlaveAddress could be ignored.

RegInx

[in] Registry Index.

WriteBuf

[in] Pointer to a byte array which contains the bytes of data to be written.

WriteLen

[in] Specifies the number of bytes to be written.

ReadBuf

[out] Pointer to a variable in which the function reads the bytes of data.

ReadLen

[in]Specifies the number of bytes to be read

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

The function is mainly for EEPROM I2C devices - the bytes written first are used to locate to a certain address in ROM, and the following bytes read will retrieve the data bytes starting from this address.

Call SusiIICAvailable first to make sure the support I2C type. For more information about how to use this API, and the relationship between IIC and SMBus, please refer to "Programming Overview", parts "SMBus functions" to "IIC versus SMBus - compatibility"

3.10.3.25 SusiVCAvailable

Check if VC driver is available and also get the feature support information.

BOOL SusiVCAvailable(void)

Parameters

None.

Return Value

Value	Meaning
-1	The function fails.
0	The function succeeds; the platform does not support any SusiVC- APIs.
SUSI_VC_BRIGHT_CONTROL_AVAILABLE (1)	The function succeeds; the platform supports only brightness APIs.
SUSI_VC_VGA_CONTROL_AVAILABLE (2)	The function succeeds; the platform supports only screen on/off APIs.
SUSI_VC_BOTH_AVAILABLE (3)	The function succeeds; the platform supports all SusiVC- APIs.

Remarks

After calling SusiDllInit successfully, all Susi*Available functions are use to check if the corresponding features are supported by the platform or not. So it is suggested to call Susi*Available before using any Susi*-functions.

3.10.3.26 SusiVCGetBrightRange

Get the step, minimum and maximum values in brightness adjustment.

BOOL SusiVCGetBrightRange(BYTE *minimum, BYTE *maximum, BYTE *stepping)

Parameter

minimum

[out]Pointer to a variable to get the minimum brightness value. maximum

[out]Pointer to a variable to get the maximum brightness value. stepping

[out]Pointer to a variable to get the step of brightness up and down

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

Call SusiVCAvailable first to make sure if the brightness control is available. The values may vary from platform to platform; depend on the hardware implementations of brightness control. For example, if minimum is 0, maximum is 255, and stepping is 5, it means the brightness can be 0, 5, 10, …, 255.

3.10.3.27SusiVCGetBright

Get the current panel brightness.

BOOL SusiVCGetBright(BYTE *brightness)

Parameters

brightness

[out]Pointer to a variable in which this function returns the brightness.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

Call SusiVCAvailable first to make sure if the brightness control is available.

3.10.3.28SusiVCSetBright

Set current panel brightness.

BOOL SusiVCSetBright(BYTE brightness)

Parameters

brightness

[in] Specifies the brightness value to be set.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

Call SusiVCAvailable first to make sure if the brightness control is available. In some implementations, the higher the brightness value, the higher the voltage fed to the panel. So please make sure the voltage toleration of your panel prior to the API use.

3.10.3.29SusiVCScreenOn

Turn on VGA display signal.

BOOL SusiVCScreenOn(void)

Parameters

None.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

The function enables both the LCD and CRT display signals.

3.10.3.30 SusiVCScreenOff

Turn off VGA display signal.

BOOL SusiVCScreenOff(void)

Parameters

None.

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

The function disables both the LCD and CRT display signals.

3.10.3.31 SusiSPIAvailable

Check if SPI driver is available.

int SusiSPIAvailable (void)

Parameters

None.

Return Value

Value	Meaning
-1	The function fails.
0	The function succeeds; the platform does not support SusiIO- APIs.
1	The function succeeds; the platform supports SPI.

Remarks

After calling SusiDllInit successfully, all Susi*Available functions are used to check if the corresponding features are supported by the platform or not. It is suggested to call Susi*Available before using any Susi*- functions.

3.10.3.32SusiSPISetBusConfig

Set SPI channel, frequency and data rate for SPI control..

void SusiSPISetBusConfig(BYTE ch, BYTE freq, BYTE dataRate)

Parameters

ch

[in] Specifies the channel value to be set.

freq

[in] Specifies the frequency value to be set.

dataRate

[in] Specifies the data rate value to be set.

Return Value

None

Remarks

The default parameters list below.

Parameter	Value
ch	0
frqy	16000000
dataRate	32

3.10.3.33SusiSPIExchange

This function performs SPI exchange operations.

BOOL SusiSPIExchange(DWORD *txBuf, DWORD *rxBuf)

Parameters

txBuf

[in] Pointer to the SPI Tx data buffer in the Packet

rxBuf

[in] Pointer to the SPI Rx data buffer in the Packet

Return Value

TRUE (1) indicates success; FALSE (0) indicates failure.

Remarks

The max size for Tx/Rx data buffer is 1024 bytes.

Appendix A

API Error Code

An error value will be either

Function Index Code + Library Error Code, or

Function Index Code + Driver Error Code.

If you call an API and returns with fail. The Function Index Code in its error code combination does not necessarily equal to the index code of the API. This is because the API may make a call to another API.

A.1 Function Index Code

Index Code	Function Index
DLL	
00100000	ESusiInit
00200000	ESusiUnInit
00300000	ESusiGetVersion
00400000	ESusiDllInit
00500000	ESusiDllUnInit
00600000	ESusiDllGetVersion
00700000	ESusiDllGetLastError
Core	
10100000	ESusiCoreInit
10200000	ESusiCoreAvailable
10300000	ESusiCoreGetBIOSVersion
10400000	ESusiCoreGetPlatformName
10500000	ESusiCoreAccessBootCounter
10600000	ESusiCoreAccessRunTimer
10700000	ESusiCoreRebootSystem
10800000	ESusiReserved8000000
Watchdog	
20100000	ESusiWDInit
20200000	ESusiWDAvailable
20300000	ESusiWDDisable
20400000	ESusiWDGetRange
20500000	ESusiWDSetConfig
20600000	ESusiWDTrigger

GPIO	
30100000	ESusiIOInit
30200000	ESusiIOAvailable
30300000	ESusiIOCount
30400000	ESusiIOInitial
30500000	ESusiIORead
30600000	ESusiIOReadMulti
30700000	ESusiIOWrite
30800000	ESusiIOWriteMulti
30900000	ESusiIOCountEx
31000000	ESusiIOQueryMask
31100000	ESusiIOSetDirection
31200000	ESusiIOSetDirectionMulti
31300000	ESusiIOReadEx
31400000	ESusiIOReadMultiEx
31500000	ESusiIOWriteEx
31600000	ESusiIOWriteMultiEx
SMBus (N/A in SUSI-RISC)	
40100000	ESusiSMBusInit
40200000	ESusiSMBusAvailable
40300000	ESusiSMBusReadByte
40400000	ESusiSMBusReadByteMulti
40500000	ESusiSMBusReadWord
40600000	ESusiSMBusWriteByte
40700000	ESusiSMBusWriteByteMulti
40800000	ESusiSMBusWriteWord
40900000	ESusiSMBusReceiveByte
41000000	ESusiSMBusSendByte
41100000	ESusiSMBusWriteQuick
41200000	ESusiSMBusReadQuick
41300000	ESusiSMBusScanDevice
41400000	ESusiSMBusWriteBlock
41500000	ESusiSMBusReadBlock
IIC	
50100000	ESusiIICInit
50200000	ESusiIICAvailable
50300000	ESusiIICReadByte
50400000	ESusiIICWriteByte
50500000	ESusiIICWriteReadCombine
50600000	ESusiIICRead

50700000	ESusiIICWrite
50800000	ESusiIICScanDevice
50900000	ESusiIICWriteRegister
51000000	ESusiIICReadRegister
VGA Control	
60100000	ESusiVCInit
60200000	ESusiVCAvailable
60300000	ESusiVCGetBright
60400000	ESusiVCGetBrightRange
60500000	ESusiVCScreenOff
60600000	ESusiVCScreenOn
60700000	ESusiVCSetBright
Hardware Monitor (N/A in SUSI-RISC)	
70100000	ESusiHWMInit
70200000	ESusiHWMAvailable
70300000	ESusiHWMGetFanSpeed
70400000	ESusiHWMGetTemperature
70500000	ESusiHWMGetVoltage
70600000	ESusiHWMSetFanSpeed

A.2 Library Error Code

Error Code	Error Type
Driver Open Errors	
00000001	ERRLIB_CORE_OPEN_FAIL
00000002	ERRLIB_WDT_OPEN_FAIL
00000004	ERRLIB_GPIO_OPEN_FAIL
00000008	ERRLIB_SMB_OPEN_FAIL
00000016	ERRLIB_VC_OPEN_FAIL
00000032	ERRLIB_HWM_OPEN_FAIL
	DLL Functions
00000000	ERRLIB_SUCCESS
00000001	ERRLIB_RESERVED1
00000002	ERRLIB_RESERVED2
00000003	ERRLIB_LOGIC
00000004	ERRLIB_RESERVED4
00000005	ERRLIB_SUSIDLL_NOT_INIT
00000006	ERRLIB_PLATFORM_UNSUPPORT
00000007	ERRLIB_API_UNSUPPORT
00000008	ERRLIB_RESERVED8

00000009	ERRLIB_API_CURRENT_UNSUPPORT
00000010	ERRLIB_LIB_INIT_FAIL
00000011	ERRLIB_DRIVER_CONTROL_FAIL
00000012	ERRLIB_INVALID_PARAMETER
00000013	ERRLIB_INVALID_ID
00000014	ERRLIB_CREATEMUTEX_FAIL
00000015	ERRLIB_OUTBUF_RETURN_SIZE_INCORRECT
00000016	ERRLIB_RESERVED16
00000017	ERRLIB_ARRAY_LENGTH_INSUFFICIENT
00000032	ERRLIB_RESERVED32
00000050	ERRLIB_BRIGHT_CONTROL_FAIL
00000051	ERRLIB_BRIGHT_OUT_OF_RANGE
00000064	ERRLIB_RESERVED64
00000128	ERRLIB_RESERVED128
00000256	ERRLIB_RESERVED256
	Core Functions
00000510	ERRLIB_CORE_BIOS_STRING_NOT_FOUND
00000512	ERRLIB_RESERVED512
Watchdog Functions	
00001024	ERRLIB_RESERVED1024
GPIO Functions (N/A)	
SMBus Functions (N/A in SUSI-RISC)	
00001400	ERRLIB_SMB_MAX_BLOCK_SIZE_MUST_WITHIN_32
IIC Functions	
00001600	ERRLIB_IIC_GETCPUFREQ_FAIL
VGA Control Functions (N/A)	
Hardware Monitor Functions (N/A in SUSI-RISC)	
00002000	ERRLIB_HWM_CHECKCPUTYPE_FAIL
00002001	ERRLIB_HWM_FUNCTION_UNSUPPORT
00002002	ERRLIB_HWM_FUNCTION_CURRENT_UNSUPPORT
00002003	ERRLIB_HWM_FANDIVISOR_INVALID
00002048	ERRLIB_RESERVED2048
Reserved Functions	
00004096	ERRLIB_RESERVED4096
00008192	ERRLIB_RESERVED8192

A.3 Driver Error Code

Error code	Error Type
00000000	ERRDRV_SUCCESS
Common to all Drivers	
00010000	ERRDRV_CTRLCODE
00010001	ERRDRV_LOGIC
00010002	ERRDRV_INBUF_INSUFFICIENT
00010003	ERRDRV_OUTBUF_INSUFFICIENT
00010004	ERRDRV_STOPTIMER_FAILED
00010005	ERRDRV_STARTTIMER_FAILED
00010006	ERRDRV_CREATEREG_FAILED
00010007	ERRDRV_OPENREG_FAILED
00010008	ERRDRV_SETREGVALUE_FAILED
00010009	ERRDRV_GETREGVALUE_FAILED
00010010	ERRDRV_FLUSHREG_FAILED
00010011	ERRDRV_MEMMAP_FAILED
Core Driver (N/A)	
Watchdog Driver (N/A)	
GPIO Driver	
00011200	ERRDRV_GPIO_PIN_DIR_CHANGED
00011201	ERRDRV_GPIO_PIN_INCONFIGURABLE
00011202	ERRDRV_GPIO_PIN_OUTPUT_UNREADABLE
00011203	ERRDRV_GPIO_PIN_INPUT_UNWRITTABLE
00011204	ERRDRV_GPIO_INITIAL_FAILED
00011205	ERRDRV_GPIO_GETINPUT_FAILED
00011206	ERRDRV_GPIO_SETOUTPUT_FAILED
00011207	ERRDRV_GPIO_GETSTATUS_IO_FAILED
00011208	ERRDRV_GPIO_SETSTATUS_OUT_FAILED
00011209	ERRDRV_GPIO_SETDIR_FAILED
SMBus Driver (N/A in SUSI-RISC)	
00011400	ERRDRV_SMB_RESETDEV_FAILED
00011401	ERRDRV_SMB_TIMEOUT
00011402	ERRDRV_SMB_BUSTRANSACTION_FAILED
00011403	ERRDRV_SMB_BUSCOLLISION
00011404	ERRDRV_SMB_CLIENTDEV_NORESPONSE
00011405	ERRDRV_SMB_REQUESTMASTERMODE_FAILED
00011406	ERRDRV_SMB_NOT_MASTERMODE
00011407	ERRDRV_SMB_BUS_ERROR
00011408	ERRDRV_SMB_BUS_STALLED
00011409	ERRDRV_SMB_NEGACK_DETECTED

00011410	ERRDRV_SMB_TRANSMITMODE_ACTIVE
00011411	ERRDRV_SMB_TRANSMITMODE_INACTIVE
00011412	ERRDRV_SMB_STATE_UNKNOWN
IIC Driver	
00011600	ERRDRV_IIC_RESETDEV_FAILED
00011601	ERRDRV_IIC_TIMEOUT
00011602	ERRDRV_IIC_BUSTRANSACTION_FAILED
00011603	ERRDRV_IIC_BUSCOLLISION
00011604	ERRDRV_IIC_CLIENTDEV_NORESPONSE
00011605	ERRDRV_IIC_REQUESTMASTERMODE_FAILED
00011606	ERRDRV_IIC_NOT_MASTERMODE
00011607	ERRDRV_IIC_BUS_ERROR
00011608	ERRDRV_IIC_BUS_STALLED
00011609	ERRDRV_IIC_NEGACK_DETECTED
00011610	ERRDRV_IIC_TRANSMITMODE_ACTIVE
00011611	ERRDRV_IIC_TRANSMITMODE_INACTIVE
00011612	ERRDRV_IIC_STATE_UNKNOWN
VGA Control Driver	
00011800	ERRDRV_VC_FINDVGA_FAILED
00011801	ERRDRV_VC_FINDBRIGHTDEV_FAILED
00011802	ERRDRV_VC_VGA_UNSUPPORTED
00011803	ERRDRV_VC_BRIGHTDEV_UNSUPPORTED
Hardware Monitor Driver (N/A)	

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