

RSB-3850

**2.5" SBC with Intel Quark x1000
Processor**

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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.

Declaration of Conformity

FCC Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Technical Support and Assistance

1. Visit the Advantech website at <http://support.advantech.com> where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

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.

Item Part Number

- 1 x RSB-3850 SBC
- 1 x 6-pin terminal block connector

Ordering Information

Model Number	Description
RSB-3850CS-GPA1E	Intel Quark x1000 400MHz w/ PoE

Optional Accessories

Model Number	Description
96PSA-A36W12R1	Adaptor 100-240V 36W 12V 3A
1700001524	3-pin USA standard power cord
170203183C	3-pin Europe standard cord
170203180A	3-pin UK standard power cord.

Certification and Safety Instructions

This device complies with the requirements in part 15 of the FCC rules: Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense. The user is advised that any equipment changes or modifications not expressly approved by the party responsible for compliance would void the compliance to FCC regulations and therefore, the user's authority to operate the equipment.

Caution! *There is a danger of a new battery exploding if it is incorrectly installed.*



Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer.

Discard used batteries according to the manufacturer's instructions.

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Chapter 1

General Introduction

This chapter gives background information on the RSB-3850.

Sections include:

- Introduction
- Product Features
- Specifications

1.1 Introduction

RSB-3850 is a standard Pico-ITX form factor SBC powered by Intel Quark x1000 CPU. This document introduces the board and helps end users start performance evaluation and application development easily and smoothly.

The document is in two parts: the I/O specifications and BSP introduction. It supports standard Yocto Linux, and if you need a complete source code package, please contact Advantech sales channel.

It's highly recommended to completely read this document before starting RSB-3850 evaluation since it contains critical information such as I/O pin definitions, handling processes and connector specifications. You should also comply with all warning notices and regulations to prevent damaging RSB-3850 and those devices being connected to it. Inappropriate handling process may cause physical damage to RSB-3850, resulting in function-loss or abnormal behaviors as kernel panic or unstable EC performance.

For more information of Advantech RISC products, please visit RISC Mini Site: <http://risc.advantech.com>

1.2 Specifications

1.2.1 Functional Specifications

- Intel® Quark x1000 400 MHz processor
- Onboard DDR3-800 512 MB memory
- Onboard SPI ROM 4 MB

System Memory Support

- DDR3 400 MHz
- **Capacity:** On board DDR3 512 MB

Gigabit Ethernet

- **Chipset:** Intel Quark x1000 integrated RGMII
- 2 x 10/100 Mbps. One support PoE (Powered Over Ethernet)

Peripheral Interface

- 1 x UART port (4 wires)
- 1 x GPIO port (2x GPI, 2x GPO)
- 1 x USB 2.0 port
- 2 x Ethernet ports
- 1 x SD slot
- 1 x miniPCIe slot
- 1 x SIM slot

OS Support

Supports Yocto Linux BSP & Image.

1.2.2 Mechanical Specifications

- **Dimension:** 100 x 72 mm (5.7"x4")
- **Height:** 30 mm
- **Reference Weight:** 500 g (including whole package)

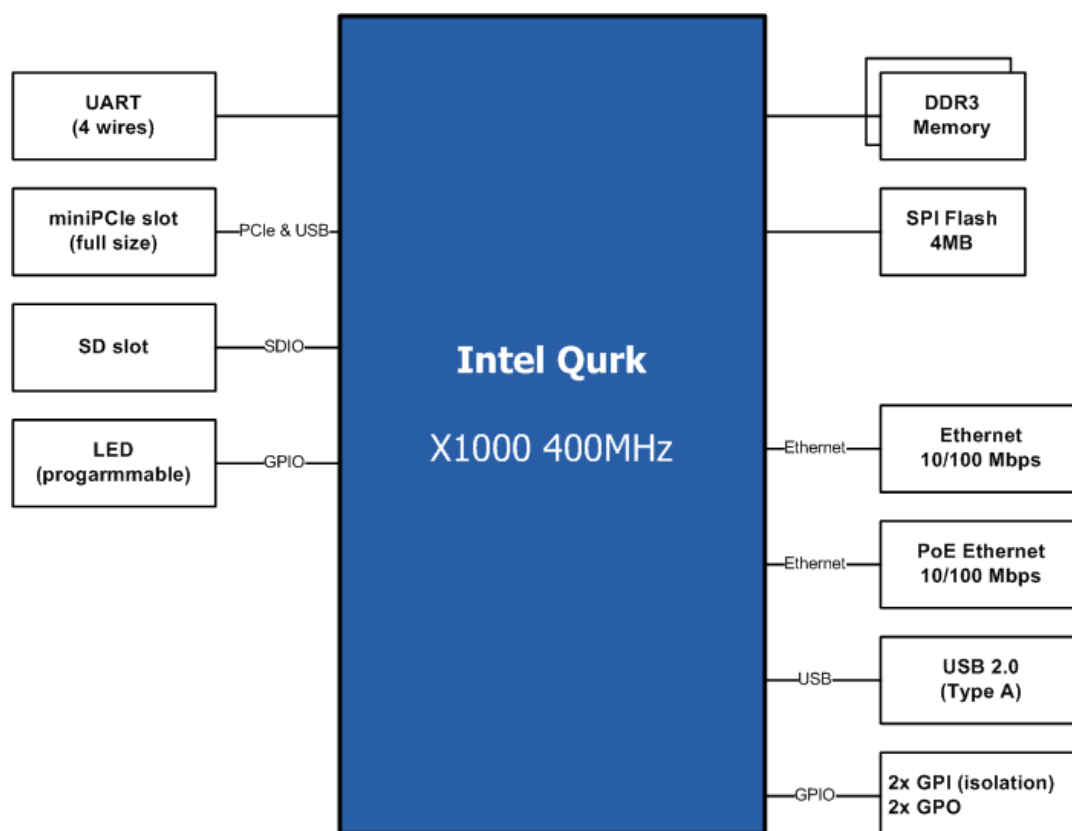
1.2.3 Electrical Specifications

- **Power supply type:** DC-in 12 V
- **Power consumption:**
 - Kernel Idle mode: 2.16 W
 - Max mode: 2.76 W
- **RTC Battery:**
 - Typical voltage: 3.0 V
 - Normal discharge capacity: 3 uA

1.3 Environmental Specifications

- **Operating temperature:** 0 ~ 60° C (32 ~ 140° F)
- **Operating humidity:** 40° C @ 95% RH Non-condensing
- **Storage temperature:** -40 ~ 85° C (-40 ~ 185° C)
- **Storage humidity:** 60° C @ 95% RH Non-condensing

1.4 Block Diagram



Chapter 2

H/W Installation

This chapter introduces the startup procedures of the RSB-3850 hardware, including jumper setting and device integration. It also introduces the setting of switches, indicators and also shows the mechanical drawings.

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

2.1 Connectors

2.1.1 Connector List

CN2	RTC battery
MINI_PCIE_FULL1	Full-size Mini PCIe
SIM_SLOT1	SIM socket
DEBUG_CONSOLE1	UART1 debug port
USB_HOST1	USB Type A Connector
LAN1	Ethernet Connector with PoE
LAN2	Ethernet Connector
DCIN1	DC power jack
U37_MCU	Reserved
SD1	SD Card
COM1	COM
CN1	GPIO
CN1_SPI	Reserved

2.1.2 Connector Settings

2.1.2.1 RTC Battery Connector (CN2)

RSB-3850 supports a lithium 3V/210mAH CR2032 battery connector.

2.1.2.2 Full-size MiniPCIe (MINIPCI_FULL1)

RSB-3850 supports full size miniPCIe slot which supports USB & PCIe interfaces.

Pin	Description	Pin	Description
1	NA	27	GND
2	+3.3V	28	NA
3	Reserved	29	GND
4	GND	30	NA
5	Reserved	31	PCIe_TXM
6	NA	32	NA
7	NA	33	PCIe_TXP
8	UIM_PWR	34	GND
9	GND	35	GND
10	UIM_DATA	36	USB_DATA-
11	NA	37	Reserved
12	UIM_CLK	38	USB_DATA+
13	NA	39	Reserved
14	UIM_RESET	40	GND
15	GND	41	Reserved
16	UIM_VPP	42	LED_WWAN
17	Reserved	43	Reserved
18	GND	44	LED_WLAN
19	Reserved	45	Reserved
20	Reserved	46	LED_WPAN
21	GND	47	Reserved
22	PERST	48	NA

23	PCIe_RXM	49	Reserved
24	+3.3V	50	GND
25	PCIe_RXP	51	Reserved
26	GND	52	+3.3V



Figure 2.1 Full size mini PCIe

2.1.2.3 SIM Socket (SIM_SLOT1)

RSB-3850 supports on board SIM socket is for 3G integration. Please insert a valid SIM card to dial to the 3G network.

Pin	Signal Name	Pin	Signal Name
C1	UIM_PWR	C2	UIM_RESET
C3	UIM_CLK	C5	GND
C6		C7	UIM_DATA

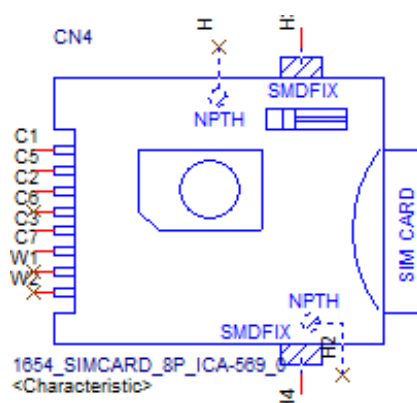


Figure 2.2 SIM Socket

2.1.2.4 UART1 Debug Port (DEBUG_CONSOLE1)

RSB-3850 can communicate with a host server (Windows or Linux) by using serial cables.

Pin	Description
1	+V3.3
2	DEBUG_TXD
3	DEBUG_RXD
4	GND

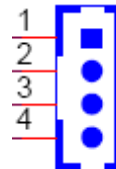


Figure 2.3 Debug Port

2.1.2.5 USB Type A Connector (USB_HOST1)

RSB-3850 supports one standard USB2.0 Type A connector in the coastline.

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



Figure 2.4 USB Type A Connector

2.1.2.6 Ethernet Connector (LAN1/LAN2)

The RSB-3850 provides two RJ45 interface connectors. The Ethernet ports are fully compliant with IEEE 802.3x 10/100 and CSMA/CD protocol support. The Ethernet ports provides standard RJ-45 connector with LED indicators on the front side to show Speed/Active status.

LAN1 (PoE): Left is Active, Right is speed (ON-100, OFF-10).

LAN2: Left is speed (ON-100, OFF-10), Right is Active

Pin	LAN1	LAN2
1	TX+	TX+
2	TX-	TX-
3	RX+	RX+
4	NA	RX-
5	NA	GND

6	RX-	GND
7	NA	NA
8	NA	NA

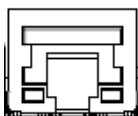


Figure 2.5 Ethernet Connector

2.1.2.7 DC power Jack (DCIN)

RSB-3850 comes with a DC-Jack header that carries 12V DC external power input.

Pin	Description
1	DC_IN
2	GND



Figure 2.6 DC Power Jack

2.1.2.8 SD Slot

RSB-3850 supports SD/MMC card in Class 2, 4, 6, 8, 10. Supported capacity is up to 32G (SDHC).

Pin	Signal Name
1	DAT3
2	CMD
3	GND
4	+3.3V
5	CLK
6	GND
7	DAT0
8	DAT1
9	DAT2

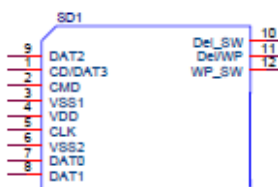


Figure 2.7 SD Slot

2.1.2.9 COM Port

RSB-3850 provides one 6-pin terminal block connector as serial communication interface port. The port can support RS-232 mode communication.

Pin	Signal Name
1	RX
2	RTS
3	TX
4	CTS
5	GND
6	N/C

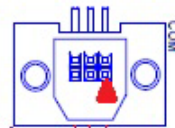


Figure 2.8 COM Port

2.2 Mechanical

2.2.1 Jumper and Connector Locations

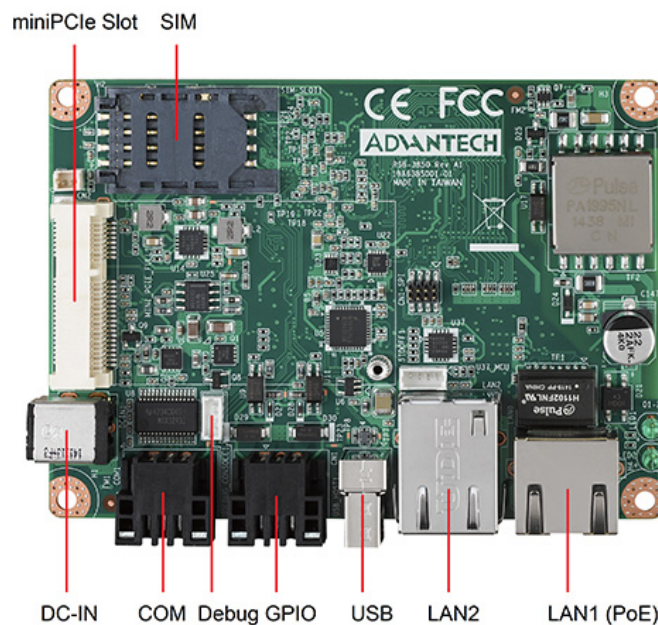


Figure 2.9 Jumper and Connector Layout (Top side)

2.2.2 Board Dimensions

2.2.2.1 Board Drawing

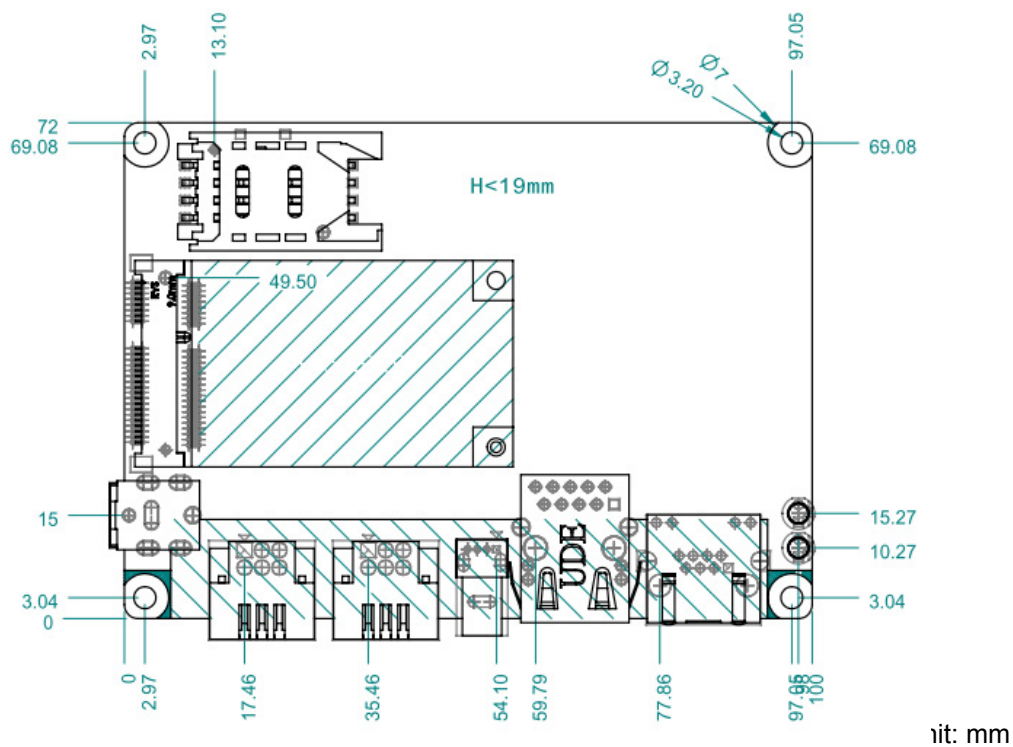


Figure 2.10 Board Dimension Layout (Top Side)

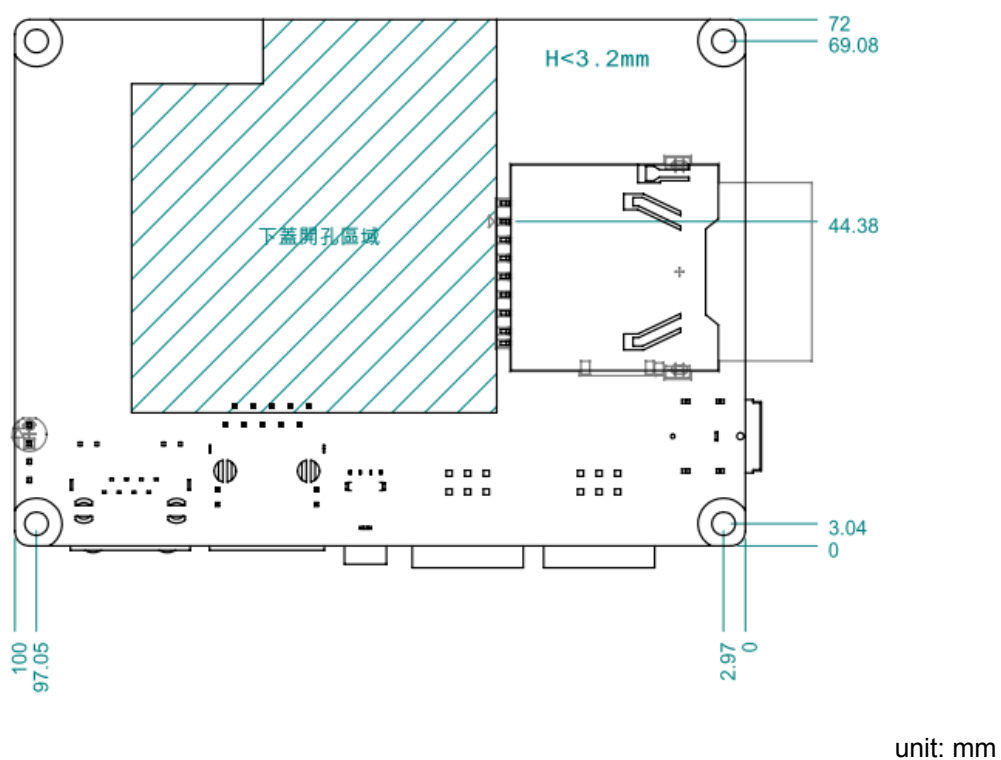


Figure 2.11 Board Dimension Layout (Bottom Side)

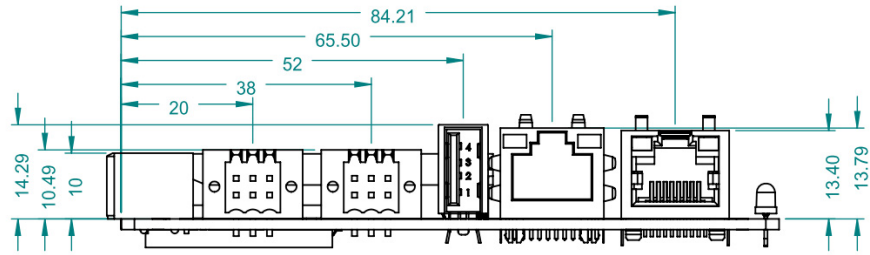


Figure 2.12 Board Dimension Layout (Coastline)

2.3 Quick Start of RSB-3850

2.3.1 Debug Port Connection

1. Connect debug port cable to the RSB-3850 debug port.
2. Connect the RS-232 extension cable to the debug cable.
3. Connector the other side of the extension cable to the USB-to-RS-232 cable then connect to your PC.

2.3.2 Debug Port setting

RSB-3850 can communicate with a host server (Windows or Linux) by using serial cables. Common serial communication programs such as Hyper Terminal, Tera Term or PuTTY can be used in this case. The example below describes the serial terminal setup using Hyper Terminal on a Windows host:

1. Connect RSB-3850 with your Windows PC by using a serial cable.
2. Open Hyper Terminal on your Windows PC, and select the settings as shown in Figure 2.13
3. After the bootloader is programmed on the SD card, insert power adapter connector to DC jack on RSB-3850 to power up the board. The bootloader prompt is displayed on the terminal screen.

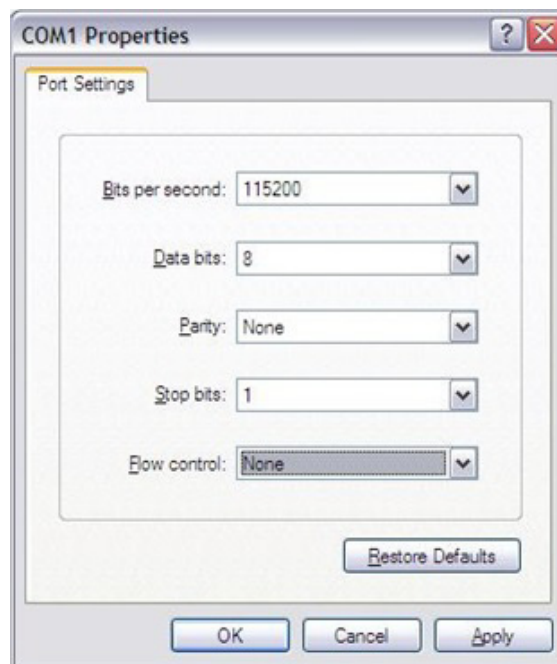


Figure 2.13 Hyper Terminal Settings for Terminal Setup

2.4 Test tools

All test tools must be verified on RSB-3850, please prepare required test fixtures before verifying each specified I/O. If you have any problem to get the test fixture, please contact your Advantech contact window for help.

2.5 Debug Port Setting

RSB-3850 can communicate with a host server (Windows or Linux) by using serial cables. Common serial communication programs such as HyperTerminal, Tera Term or PuTTY can be used in this case. The example as below describes the serial terminal setup using HyperTerminal on a Windows host:

1. Connect RSB-3850 with your Windows PC by using a serial cable.
2. Open HyperTerminal on your Windows PC, and select the settings as shown in Figure 2.14.

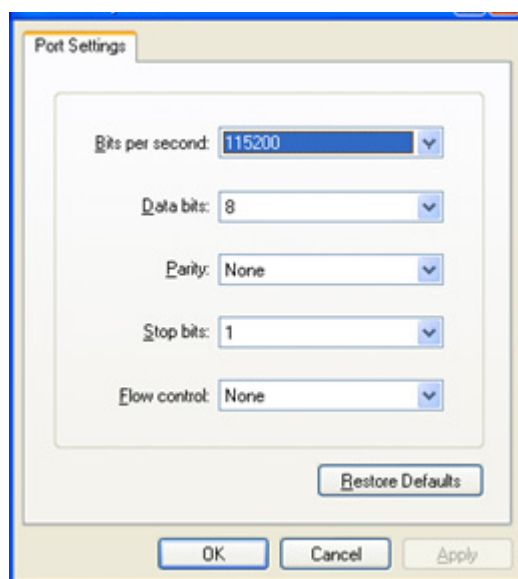


Figure 2.14 Debug port setting

3. After the bootloader is programmed on SD card, plug in the power cord to power up the RSB-3850. The bootloader prompt is displayed on the terminal screen.

2.6 GPIO

```
# echo 0 > /sys/class/gpio/export
# echo 1 > /sys/class/gpio/export
# echo 2 > /sys/class/gpio/export
# echo 3 > /sys/class/gpio/export
# echo "out" > /sys/class/gpio/gpio0/direction
# echo "out" > /sys/class/gpio/gpio1/direction
# echo "in" > /sys/class/gpio/gpio2/direction
# echo "in" > /sys/class/gpio/gpio3/direction
# grep "" /sys/class/gpio/gpio{0..3}/direction
```

2.6.1 Connecting #0 and #3

```
# echo 0 > /sys/class/gpio/gpio0/value  
# grep "" /sys/class/gpio/gpio{0,3}/value
```

```
# grep "" /sys/class/gpio/gpio{0..3}/direction  
/sys/class/gpio/gpio0/direction:out  
/sys/class/gpio/gpio1/direction:out  
/sys/class/gpio/gpio2/direction:in  
/sys/class/gpio/gpio3/direction:in
```

```
# echo 1 > /sys/class/gpio/gpio0/value  
# grep "" /sys/class/gpio/gpio{0,3}/value
```

```
# echo 0 > /sys/class/gpio/gpio0/value  
# grep "" /sys/class/gpio/gpio{0,3}/value  
/sys/class/gpio/gpio0/value:0  
/sys/class/gpio/gpio3/value:0
```

2.6.2 Connecting #1 and #2

```
# echo 0 > /sys/class/gpio/gpio1/value  
# grep "" /sys/class/gpio/gpio{1,2}/value
```

```
# echo 0 > /sys/class/gpio/gpio1/value  
# grep "" /sys/class/gpio/gpio{1,2}/value  
/sys/class/gpio/gpio1/value:0  
/sys/class/gpio/gpio2/value:0
```

```
# echo 1 > /sys/class/gpio/gpio1/value  
# grep "" /sys/class/gpio/gpio{1,2}/value
```

```
# echo 1 > /sys/class/gpio/gpio1/value  
# grep "" /sys/class/gpio/gpio{1,2}/value  
/sys/class/gpio/gpio1/value:1  
/sys/class/gpio/gpio2/value:1
```

2.7 UART

```
# stty -F /dev/ttyS0 -echo
# cat /dev/ttyS0 &
# echo "1234567890" > /dev/ttyS0
```

2.7.1 Connecting #Tx and #Rx

```
# echo "1234567890" > /dev/ttyS0
```

```
# stty -F /dev/ttyS0 -echo
# cat /dev/ttyS0 &
[1] 1318
# echo "1234567890" > /dev/ttyS0
#
# #Connecting #Tx with #Rx
# echo "1234567890" > /dev/ttyS0
# 1234567890
```

2.8 LED

```
# echo 15 > /sys/class/gpio/export
# echo "out" > /sys/class/gpio/gpio15/direction
```

2.8.1 LED on

```
# echo 1 > /sys/class/gpio/gpio15/value
```

2.8.2 LED off

```
# echo 0 > /sys/class/gpio/gpio15/value
```

```
# echo 15 > /sys/class/gpio/export
# echo "out" > /sys/class/gpio/gpio15/direction
# #LED on
# echo 1 > /sys/class/gpio/gpio15/value
# #LED off
# echo 0 > /sys/class/gpio/gpio15/value
```


2.9 Wifi

Using Intel wifi card for example.

Intel Centrino Wireless-N 135

Model:135BNHMW

set wifi ssid to environment variable, SSID

set wifi password to environment variable, PSWD

```
# ifconfig wlan0 up
# wpa_passphrase $SSID $PSWD > /tmp/wpa.conf
# wpa_supplicant -BDwext -iwlan0 -c/tmp/wpa.conf
# udhcpc -b -i wlan0
# ifconfig
# ping tw.yahoo.com
```

```
wlan0      Link encap:Ethernet  HWaddr 0C:D2:92:57:DA:23
            inet addr:192.168.1.57  Bcast:0.0.0.0  Mask:255.255.255.0
            UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
            RX packets:17 errors:0 dropped:0 overruns:0 frame:0
            TX packets:10 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:1000
            RX bytes:2648 (2.5 KiB)  TX bytes:1572 (1.5 KiB)

# ping tw.yahoo.com
PING tw.yahoo.com (116.214.12.74): 56 data bytes
64 bytes from 116.214.12.74: seq=0 ttl=52 time=3.425 ms
64 bytes from 116.214.12.74: seq=1 ttl=52 time=3.359 ms
64 bytes from 116.214.12.74: seq=2 ttl=52 time=3.312 ms
```


2.10 LAN eth0

Making sure the DHCP service works in the connected LAN.

Remove network connection from both of the two LAN ports.

```
# ifconfig eth1 down
```

```
# ifconfig eth0 up
```

```
# ifconfig
```

```
# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:13:20:FD:F4:F2
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:322 (322.0 B)
          Interrupt:40 Base address:0x4000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

Plug the network cable into the LAN port eth0 and wait for the "eth0: link becomes ready" to show up.

```
# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:13:20:FD:F4:F2
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:322 (322.0 B)
          Interrupt:40 Base address:0x8000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

# [ 104.140198] libphy: stmmac-1:01 - Link is Up - 100/Full
# [ 104.145653] IPv6: ADDRCONF(NETDEV_CHANGE): eth0: link becomes ready
```

Checking if there is one ip or not.

ifconfig

```
# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:13:20:FD:F4:F2
          inet addr:172.22.12.217  Bcast:172.22.15.255  Mask:255.255.252.0
          inet6 addr: fe80::213:20ff:fefd:f4f2/64  Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:4378  errors:0  dropped:1052  overruns:0  frame:0
          TX packets:40  errors:0  dropped:0  overruns:0  carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:401042 (391.6 KiB)  TX bytes:4243 (4.1 KiB)
          Interrupt:40  Base address:0x8000
```

If there is no ip, please check your network connection and DHCP service.

If there is one ip, that means the network is working.

Using ping to test the network connection again.

```
# ping 172.22.15.145
PING 172.22.15.145 (172.22.15.145): 56 data bytes
64 bytes from 172.22.15.145: seq=0 ttl=64 time=2.404 ms
64 bytes from 172.22.15.145: seq=1 ttl=64 time=1.194 ms
64 bytes from 172.22.15.145: seq=2 ttl=64 time=1.385 ms
64 bytes from 172.22.15.145: seq=3 ttl=64 time=1.353 ms
64 bytes from 172.22.15.145: seq=4 ttl=64 time=1.392 ms
^C
--- 172.22.15.145 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 1.194/1.545/2.404 ms
```

2.11 LAN eth1

Make sure the DHCP service works in the connected LAN.

Remove network connection from both of the two LAN ports.

```
# ifconfig eth0 down
```

```
# ifconfig eth1 up
```

```
# ifconfig
```

```
# ifconfig
eth1      Link encap:Ethernet  HWaddr 02:FF:FF:FF:FF:01
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:5 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:938 (938.0 B)
          Interrupt:41 Base address:0xc000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

Plug the network cable into LAN port eth1 and wait for the "eth1: link becomes ready" to show up.

```
# ifconfig
eth1      Link encap:Ethernet  HWaddr 02:FF:FF:FF:FF:01
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:5 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:938 (938.0 B)
          Interrupt:41 Base address:0xc000

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

# [ 484.590197] libphy: stmmac-2:01 - Link is Up - 100/Full
# [ 484.595641] IPv6: ADDRCONF(NETDEV_CHANGE): eth1: link becomes ready
```


Checking if there is one ip or not.

```
# ifconfig
```

```
# ifconfig
eth1      Link encap:Ethernet  HWaddr 02:FF:FF:FF:FF:01
          inet addr:172.22.12.251  Bcast:172.22.15.255  Mask:255.255.252.0
          inet6 addr: fe80::ff:ffff:feff:ff01/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:7232 errors:0 dropped:1598 overruns:0 frame:0
          TX packets:51 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:655315 (639.9 KiB)  TX bytes:5179 (5.0 KiB)
          Interrupt:41 Base address:0xc000
```

If there is no ip, please check the network connection and DHCP service.

If there is one ip, that means the network is working.

Using ping to test the network connection again.

```
# ping 172.22.15.145
PING 172.22.15.145 (172.22.15.145): 56 data bytes
64 bytes from 172.22.15.145: seq=0 ttl=64 time=2.623 ms
64 bytes from 172.22.15.145: seq=1 ttl=64 time=1.392 ms
64 bytes from 172.22.15.145: seq=2 ttl=64 time=1.354 ms
64 bytes from 172.22.15.145: seq=3 ttl=64 time=1.258 ms
```

2.12 USB

Connecting any USB device.

Plug in one USB storage device with filesystem(fat32,ext2 or ext3), the following message will show up and the filesystem will be mounted automatically

```
# df
Filesystem      1K-blocks    Used Available Use% Mounted on
rootfs           302183    144136    142687   50% /
none            247980         4    247976    0% /dev
/dev/mmcblk0p1   7838720    311328    7527392    4% /media/realroot
/dev/loop0       302183    144136    142687   50% /
/dev/mmcblk0p1   7838720    311328    7527392    4% /media/mmcblk0p1
tmpfs            248960      124    248836    0% /var/volatile
tmpfs            248960         0    248960    0% /media/ram

# [ 2079.780169] usb 2-1: new high-speed USB device number 5 using ehci-pci
[ 2080.150243] usb-storage 2-1:1.0: Quirks match for vid 058f pid 6387: 400
[ 2080.158994] scsi3 : usb-storage 2-1:1.0
[ 2081.182893] scsi 3:0:0:0: Direct-Access          JetFlash TS1GJFV30           8.07 PQ: 0 ANSI: 2
[ 2081.211808] sd 3:0:0:0: [sda] 1986558 512-byte logical blocks: (1.01 GiB/969 MiB)
[ 2081.235436] sd 3:0:0:0: Attached scsi generic sg0 type 0
[ 2081.249283] sd 3:0:0:0: [sda] Write Protect is off
[ 2081.259179] sd 3:0:0:0: [sda] No Caching mode page present
[ 2081.264830] sd 3:0:0:0: [sda] Assuming drive cache: write through
[ 2081.287804] sd 3:0:0:0: [sda] No Caching mode page present
[ 2081.293467] sd 3:0:0:0: [sda] Assuming drive cache: write through
[ 2081.304938] sda: sda1
[ 2081.326570] sd 3:0:0:0: [sda] No Caching mode page present
[ 2081.332234] sd 3:0:0:0: [sda] Assuming drive cache: write through
[ 2081.338391] sd 3:0:0:0: [sda] Attached SCSI removable disk
```

```
# df
```

```
# df
Filesystem            1K-blocks      Used Available Use% Mounted on
rootfs                 302183      144137    142686   50% /
none                  247980         4     247976    0% /dev
/dev/mmcblk0p1        7838720     311328    7527392    4% /media/realroot
/dev/loop0            302183      144137    142686   50% /
/dev/mmcblk0p1        7838720     311328    7527392    4% /media/mmcblk0p1
tmpfs                 248960        124    248836    0% /var/volatile
tmpfs                 248960         0     248960    0% /media/ram
/dev/sda1             989148      74148    915000    7% /media/sda1
```

Unmounting the USB storage device

```
# umount /media/sda1
```

2.13 3G

```
# ifconfig eth0 down
```

```
# ifconfig eth1 down
```

```
# pppd connect 'chat -v -s -t 10 "" "AT" "" "ATDT*99#" "CONNECT" ""'
user username password password /dev/ttyUSB2 460800 nodetach crtscts
debug usepeerdns defaultroute &
```

```
# pppd connect 'chat -v -s -t 10 "" "AT" "" "ATDT*99#" "CONNECT" ""' user username password password /dev/
ttyUSB2 460800 nodetach crtscts debug usepeerdns defaultroute &
[1] 1325
# send (AT^M)
send (ATDT*99#^M)
expect (CONNECT)
AT^M^M
OK^M
ATDT*99#^M^M
CONNECT
-- got it

send (^M)
Script chat -v -s -t 10 "" "AT" "" "ATDT*99#" "CONNECT" "" finished (pid 1326), status = 0x0
Serial connection established.
using channel 2
Using interface ppp0
Connect: ppp0 <--> /dev/ttyUSB2
```

```

sent [LCP ConfReq id=0x1 <asynmap 0x0> <magic 0x8a436f3c> <pcomp> <accomp>]
rcvd [LCP ConfReq id=0x3 <asynmap 0x0> <auth chap MD5> <magic 0x1043349> <pcomp> <accomp>]
sent [LCP ConfAck id=0x3 <asynmap 0x0> <auth chap MD5> <magic 0x1043349> <pcomp> <accomp>]
rcvd [LCP ConfAck id=0x1 <asynmap 0x0> <magic 0x8a436f3c> <pcomp> <accomp>]
rcvd [LCP DiscReq id=0x4 magic=0x1043349]
rcvd [CHAP Challenge id=0x1 <6cd09e243c7585361ad2d3735ee48657>, name = "UMTS_CHAP_SRVR"]
sent [CHAP Response id=0x1 <606d8283832332d22b1503fc4408b650>, name = "username"]
rcvd [CHAP Success id=0x1 ""]
CHAP authentication succeeded
CHAP authentication succeeded
sent [CCP ConfReq id=0x1 <deflate 15> <deflate(old#) 15> <bsd v1 15>]
sent [IPCP ConfReq id=0x1 <compress VJ 0f 01> <addr 0.0.0.0> <ms-dns1 0.0.0.0> <ms-dns2 0.0.0.0>]
rcvd [LCP ProtRej id=0x5 80 fd 01 01 00 0f 1a 04 78 00 18 04 78 00 15 03 2f]
Protocol-Reject for 'Compression Control Protocol' (0x80fd) received
rcvd [IPCP ConfNak id=0x1 <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14> <ms-wins 10.11.12.13> <ms-wins 10.11.12.14>]
sent [IPCP ConfReq id=0x2 <compress VJ 0f 01> <addr 0.0.0.0> <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14> <ms-wins 10.11.12.13> <ms-wins 10.11.12.14>]
rcvd [IPCP ConfNak id=0x2 <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14> <ms-wins 10.11.12.13> <ms-wins 10.11.12.14>]
sent [IPCP ConfReq id=0x3 <compress VJ 0f 01> <addr 0.0.0.0> <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14> <ms-wins 10.11.12.13> <ms-wins 10.11.12.14>]
rcvd [IPCP ConfNak id=0x3 <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14> <ms-wins 10.11.12.13> <ms-wins 10.11.12.14>]
sent [IPCP ConfReq id=0x4 <compress VJ 0f 01> <addr 0.0.0.0> <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14> <ms-wins 10.11.12.13> <ms-wins 10.11.12.14>]
rcvd [IPCP ConfReq id=0x2]
sent [IPCP ConfNak id=0x2 <addr 0.0.0.0>]
rcvd [IPCP ConfRej id=0x4 <compress VJ 0f 01> <ms-wins 10.11.12.13> <ms-wins 10.11.12.14>]
sent [IPCP ConfReq id=0x5 <addr 0.0.0.0> <ms-dns1 10.11.12.13> <ms-dns2 10.11.12.14>]
rcvd [IPCP ConfReq id=0x3]
sent [IPCP ConfAck id=0x3]
rcvd [IPCP ConfNak id=0x5 <addr 100.67.33.244> <ms-dns1 168.95.1.1> <ms-dns2 168.95.192.1>]
sent [IPCP ConfReq id=0x6 <addr 100.67.33.244> <ms-dns1 168.95.1.1> <ms-dns2 168.95.192.1>]
rcvd [IPCP ConfAck id=0x6 <addr 100.67.33.244> <ms-dns1 168.95.1.1> <ms-dns2 168.95.192.1>]
Could not determine remote IP address: defaulting to 10.64.64.64
not replacing default route to eth1 [172.22.15.254]
local IP address 100.67.33.244
remote IP address 10.64.64.64
primary DNS address 168.95.1.1
secondary DNS address 168.95.192.1
Script /etc/ppp/ip-up started (pid 1329)
Script /etc/ppp/ip-up finished (pid 1329), status = 0x0

```

Checking if DNS is ready.

```
# cat /etc/resolv.conf
```

```
# cat /etc/resolv.conf
nameserver 168.95.1.1
nameserver 168.95.192.1
```

Testing if the WiFi connection works or not.

```
# ping www.google.com
```

```
# ping www.google.com
PING www.google.com (64.233.189.99): 56 data bytes
64 bytes from 64.233.189.99: seq=0 ttl=45 time=6.137 ms
64 bytes from 64.233.189.99: seq=1 ttl=45 time=6.123 ms
64 bytes from 64.233.189.99: seq=2 ttl=45 time=6.115 ms
64 bytes from 64.233.189.99: seq=3 ttl=45 time=7.106 ms
64 bytes from 64.233.189.99: seq=4 ttl=45 time=6.155 ms
^C
--- www.google.com ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 6.115/6.327/7.106 ms
```

Chapter 3

Advantech Services

This chapter introduces Advantech design in serviceability, technical support and warranty policy for RSB-3850.

3.1 RISC Design-in Services

With the spread of industrial computing, a whole range of new applications have been developed, resulting in a fundamental change in the IPC industry. In the past System Integrators (SI) were used to completing projects without outside assistance but now such working models have moved on. Due to diverse market demands and intense competition, cooperation for (both upstream and downstream) vertical integration has become a much more effective way to create competitive advantages. As a result, ARM-based CPU modules were born out of this trend. Concentrating all necessary components on the CPU module and placing other parts on the carrier board in response to market requirements for specialization, provides greater flexibility while retaining its low power consumption credentials.

Advantech has been involved in the industrial computer industry for many years and found that customers usually have the following questions when implementing modular designs.

General I/O design capability

Although customers possess the ability for vertical integration and have enough know-how and core competitiveness in the professional application field, the lack of expertise and experience in general power and I/O design causes many challenges for them, especially integrating CPU modules into their carrier board.

The acquisition of information

Even if the individual client is able to obtain sufficient information to make the right decision for the specialized vertical application, some customers encounter difficult problems dealing with platform design in general and communicating with CPU or chipset manufacturers, thereby increasing carrier board design difficulties and risk as well as seriously impacting on Time-to-market and lost market opportunities.

Software development and modification

Compared to x86 architectures, RISC architectures use simpler instruction sets, therefore the software support for x86 platforms cannot be used on RISC platforms. System integrators need to develop software for their system and do the hardware and software integration themselves. Unlike x86 platforms, RISC platforms have less support for Board Support Packages (BSP) and drivers as well. Even though driver support is provided, SIs still have to make a lot of effort to integrate it into the system core. Moreover, the BSP provided by CPU manufacturers are usually for carrier board design, so it's difficult for SIs to have an environment for software development.

In view of this, Advantech proposed the concept of Streamlined Design-in Support Services for RISC-based Computer On Modules (COM). With a dedicated professional design-in services team, Advantech actively participates in carrier board design and problem solving. Our services not only enable customers to effectively distribute their resources but also reduce R&D manpower cost and hardware investment.

By virtue of a close interactive relationship with leading original manufacturers of CPUs and chipsets such as ARM, TI and Freescale, Advantech helps solve communication and technical support difficulties, and that can reduce the uncertainties of product development too. Advantech's professional software team also focuses on providing a complete Board Support Package and assists customers to build up a software development environment for their RISC platforms.

Advantech RISC design-in services helps customers overcome their problems to achieve the most important goal of faster time to market through a streamlined RISC Design-in services.

Along with our multi-stage development process which includes: planning, design, integration, and validation, Advantech's RISC design-in service provides comprehensive support to the following different phases:

Planning stage

Before deciding to adopt Advantech RISC COM, customers must go through a complete survey process, including product features, specification, and compatibility testing with software. So, Advantech offers a RISC Customer Solution Board (CSB) as an evaluation tool for carrier boards which are simultaneously designed when developing RISC COMs. In the planning stage, customers can use this evaluation board to assess RISC modules and test peripheral hardware. What's more, Advantech provides standard software Board Support

Package (BSP) for RISC COM, so that customers can define their product's specifications as well as verifying I/O and performance at the same time. We not only offer hardware planning and technology consulting, but also software evaluation and peripheral module recommendations (such as WiFi, 3G, BT). Resolving customer concerns is Advantech's main target at this stage. Since we all know that product evaluation is the key task in the planning period, especially for performance and specification, so we try to help our customers conduct all the necessary tests for their RISC COM.

Design stage

When a product moves into the design stage, Advantech will supply a design guide of the carrier board for reference. The carrier board design guide provides pin definitions of the COM connector with limitations and recommendations for carrier board design, so customers can have a clear guideline to follow during their carrier board development. Regarding different form factors, Advantech offers a complete pin-out check list for different form factors such as Q7, ULP and RTX2.0, so that customers can examine the carrier board signals and layout design accordingly. In addition, our team is able to assist customers to review the placement/layout and schematics to ensure the carrier board design meets their full requirements. For software development, Advantech RISC software team can assist customers to establish an environment for software development and evaluate the amount of time and resources needed. If customers outsource software development to a 3rd party, Advantech can also cooperate with the 3rd party and provide proficient consulting services. With Advantech's professional support, the design process becomes much easier and product quality will be improved to meet their targets.

Integration stage

This phase comprises of HW/SW integration, application development, and peripheral module implementation. Due to the lack of knowledge and experience on platforms, customers need to spend a certain amount of time on analyzing integration problems. In addition, peripheral module implementation has a lot to do with driver designs on carrier boards, RISC platforms usually have less support for ready-made drivers on the carrier board, therefore the customer has to learn from trial and error and finally get the best solution with the least effort. Advantech's team has years of experience in customer support and HW/SW development knowledge. Consequently, we can support customers with professional advice and information as well as shortening development time and enabling more effective product integration.

Validation stage

After customer's ES sample is completed, the next step is a series of verification steps. In addition to verifying a product's functionality, the related test of the product's efficiency is also an important part at this stage especially for RISC platforms.

As a supportive role, Advantech primarily helps customers solve their problems in the testing process and will give suggestions and tips as well. Through an efficient verification process backed by our technical support, customers are able to optimize their applications with less fuss. Furthermore, Advantech's team can provide professional consulting services about further testing and equipment usage, so customers can find the right tools to efficiently identify and solve problems to further enhance their products quality and performance.

3.2 Contact Information

Below is the contact information for Advantech customer service.

Region/Country	Contact Information
America	1-888-576-9688
Brazil	0800-770-5355
Mexico	01-800-467-2415
Europe (Toll Free)	00800-2426-8080
Singapore & SAP	65-64421000
Malaysia	1800-88-1809
Australia (Toll Free)	1300-308-531
China (Toll Free)	800-810-0345 800-810-8389 Sales@advantech.com.cn
India (Toll Free)	1-800-425-5071
Japan (Toll Free)	0800-500-1055
Korea (Toll Free)	080-363-9494 080-363-9495
Taiwan (Toll Free)	0800-777-111
Russia (Toll Free)	8-800-555-01-50

You can reach our service team through below website, our technical support engineer will provide quick response once the form is filled out:

http://www.advantech.com.tw/contact/default.aspx?page=contact_form2&subject=Technical+Support

3.3 Global Service Policy

3.3.1 Warranty Policy

Below is the warranty policy of Advantech products:

3.3.1.1 Warranty Period

Advantech branded off-the-shelf products and 3rd party off-the-shelf products used to assemble Advantech Configure to Order products are entitled to a 2 years complete and prompt global warranty service. Product defects in design, materials, and workmanship, are covered from the date of shipment.

All customized products will by default carry a 15 months regional warranty service. The actual product warranty terms and conditions may vary based on sales contract.

All 3rd party products purchased separately will be covered by the original manufacturer's warranty and time period, and shall not exceed one year of coverage through Advantech.

3.3.1.2 Repairs under Warranty

It is possible to obtain a replacement (Cross-Shipment) during the first 30 days of the purchase, thru your original ADVANTECH supplier to arrange DOA replacement if the products were purchased directly from ADVANTECH and the product is DOA (Dead-on-Arrival). The DOA Cross-Shipment excludes any shipping damage, customized and/or build-to-order products.

For those products which are not DOA, the return fee to an authorized ADVANTECH repair facility will be at the customers' expense. The shipping fee for reconstructive products from ADVANTECH back to customers' sites will be at ADVANTECH's expense.

3.3.1.3 Exclusions from Warranty

The product is excluded from warranty if

- The product has been found to be defective after expiry of the warranty period.
- Warranty has been voided by removal or alternation of product or part identification labels.
- The product has been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable physical or operating environment; improperly maintained by the customer; or failure caused which ADVANTECH is not responsible whether by accident or other cause. Such conditions will be determined by ADVANTECH at its sole unfettered discretion.
- The product is damaged beyond repair due to a natural disaster such as a lightning strike, flood, earthquake, etc.
- Product updates/upgrades and tests upon the request of customers who are without warranty.

3.3.2 Repair Process

3.3.2.1 Obtaining an RMA Number

All returns from customers must be authorized with an ADVANTECH RMA (Return Merchandise Authorization) number. Any returns of defective units or parts without valid RMA numbers will not be accepted; they will be returned to the customer at the customer's cost without prior notice. An RMA number is only an authorization for returning a product; it is not an approval for repair or replacement. When requesting an RMA number, please access ADVANTECH's RMA web site: <http://erma.ADVANTECH.com.tw> with an authorized user ID and password.

You must fill out basic product and customer information and describe the problems encountered in detail in "Problem Description". Vague entries such as "does not work" and "failure" are not acceptable.

If you are uncertain about the cause of the problem, please contact ADVANTECH's Application Engineers (AE). They may be able to find a solution that does not require sending the product for repair.

The serial number of the whole set is required if only a key defective part is returned for repair. Otherwise, the case will be regarded as out-of-warranty.

3.3.2.2 Returning the Product for Repair

It's possible customers can save time and meet end-user requirements by returning defective products to any authorized ADVANTECH repair facility without an extra cross-region charge. It is required to contact the local repair center before offering global repair service.

It is recommended to send cards without accessories (manuals, cables, etc.). Remove any unnecessary components from the card, such as CPU, DRAM, and CF Card. If you send all these parts back (because you believe they may be part of the problem), please note clearly that they are included. Otherwise, ADVANTECH is not responsible for any items not listed. Make sure the " Problem Description " is enclosed.

European Customers that are located outside European Community are requested to use UPS as the forwarding company. We strongly recommend adding a packing list to all shipments. Please prepare a shipment invoice according to the following guidelines to decrease goods clearance time:

1. Give a low value to the product on the invoice, or additional charges will be levied by customs that will be borne by the sender.
2. Add information "Invoice for customs purposes only with no commercial value" on the shipment invoice.
3. Show RMA numbers, product serial numbers and warranty status on the shipment invoice.
4. Add information about Country of origin of goods

In addition, please attach an invoice with RMA number to the carton, then write the RMA number on the outside of the carton and attach the packing slip to save handling time. Please also address the parts directly to the Service Department and mark the package "Attn. RMA Service Department".

All products must be returned in properly packed ESD material or anti-static bags. ADVANTECH reserves the right to return unrepaired items at the customer's cost if inappropriately packed.

Besides that, "Door-to-Door" transportation such as speed post is recommended for delivery, otherwise, the sender should bear additional charges such as clearance fees if Air-Cargo is adopted.

Should DOA cases fail, ADVANTECH will take full responsibility for the product and transportation charges. If the items are not DOA, but fail within warranty, the sender will bear the freight charges. For out-of-warranty cases, customers must cover the cost and take care of both outward and inward transportation.

3.3.2.3 Service Charges

The product is excluded from warranty if:

- The product is repaired after expiry of the warranty period.
- The product is tested or calibrated after expiry of the warranty period, and a No Problem Found (NPF) result is obtained.
- The product, though repaired within the warranty period, has been misused, abused, or subjected to unauthorized disassembly/modification; placed in an

unsuitable physical or operating environment; improperly maintained by the customer; or failure caused which ADVANTECH is not responsible whether by accident or other cause. Such conditions will be determined by ADVANTECH at its sole unfettered discretion.

- The product is damaged beyond repair due to a natural disaster such as a lightning strike, flood, earthquake, etc.
- Product updates and tests upon the request of customers who are without warranty.

If a product has been repaired by ADVANTECH, and within three months after such a repair the product requires another repair for the same problem, ADVANTECH will do this repair free of charge. However, such free repairs do not apply to products which have been misused, abused, or subjected to unauthorized disassembly/modification; placed in an unsuitable physical or operating environment; improperly maintained by the customer; or failure caused which ADVANTECH is not responsible whether by accident or other cause.

Please contact your nearest regional service center for detail service quotation.

Before we start out-of-warranty repairs, we will send you a pro forma invoice (P/I) with the repair charges. When you remit the funds, please reference the P/I number listed under "Our Ref". ADVANTECH reserves the right to deny repair services to customers that do not return the DOA unit or sign the P/I. Meanwhile, ADVANTECH will scrap defective products without prior notice if customers do not return the signed P/I within 3 months.

3.3.2.4 Repair Report

ADVANTECH returns each product with a "Repair Report" which shows the result of the repair. A "Repair Analysis Report" is also provided to customers upon request. If the defect is not caused by ADVANTECH design or manufacturing, customers will be charged US\$60 or US\$120 for in-warranty or out-of-warranty repair analysis reports respectively.

3.3.2.5 Custody of Products Submitted for Repair

ADVANTECH will retain custody of a product submitted for repair for one month while it is waiting for return of a signed P/I or payment (A/R). If the customer fails to respond within such period, ADVANTECH will close the case automatically. ADVANTECH will take reasonable measures to stay in proper contact with the customer during this one month period.

3.3.2.6 Shipping Back to Customer

The forwarding company for RMA returns from ADVANTECH to customers is selected by ADVANTECH. Per customer requirement, other express services can be adopted, such as UPS, FedEx and etc. The customer must bear the extra costs of such alternative shipment. If you require any special arrangements, please indicate this when shipping the product to us.



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