User Manual

ROM-DB3900

Development Board for RTX v2.0 Modules

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.

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.

Warnings, Cautions and Notes

Warning! *Warnings indicate conditions, which if not observed, can cause personal injury!*

Caution! *Cautions are included to help you avoid damaging hardware or losing data. e.g.*

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.

Note! *Notes provide optional additional information.*

Packing List

Before installation, please ensure the following items have been shipped.

9696M39000E	RTX 2.0 Carrier board ROM-DB3900	1
9696ED2000E	debug adapter board	1
1700021882-01	LVDS backlight cable	1
1700021883-01	LVDS cable	1
1700021941-01	SATA power	1
1700004711	SATA signal	1
1700019076	USB OTG to Type A female	1
1700019077	USB OTG to Type A male	1
1701100300	F Cable IDE#3 10P-2.54/D-SUB 9P(M) 30cm for UART and CAN	2
1700021861-01	USB 4 pin to Type A Cable	1
1700022373-01	Debug port cable for ROM-3420	1
1700019474	A Cable D-SUB 9P(F)/D-SUB 9P(F) RS232/RS485 100c	1
2026390000	China RoHS ROM-DB3900 Electronic Pollution 1st	1

Optional Accessories

Part No.	Description
9696MEG510E	Daughter board for audio codec
9696MX5300E	Daughter board for system bus
9680015491	PCIe to miniPCIe adapter card
96LEDK-A070WV40NB1	7" LCD AUO G070VW01 V0 w/o touch

RTX 2.0 CPU Boards

Part No.	Description
ROM-3420CD-MDA1E	Freescale i.mx6 Dual core 1GHz with 1GB memory (0~60C)
ROM-3420WD-MDA1E	Freescale i.mx6 Dual core 1GHz with 1GB memory(-40~85C)
ROM-3420CQ-MDA1E	Freescale i.mx6 Quad core 1GHz with 1GB memory(0~60C)
ROM-3420WQ-MDA1E	Freescale i.mx6 Quad core 1GHz with 1GB memory(-40~85C)

For more information please refer to "Advantech Baseboard Check List" and "Evaluation Board Reference Schematic".

You can download "Advantech Baseboard Check List" and "Evaluation Board Reference Schematic" from http://www.advantech.com

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.
15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.

16. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

■ To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.

■ Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Contents

Chapter 1

General Introduction

This chapter gives background information on the ROM-DB3900.

Sections include:

- Introduction
- Specification

1.1 Introduction

ROM-DB3900 is an evaluation carrier board designed for the Advantech RTX module. It is compatible with RTX module ROM-3420 and has rich I/O interface for evaluation and development. It supports wide range operating temperatures, and also supports two MIPI connectors for the camera module. ROM-DB3900 is an ideal development board for ruggedized applications, such as medical device, Industrial control, Transportation/fleet management systems.

ROM-DB3900 comes with RISC RTX carrier board design documents: Carrier Board Design Guide, Layout, Schematic checklist, and also the reference board schematics ready for you to start your own carrier board design.

- ■ +19V DC in power input
- ■ 2 camera input support
- ■ 10 GPIO
- ■ 4 UART and 2 CAN ports

1.2 Product Specification

Compatible Module		Advantech RTX 2.0 CPU Module Series
Graphic	HDMI	1 HDMI TypeA
	LVDS	1 single channel 24-bit LVDS
	VGA	1 D-Sub 15 with female connector
Ethernet	10/100/100 Mbps	1 RJ45
Storage	eMMC	Onboard 4GB eMMC
	EEPROM	Onboard 4KB EEPROM
	SD	1 SD card slot
	SATA	1 SATAII Connector (with SATA-DOM support)
I/O	USB	1 USB Mini Type B (OTG), 1 USD 2.0/3.0 Type A
	UART	4 UART Ports (4 wires)
	Audio	1 2 port phone jack, support line-in, line-out
	CAN	2 CAN 2.0B ports, Differential mode +5V
	GPIO	10 GPIO Ports
	I2C	2 I2C pin header
	SPI	2 SPI pin header
	Camera input	2 MIPI connectors
	System Bus	1 PC104 Connector (Address:31 bits, Data: 16 bits)
	KeyPad	4x4 Keypad (share pin with GPIO, By software setting)
	I2S	1 Pin header
Expansion	PCIe slot	2 PCIe x1
Power input	Power	+ 19V DC Jack
Environment	Operation	0~60°C (32~140°F)
	Operating Humidity	0% ~ 90% relative humidity, non-condensing
Physical Characteristics	Dimensions	305 x 244 mm (12" x 9.6")

Chapter 2

H/W Installation

This chapter gives mechanical and connector information on the ROM-DB3900 carrier board.

Sections include:

- Connector Information
- Mechanical Drawing
- Hardware Installation

2.1 Module Form Factor

RTX form factor size, 68mm (W) x 68mm (D)

2.2 Environmental Specifications

- **Operating temperature:** 0~60 °C (32~140°F)
  The operating temperature refers to the environmental temperature for the model.
- **Operating humidity:** 0% ~ 90% relative humidity, non-condensing
- **Storage temperature:** -40~85 °C
- **Relative humidity:** 95% @ 60 °C
- **Weight (g):** 80 g (weight of total package)

2.3 ROM-DB3900 Appearance

2.3.1 ROM-DB3900 Overview
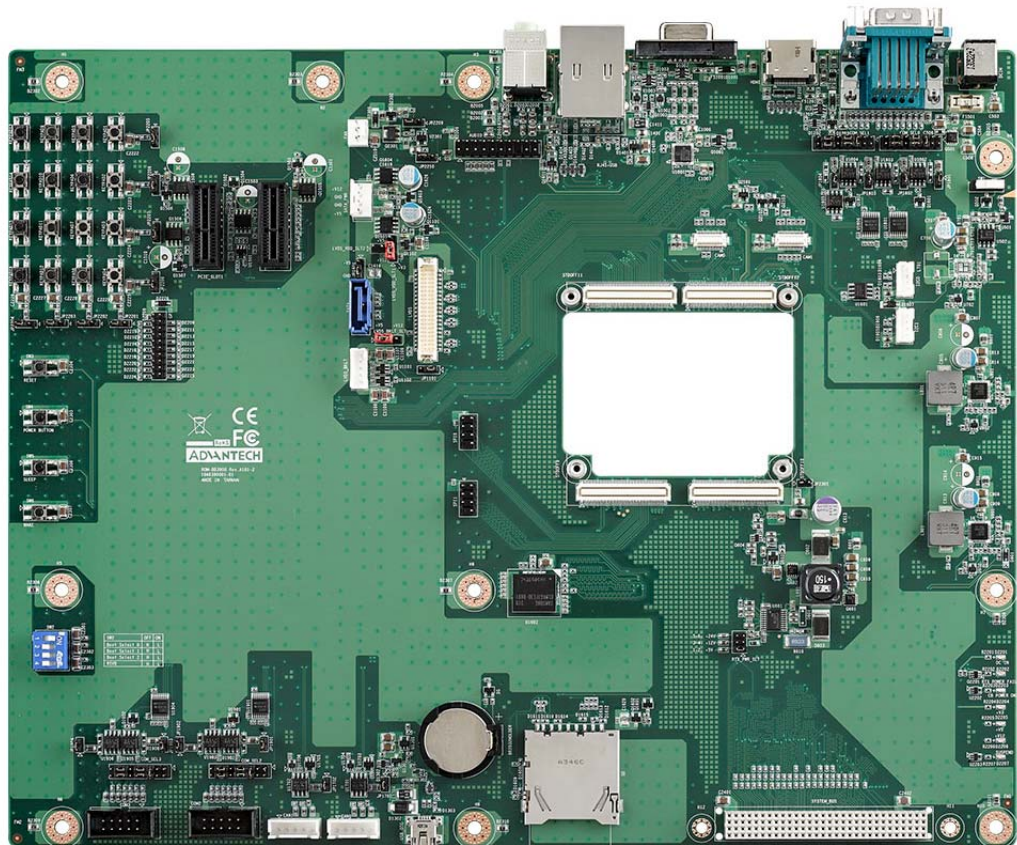
2.3.2 I/O Connectors

2.4 Connectors, Jumper settings, Switches and LEDs

2.4.1 Rear I/O panel
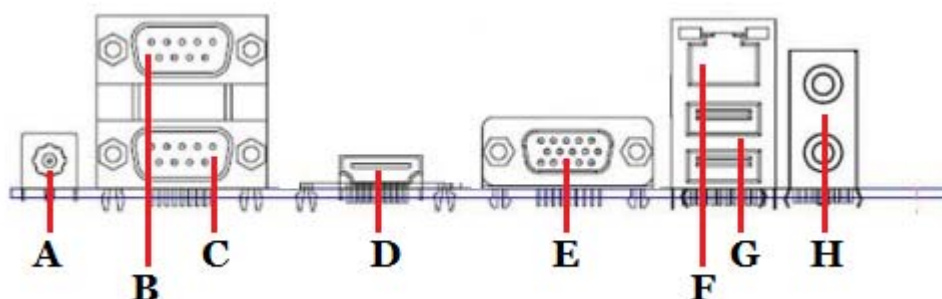
Table 2.1: External IO Connector		
Position	**Description**	
DCIN	DC Jack	A
COM01A	UART Port 1	B
COM01B	UART Port 2	C
HDMI	HDMI Port	D
VGA	VGA Port	E
RJ45+USB	GbE Ethernet Connector	F
RJ45+USB	USB Port 1/ 2	G
PHONE_JACK	MIC Input/ Audio Output	H

Table 2.2: DCIN (DC-Jack, +19V power input)			
Pin	**Signal**	**Pin**	**Signal**
1	+19V	Shield	GND
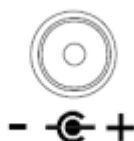
Table 2.3: COM01A (UART0, 4 WIRE)

Pin	Signal	Pin	Signal
1	TXD485-	2	RXD/TXD485+
3	TXD/RXD485+TX	4	RXD485-
5	GND	6	-
7	RTS	8	CTS
9	-		
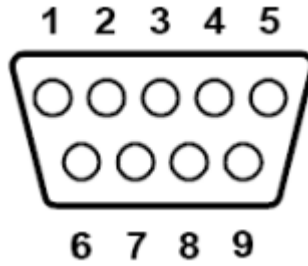
Table 2.4: COM01B (UART1, 4 WIRE)

Pin	Signal	Pin	Signal
1	TXD485-	2	RXD/TXD485+
3	TXD/RXD485+	4	RXD485-
5	GND	6	-
7	RTS	8	CTS
9	-		
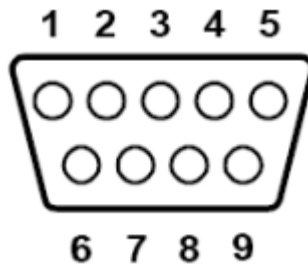
Table 2.5: VGA (VGA)

Pin	Signal	Pin	Signal
1	Red	2	Green
3	Blue	4	-
5	GND	6	GND
7	GND	8	GND
9	+5V	10	GND
11	-	12	DDC_DAT
13	HSYNC	14	VSYNC
15	DDC_CK		
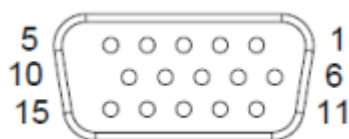
Table 2.6: HDMI (HDMI)

Pin	Signal	Pin	Signal
1	TMDS_D2+	2	GND
3	TMDS_D2-	4	TMDS_D1+
5	GND	6	TMDS_D1-
7	TMDS_D0+	8	GND
9	TMDS_D0-	10	TMDS_CLK+
11	GND	12	TMDS_CLK-
13	CEC	14	-
15	CTRL_CLK	16	CTRL_DAT
17	GND	18	+5V
19	HPD		
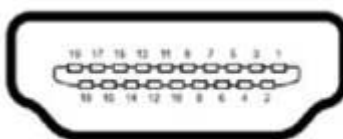
Table 2.7: RJ45+USB (RJ-45 & USB 1/2)			
1	DA+	**Pin**	**Signal**
2	DA-	U1	VBUS
3	DB+	U2	D-
4	DC+	U3	D+
5	DC-	U4	GND
6	DB-	U5	SS_RX-
7	DD+	U6	SS_RX+
8	DD-	U7	GND
L3	GBE_LINK1000#	U8	SS_TX-
		U9	SS_TX+
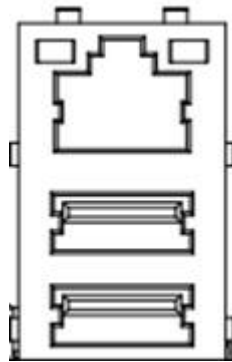
Table 2.8: PHONE_JACK (Audio output)			
Pin	**Signal**	**Pin**	**Signal**
1	GND	22	Audio_L
2	-	23	GND
3	GND	24	GND
4	GND	25	Audio_R
5	MIC_IN		

Line out: stereo, Line in: mono

2.4.2 Internal I/O
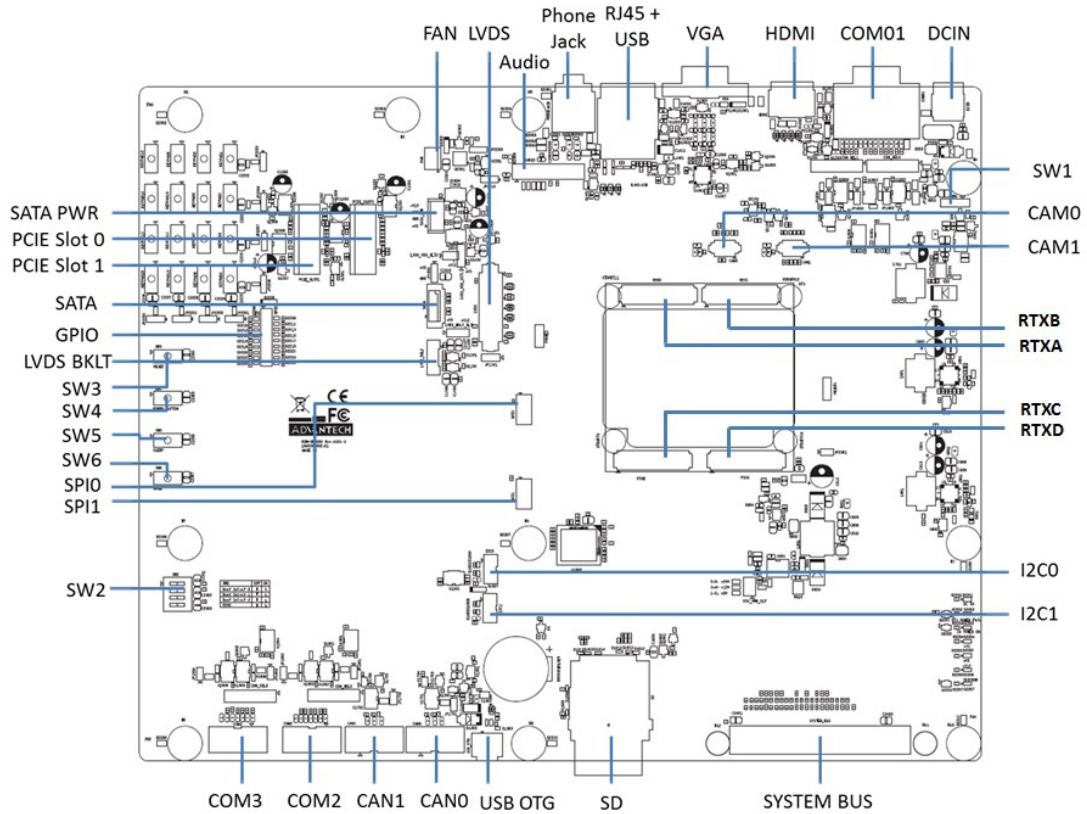
Table 2.9: Internal IO Connectors		
Position	**Description**	**Connector type**
DCIN	DC-in	DC POWER JACK 2.5mm 90D(M) DIP 2DC-G213B200
COM01	COM Port	D-SUB Conn. 18P 90D(M) DIP DM10151-H531-4F
HDMI	HDMI	HDMI Conn. 19P 0.5mm 90D(F) SMD QJ51191-LFB4-7F
VGA	VGA	D-SUB Conn. 15P 90D(F) DIP 070242FR015S200ZU
RJ45+USB	LAN+USB	PhoneJack RJ45+USB3.0*2 32P 90D(F) DIP 05-A00919
Phone Jack	PhoneJack	Audio Jack 9P 2.5mm 90D(F) DIP ABA-JAK-03
Audio	Audio	PIN HEADER 2x10P 2.54mm 180D(M) DIP 21N22564
LVDS	LVDS	B/B Conn. 40P 1.25mm 90D SMD DF13-40DP-1.25V(91)
FAN	FAN	Wafer 2.54mm 3P 180D(M) DIP 22-27-2031
SATA_PWR	SATA power	WAFER 4P 2.5mm 180D(M) DIP 24W1161-04S10-01T
PCIE_SLOT0	PCIE_SLOT0	PCIEXPRESS 36P 180D(F) DIP 2EG01817-D2D-DF
PCIE_SLOT1	PCIE_SLOT1	PCIEXPRESS 36P 180D(F) DIP 2EG01817-D2D-DF
SATA	SATA	Serial ATA 7P 1.27mm 180D(M) DIP WATM-07DBN4A3B8
GPIO	GPIO	PIN HEADER 10x2P 2.0mm 180D(M) DIP 21N22050
LVDS_BKLT	LVDS Backlight	WAFER BOX 2.0mm 5P 180D(M) DIP WO/Pb JIH VEI
SW3	Reset button	TACT SW STS-091 SMD 4P H=3.8mm

Table 2.9: Internal IO Connectors		
SW4	Power button	TACT SW STS-091 SMD 4P H=3.8mm
SW5	Sleep button	TACT SW STS-091 SMD 4P H=3.8mm
SW6	Wake up button	TACT SW STS-091 SMD 4P H=3.8mm
SPI0	SPI0	PIN HEADER 2x4P 2.54mm 180D(M) DIP 210-92-04GB02
SPI1	SPI1	PIN HEADER 2x4P 2.54mm 180D(M) DIP 210-92-04GB02
SW2	Boot selection	DIP SW EDG104S DIP 4P Radial SPST
COM3	COM3	BOX HEADER 5x2P 2.54mm 180D(M) DIP 23N6960-10S10
COM2	COM2	BOX HEADER 5x2P 2.54mm 180D(M) DIP 23N6960-10S10
CAN1	CAN1	BOX HEADER 5x2P 2.54mm 180D(M) DIP 23N6960-10S10
CAN0	CAN0	BOX HEADER 5x2P 2.54mm 180D(M) DIP 23N6960-10S10
USB_OTG	USB OTG	MINI USB 5P 180D(F) SMD UH51543-CS7-7F
SD	SD	SD CARD 9P 90D(F) SMD WK2192C-S3D-7H
System_Bus	SYSTEMBUS	PCB SKT 30x4P 2.00mm 180D(F) DIP 264-40303-02
I2C0	I2C0	WAFER BOX 2.0mm 4P 180D(M) W/LOCK A2001WV2-4P
I2C1	I2C1	WAFER BOX 2.0mm 4P 180D(M) W/LOCK A2001WV2-4P
RTXA,RTXB, RTXC,RTXD	RTX B2B Connector	B/B Conn. 50x2P 0.5mm 180D(M) SMD AXK500137YG

2.4.3 Connectors

Table 2.10: PCIE_SLOT0 (PCIex1 connector1)			
Pin	Signal	Pin	Signal
B1	+12V	A1	+12V
B2	+12V	A2	+12V
B3	+12V	A3	+12V
B4	GND	A4	GND
B5	PCIE_A_CK	A5	PCIE_A_JTAG2
B6	PCIE_A_DAT	A6	PCIE_A_JTAG3
B7	GND	A7	PCIE_A_JTAG4
B8	+3V	A8	PCIE_A_JTAG5
B9	PCIE_A_JTAG1	A9	+3V
B10	+3V	A10	+3V
B11	+3V	A11	PWRGD
	Mechanical Key		
B12	Reserved	A12	GND
B13	GND	A13	PCIE_A_REFCK+
B14	PCIE_A_TX+	A14	PCIE_A_REFCK-
B15	PCIE_A_TX-	A15	GND
B16	GND	A16	PCIE_A_RX+
B17	+3V	A17	PCIE_A_RX-
B18	GND	A18	GND
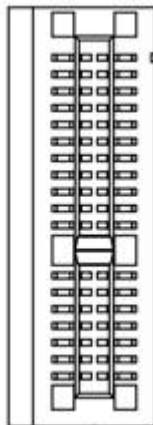
Table 2.11: PCIE_SLOT1 (PCIex1 connector2)			
Pin	**Signal**	**Pin**	**Signal**
B1	+12V	A1	+12V
B2	+12V	A2	+12V
B3	+12V	A3	+12V
B4	GND	A4	GND
B5	PCIE_B_CK	A5	PCIE_B_JTAG2
B6	PCIE_B_DAT	A6	PCIE_B_JTAG3
B7	GND	A7	PCIE_B_JTAG4
B8	+3V	A8	PCIE_B_JTAG5
B9	PCIE_B_JTAG1	A9	+3V
B10	+3V	A10	+3V
B11	+3V	A11	PWRGD
		Mechanical Key	
B12	Reserved	A12	GND
B13	GND	A13	PCIE_B_REFCK+
B14	PCIE_B_TX+	A14	PCIE_B_REFCK-
B15	PCIE_B_TX-	A15	GND
B16	GND	A16	PCIE_B_RX+
B17	+3V	A17	PCIE_B_RX-
B18	GND	A18	GND
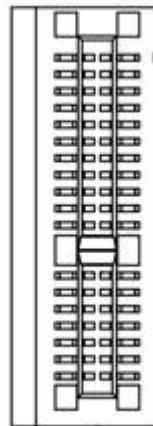
Table 2.12: SATA (SATA connector)			
Pin	Signal	Pin	Signal
1	GND	2	SATA_TX+
3	SATA_TX-	4	GND
5	SATA_RX-	6	SATA_RX+
7	SATA DOM PIN7		

Table 2.13: SATA_PWR (SATA Power connector)			
1	+5V	2	GND
3	GND	4	+12V
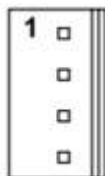
Table 2.14: LVDS (LVDS 24-bit)

Pin	Signal	Pin	Signal
1	+VDD_LVDS	2	+VDD_LVDS
3	GND	4	GND
5	+VDD_LVDS	6	+VDD_LVDS
7	LVDS_D0-	8	-
9	LVDS_D0+	10	-
11	GND	12	GND
13	LVDS_D1-	14	-
15	LVDS_D1+	16	-
17	GND	18	GND
19	LVDS_D2-	20	-
21	LVDS_D2+	22	-
23	GND	24	GND
25	LVDS_CLK-	26	-
27	LVDS_CLK+	28	-
29	GND	30	GND
31	DID_CK	32	DID_DAT
33	GND	34	EDP_HDP
35	LVDS D3-	36	-
37	LVDS D3+	38	-
39	GND	40	LVDS_CTRL
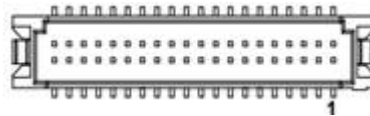
Table 2.15: LVDS_BKLT (LVDS backlight power)

Pin	Signal	Pin	Signal
1	+VDD_BKLT_LVDS	2	GND
3	BLK_EN	4	Brightness
5	+5V		
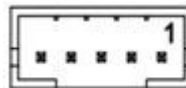
Table 2.16: USB_OTG (USB OTG)

Pin	Signal	Pin	Signal
1	VBUS	2	USB_OTG D-
3	USB_OTG D+	4	OTG ID
5	GND		

Table 2.17: SD (SD slot)

Pin	Signal	Pin	Signal
1	SDIO_DATA3_X	2	SDIO_CMD
3	GND	4	+3V
5	SDIO_CK	6	GND
7	SDIO_DATA0	8	SDIO_DATA1
9	SDIO_DATA2	10	SDIO_CD#
11	GND	12	+3V_SDIO
H1	-	H2	-
H3	-	H4	GND
H5	GND	H6	GND

Table 2.18: BR2032HOLDER (CR-2032)

Pin	Signal	Pin	Signal
1	BAT_RTC	2	GND

2.4.4 Jumpers

Table 2.19: JP2201 (GPIO/Keypad selection for GPIO0/10)

Pin	Signal
1-2	GPIO0
2-3	GPIO10

Table 2.20: JP2202 (GPIO/Keypad selection for GPIO1/11)

Pin	Signal
1-2	GPIO1
2-3	GPIO11

Table 2.21: JP2203 (GPIO/Keypad selection for GPIO2/12)

Pin	Signal
1-2	GPIO2
2-3	GPIO12

Table 2.22: JP2204 (GPIO/Keypad selection for GPIO3/13)

Pin	Signal
1-2	GPIO3
2-3	GPIO13

Table 2.23: JP2205 (GPIO/Keypad selection for GPIO4/14)

Pin	Signal
1-2	GPIO4
2-3	GPIO14

Table 2.24: JP2206 (GPIO/Keypad selection for GPIO5/15)

Pin	Signal
1-2	GPIO5
2-3	GPIO15

Table 2.25: JP2207 (GPIO/Keypad selection for GPIO6/16)

Pin	Signal
1-2	GPIO6
2-3	GPIO16
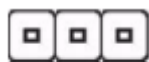
Table 2.26: JP2208 (GPIO/Keypad selection for GPIO7/17)

Pin	Signal
1-2	GPIO7
2-3	GPIO17

Table 2.27: JP2208 (GPIO8)

Pin	Signal
1-2	GPIO8
2-3	-

Table 2.28: JP22 (GPIO9)

Pin	Signal
1-2	GPIO9
2-3	-

Table 2.29: JP1801~JP1804, JP1901~JP1904 (UART 120om terminal resister)

Pin	Signal
1-2	120 OM (Default)
2-3	Without 120 OM

Table 2.30: JP1101 (EDP_HPD for LVDS)

Pin	Signal	Pin	Signal
1	GND	2	EDP_HDP_A
3	EDP_HPD		

Table 2.31: JP1601 (SATA-DOM Jumper, default 2-3)

Pin	Signal	Pin	Signal
1	+5V	2	SATA-DOM Pin7
3	GND	-	-

Table 2.32: JP1701 (CAN0 bus, 120OM terminal resistor)

Jumper	Mode	Jumper	Mode
1-2	120 OM (Default)	-	Without 120 OM
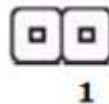
Table 2.33: JP1702 (CAN1 bus, 120OM terminal resistor)

Jumper	Mode	Jumper	Mode
1-2	120 OM (Default)	-	Without 120 OM
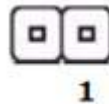
Jumper	Mode	Jumper	Mode
1-2	120 OM (Default)	-	Without 120 OM

Table 2.34: COM_SEL0/1/2/3 (UART0/1/2/3 function selection

Pin	Signal	Pin	Signal
1	SER2_RX	2	RXD485_A
3	SER2_RX	4	RXD422_A
5	SER2_RX	6	RXD232_A
7	-	8	COM2_RXD
9	NDCD#TXD485-	10	NRXD2TXD485+
11	TXD485-_A	12	TXD485+_A
13	COM2_TXD	14	-
15	NTXD2_RXD485+	16	NDTR#2_RXD485-
17	RSD485+_A	18	RSD485-_A
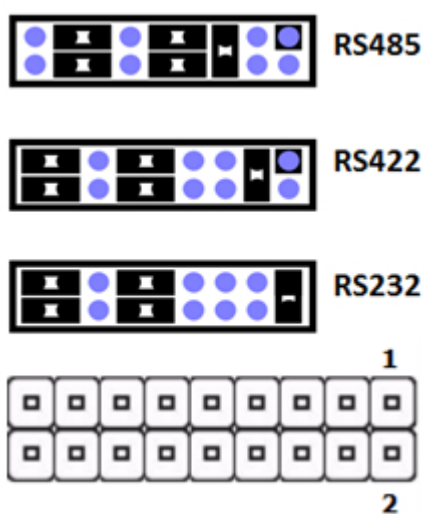
Table 2.35: (UART1, 2wires)

Pin	Signal	Pin	Signal
1	TXD485-	2	-
3	COM1_RX	4	RTS
5	COM1_TX	6	CTS
7	RXD485-	8	-
9	GND	10	-
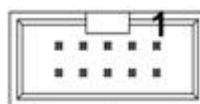
Table 2.36: (UART3, 2wires)

Pin	Signal	Pin	Signal
1	TXD485-	2	-
3	RXD/TXD485+	4	RTS
5	TXD/RXD485+	6	CTS
7	RXD485-	8	-
9	GND	10	-
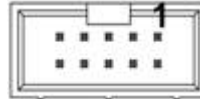
Table 2.37: CAM0 (Camera 1, MIPI)

Pin	Signal	Pin	Signal
1	PCAM_HSYNC	2	PCAM_ON_CSI1
3	PCAM_VSYNC	4	PCAM_PXL_CK1
5	CAM0_PWR	6	GND
7	CAM0_RST	8	I2C_CSI0_DAT
9	GND	10	I2C_CSI0_CK
11	NC	12	GND
13	NC	14	CSI0_X_CK+
15	GND	16	CSI0_X_CK-
17	NC	18	GND
19	PCAM_MCK	20	CSI0_X_D1+
21	GND	22	CSI0_X_D1-
23	CSI0_MCK	24	GND
25	+3V	26	CSI0_D0+
27	+3V	28	CSI0_X_D0-
29	+3V	30	GND
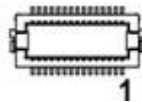
Table 2.38: CAM2 (Camera 2, MIPI)

Pin	Signal	Pin	Signal
1	PCAM_FLD	2	PCAM_ON_CSI1
3	PCAM_DE	4	PCAM_PXL_CK0
5	CAM1_PWR	6	GND
7	GND	8	I2C_CSI1_DAT
9	GND	10	I2C_CSI1_CK
11	CSI1_X_D3+	12	GND
13	CIS1_X_D3-	14	CSI1_X_CK+
15	GND	16	CSI1_X_CK-
17	CSI1_X_D2+	18	GND
19	CSI1_X_D2-	20	CSI1_X_D1+
21	GND	22	CSI1_X_D1-
23	CAM1_X_MCK	24	GND
25	+3V	26	CSI1_X_D0+
27	+3V	28	CSI1_X_D0-
29	+3V	30	GND
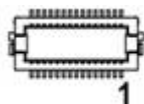
Table 2.39: GPIO (GPIO)

Pin	Signal		Pin	Signal	
1	3.3V		11	GPIO8	
2	GND		12	GPIO9	
3	GPIO0	KEY_SEL_ROW0	13	GPIO10	KEY_SEL_ROW0
4	GPIO1	KEY_SEL_ROW1	14	GPIO11	KEY_SEL_ROW1
5	GPIO2	KEY_SEL_ROW2	15	GPIO12	KEY_SEL_ROW2
6	GPIO3	KEY_SEL_ROW3	16	GPIO13	KEY_SEL_ROW3
7	GPIO4	KEY_SEL_COL0	17	GPIO14	KEY_SEL_COL0
8	GPIO5	KEY_SEL_COL1	18	GPIO15	KEY_SEL_COL1
9	GPIO6	KEY_SEL_COL2	19	GPIO16	KEY_SEL_COL2
10	GPIO7	KEY_SEL_COL3	20	GPIO17	KEY_SEL_COL3
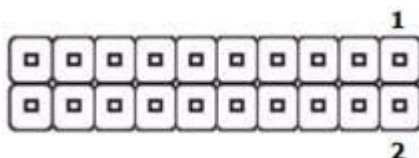
Table 2.40: JP2301 (External WDT)

Pin	Signal	Pin	Signal
1	WDT_Time_Out#	2	GND
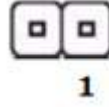
Table 2.41: FAN (System FAN)

Pin	Signal	Pin	Signal
1	GND	2	+12V
3	+5V		
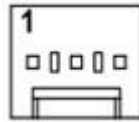
Table 2.42: AUDIO (I2S0, audio codec)

Pin	Signal	Pin	Signal
1	Audio_VDDA	2	GND
3	Audio_VDDA	4	I2S0_SDIN_C
5	I2S0_SDOUT_C	6	I2S0_LRCK_C
7	I2S0_CK_C	8	AUDIO_MCK_C
9	-	10	GND
11	Audio_I2C_CK	12	MIC_BIAS
13	Audio_I2C_DAT	14	GND
15	-	16	HP_R
17	MIC_IN	18	GND
19	GND	20	HP_L
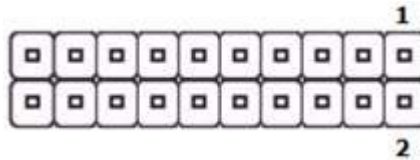
Table 2.43: SPI1 (SPI1)

Pin	Signal	Pin	Signal
1	+3V	2	GND
3	SPI1_CS0#	3	SPI1_CK
5	SPI1_DO_C	6	SPI1_DIN_C
7	-	8	SPI1_CS1#_C
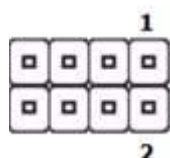
Table 2.44: SPI0 (SPI0)

Pin	Signal	Pin	Signal
1	+3V	2	GND
3	SPI0_CS0#	3	SPI0_CK
5	SPI0_DO_C	6	SPI0_DIN_C
7	-	8	SPI0_CS1#_C
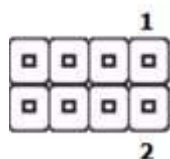
Table 2.45: LVDS_BK_SLT (LVDS backlight selection)

Jumper	Mode	Jumper	Mode
1-2	+5V (Default)	2-3	+12V

* +VDD_BKLT_LVDS, pin1

Table 2.46: LVDS_VDD_SLT1 (LVDS VDD Power selection)

Jumper	Mode	Jumper	Mode
1-2	+3.3V	2-3	+5V

Table 2.47: LVDS_VDD_SLT2 (LVDS VDD Power selection2)

Jumper	Mode	Jumper	Mode
1-2	+12V		

Table 2.48: CAN0 (CAN bus 0)

Pin	Signal	Pin	Signal
1	-	2	-
3	CAN0_D-	4	-
5	CAN0_D+	6	-
7	-	8	-
9	GND	10	-
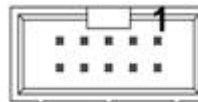
Table 2.49: CAN0 (CAN bus 0)

Pin	Signal	Pin	Signal
1	-	2	-
3	CAN0_D-	4	-
5	CAN0_D+	6	-
7	-	8	-
9	GND	10	-
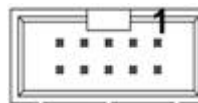
Table 2.50: RTXA Connector					
Odd Number	**RTX V2.0a**	**I/F**	**Even Number**	**RTX V2.0a**	**I/F**
A1	GND	PWR	A2	GND	PWR
A3	SYSBUS_D0	I/O	A4	SYSBUS_D8	I/O
A5	SYSBUS_D1	I/O	A6	SYSBUS_D9	I/O
A7	SYSBUS_D2	I/O	A8	SYSBUS_D10	I/O
A9	SYSBUS_D3	I/O	A10	SYSBUS_D11	I/O
A11	SYSBUS_D4	I/O	A12	SYSBUS_D12	I/O
A13	SYSBUS_D5	I/O	A14	SYSBUS_D13	I/O
A15	SYSBUS_D6	I/O	A16	SYSBUS_D14	I/O
A17	SYSBUS_D7	I/O	A18	SYSBUS_D15	I/O
A19	GND	PWR	A20	GND	PWR
A21	SYSBUS_A0	O	A22	SYSBUS_A8	O
A23	SYSBUS_A1	O	A24	SYSBUS_A9	O
A25	SYSBUS_A2	O	A26	SYSBUS_A10	O
A27	SYSBUS_A3	O	A28	SYSBUS_A11	O
A29	SYSBUS_A4	O	A30	SYSBUS_A12	O
A31	SYSBUS_A5	O	A32	SYSBUS_A13	O
A33	SYSBUS_A6	O	A34	SYSBUS_A14	O
A35	SYSBUS_A7	O	A36	SYSBUS_A15	O
A37	GND	PWR	A38	GND	PWR
A39	SYSBUS_A16	O	A40	SYSBUS_A24	O
A41	SYSBUS_A17	O	A42	SYSBUS_A25	O
A43	SYSBUS_A18	O	A44	SYSBUS_A26	O
A45	SYSBUS_A19	O	A46	SYSBUS_A27	O
A47	SYSBUS_A20	O	A48	SYSBUS_A28	O
A49	SYSBUS_A21	O	A50	SYSBUS_A29	O
A51	SYSBUS_A22	O	A52	SYSBUS_A30	O
A53	SYSBUS_A23	O	A54	?	?
A55	GND	PWR	A56	GND	PWR
A57	SYSBUS_INT0	I	A58	SYSBUS_INT2	I
A59	SYSBUS_INT1	I	A60	SYSBUS_INT3	I
A61	GND	PWR	A62	GND	PWR
A63	SYSBUS_ALE	O	A64	SYSBUS_WAIT#	I
A65	SYSBUS_BE0#	O	A66	SYSBUS_CS0#	O
A67	SYSBUS_BE1#	O	A68	SYSBUS_CS1#	O
A69	SYSBUS_WE#	O	A70	GND	PWR
A71	SYSBUS_OE#	O	A72	SYSBUS_CLK	O
A73	RESET_IN#	I/PU	A74	GND	PWR
A75	RESET_OUT#	OD	A76	WAKE#	I/PU
A77	CB_PWR_EN	O	A78	SLEEP#	I/PU
A79	CB_PGOOD	I/PU	A80	SUSPEND_REQ#	O
A81	RTX_PGOOD	I/PU	A82	WDT_OUT#	O
A83	RTC_PWR	PWR	A84	POWER_BTN#	I/PU
A85	GND	PWR	A86	GND	PWR
A87	VCC	PWR	A88	VCC	PWR

Table 2.50: RTXA Connector

A89	VCC	PWR	A90	VCC	PWR
A91	VCC	PWR	A92	VCC	PWR
A93	VCC	PWR	A94	VCC	PWR
A95	VCC	PWR	A96	VCC	PWR
A97	VCC	PWR	A98	VCC	PWR
A99	GND	PWR	A100	GND	PWR

Table 2.51: RTXB Connector

Odd Number	RTX V2.0a	I/F	Even Number	RTX V2.0a	I/F
B1	GND	PWR	B2	GND	PWR
B3	BOOT_SEL0#	I/PU	B4	TTL_R0	O
B5	BOOT_SEL1#	I/PU	B6	TTL_R1	O
B7	BOOT_SEL2#	I/PU	B8	TTL_R2	O
B9	GND	PWR	B10	TTL_R3	O
B11	TTL_HSYNC	O	B12	TTL_R4	O
B13	TTL_VSYNC	O	B14	TTL_R5	O
B15	TTL_DE	O	B16	TTL_R6	O
B17	GND	PWR	B18	TTL_R7	O
B19	TTL_PCLK	O	B20	GND	PWR
B21	GND	PWR	B22	TTL_G0	O
B23	I2C3_DATA(for TTL)	I/O	B24	TTL_G1	O
B25	I2C3_CLK(for TTL)	O	B26	TTL_G2	O
B27	GND	PWR	B28	TTL_G3	O
B29	VDD_SD0_EN	O	B30	TTL_G4	O
B31	SD0_CD#	I/PU	B32	TTL_G5	O
B33	SD0_WP	I/PU	B34	TTL_G6	O
B35	GND	PWR	B36	TTL_G7	O
B37	SD0_CMD	I/O	B38	GND	PWR
B39	SD0_D0	I/O	B40	TTL_B0	O
B41	SD0_D1	I/O	B42	TTL_B1	O
B43	SD0_D2	I/O	B44	TTL_B2	O
B45	SD0_D3	I/O	B46	TTL_B3	O
B47	SD0_CLK	O	B48	TTL_B4	O
B49	GND	PWR	B50	TTL_B5	O
B51	VDD_SD1_EN	O	B52	TTL_B6	O
B53	SD1_CD#	I/PU	B54	TTL_B7	O
B55	SD1_WP	I/PU	B56	GND	PWR
B57	GND	PWR	B58	SD1_CMD	I/O
B59	SPI0_MISO	I	B60	SD1_D0	I/O
B61	SPI0_MOSI	O	B62	SD1_D1	I/O
B63	SPI0_CS0#	O	B64	SD1_D2	I/O
B65	SPI0_CS1#	O	B66	SD1_D3	I/O
B67	SPI0_CLK	O	B68	SD1_D4	I/O
B69	GND	PWR	B70	SD1_D5	I/O
B71	SPI1_MISO	I	B72	SD1_D6	I/O

Table 2.51: RTXB Connector

B73	SPI1_MOSI	O	B74	SD1_D7	I/O
B75	SPI1_CS0#	O	B76	SD1_CLK	O
B77	SPI1_CS1#	O	B78	GND	PWR
B79	SPI1_CLK	O	B80	GPIO0	I/O
B81	GND	PWR	B82	GPIO1	I/O
B83	GPIO10/ROW0	I/O	B84	GPIO2	I/O
B85	GPIO11/ROW1	I/O	B86	GPIO3	I/O
B87	GPIO12/ROW2	I/O	B88	GPIO4	I/O
B89	GPIO13/ROW3	I/O	B90	GPIO5	I/O
B91	GPIO14/COL0	I/O	B92	GPIO6 / BAT IN	I/O
B93	GPIO15/COL1	I/O	B94	GPIO7 / BAT THRM	I/O
B95	GPIO16/COL2	I/O	B96	GPIO8 / Timer IN	I/O
B97	GPIO17/COL3	I/O	B98	GPIO9 / Timer Out	I/O
B99	GND	PWR	B100	GND	PWR

Table 2.52: RTXC Connector

Odd Number	RTX V2.0a	I/F	Even Number	RTX V2.0a	I/F
C1	GND	PWR	C2	GND	PWR
C3	CSI1_D3- / PCAM_D9	DP/I	C4	CSI0_D1- / PCAM_D15	DP/I
C5	CSI1_D3+ / PCAM_D8	DP/I	C6	CSI0_D1+ / PCAM_D14	DP/I
C7	GND	PWR	C8	GND	PWR
C9	CSI1_D2- / PCAM_D7	DP/I	C10	CSI0_D0- / PCAM_D13	DP/I
C11	CSI1_D2+ / PCAM_D6	DP/I	C12	CSI0_D0+ / PCAM_D12	DP/I
C13	GND	PWR	C14	GND	PWR
C15	CSI1_D1- / PCAM_D5	DP/I	C16	CSI0_CK- / PCAM_D11	DP/I
C17	CSI1_D1+ / PCAM_D4	DP/I	C18	CSI0_CK+ / PCAM_D10	DP/I
C19	GND	PWR	C20	GND	PWR
C21	CSI1_D0- / PCAM_D3	DP/I	C22	PCAM_MCK	O
C23	CSI1_D0+ / PCAM_D2	DP/I	C24	GND	PWR
C25	GND	PWR	C26	PCAM_HSYNC	I
C27	CSI1_CK- / PCAM_D1	DP/I	C28	PCAM_VSYNC	I
C29	CSI1_CK+ / PCAM_D0	DP/I	C30	PCAM_DE	I
C31	GND	PWR	C32	PCAM_FLD	I
C33	CAM_MCK	O	C34	PCAM_PXL_CK1	I
C35	GND	PWR	C36	GND	PWR
C37	PCAM_PXL_CK0	I	C38	PCIE1_TX+	DP
C39	GND	PWR	C40	PCIE1_TX-	DP
C41	PCIE0_TX+	DP	C42	GND	PWR
C43	PCIE0_TX-	DP	C44	PCIE1_RX+	DP
C45	GND	PWR	C46	PCIE1_RX-	DP
C47	PCIE0_RX+	DP	C48	GND	PWR
C49	PCIE0_RX-	DP	C50	PCIE1_CLK+	DP
C51	GND	PWR	C52	PCIE1_CLK-	DP
C53	PCIE0_CLK+	DP	C54	GND	PWR
C55	PCIE0_CLK-	DP	C56	PCIE1_PWR_EN	O

Table 2.52: RTXC Connector

C57	GND	PWR	C58	PCIE1_RST#	O
C59	PCIE0_PWR_EN	O	C60	PCIE_WAKE#	I/PU
C61	PCIE0_RST#	O	C62	GND	PWR
C63	GND	PWR	C64	GBE_XFMR_VREF	PWR
C65	GBE_MDI0+	DP	C66	GBE_LINK_ACT#	OD
C67	GBE_MDI0-	DP	C68	GBE_LINK100#	OD
C69	GND	PWR	C70	GBE_LINK1000#	OD
C71	GBE_MDI1+	DP	C72	GND	PWR
C73	GBE_MDI1-	DP	C74	USB_OTG_PWR_EN	O
C75	GND	PWR	C76	USB_OTG_OC#	I
C77	GBE_MDI2+	DP	C78	USB_OTG_ID	I
C79	GBE_MDI2-	DP	C80	USB_OTG_VBUS_DET	I
C81	GND	PWR	C82	GND	PWR
C83	GBE_MDI3+	DP	C84	USB_OTG_D+	DP
C85	GBE_MDI3-	DP	C86	USB_OTG_D-	DP
C87	GND	PWR	C88	GND	PWR
C89	USB_HOST_PWR_EN	O	C90	USB_HOST_D+	DP
C91	USB_HOST_OC#	I	C92	USB_HOST_D-	DP
C93	GND	PWR	C94	GND	PWR
C95	USB_SS_TX+	DP	C96	USB_SS_RX+	DP
C97	USB_SS_TX-	DP	C98	USB_SS_RX-	DP
C99	GND	PWR	C100	GND	PWR

Table 2.53: RTXD Connector

Odd Number	RTX V2.0a	I/F	Even Number	RTX V2.0a	I/F
D1	GND	PWR	D2	GND	PWR
D3	SATA_TX+	DP	D4		
D5	SATA_TX-	DP	D6		
D7	GND	PWR	D8		
D9	SATA_RX+	DP	D10		
D11	SATA_RX-	DP	D12		
D13	GND	PWR	D14		
D15	SATA_PWR_EN	O	D16		
D17	TTL_VDD_EN	O	D18		
D19	LCD_VDD_EN / eDP VDD_EN	O	D20	GND	PWR
D21	eDP_HPD	I	D22	I2C0_DATA (for Battery / RTC)	I/O
D23	LCD_BKLT_EN / eDP BKLT_EN	O	D24	I2C0_CLK (for Battery / RTC)	O
D25	LCD_BKLT_PWM / eDP BKLT_PWM	O	D26	I2C1_DATA (CODEC)	I/O
D27	GND	PWR	D28	I2C1_CLK (CODEC)	O
D29	LVDS_D0- / EDP_TX0-	DP	D30	I2C2_DATA(For Camera/ LVDS)	I/O
D31	LVDS_D0+ / EDP_TX0+	DP	D32	I2C2_CLK(For Camera/ LVDS)	O

Table 2.53: RTXD Connector

D33	GND	PWR	D34	GND	PWR
D35	LVDS_D1- / EDP_TX1-	DP	D36	CAN0_TX	O
D37	LVDS_D1+ / EDP_TX1+	DP	D38	CAN0_RX	I
D39	GND	PWR	D40	CAN1_TX	O
D41	LVDS_D2- / EDP_TX2-	DP	D42	CAN1_RX	I
D43	LVDS_D2+ / EDP_TX2+	DP	D44	GND	PWR
D45	GND	PWR	D46	I2S_BCLK	O
D47	LVDS_CLK- / EDP_AUX-	DP	D48	I2S_DIN	I
D49	LVDS_CLK+ / EDP_AUX+	DP	D50	I2S_DOUT	O
D51	GND	PWR	D52	I2S_LRCLK	O
D53	LVDS_D3- / EDP_TX3-	DP	D54	I2S_MCLK	O
D55	LVDS_D3+ / EDP_TX3+	DP	D56	GND	PWR
D57	GND	PWR	D58	UART0_TX	O
D59	HDMI_D2+	DP	D60	UART0_RX	I
D61	HDMI_D2-	DP	D62	UART0_RTS#	O
D63	GND	PWR	D64	UART0_CTS#	I
D65	HDMI_D1+	DP	D66	UART1_TX	O
D67	HDMI_D1-	DP	D68	UART1_RX	I
D69	GND	PWR	D70	UART1_RTS#	O
D71	HDMI_D0+	DP	D72	UART1_CTS#	I
D73	HDMI_D0-	DP	D74	GND	PWR
D75	GND	PWR	D76	UART2_TX	O
D77	HDMI_CK+	DP	D78	UART2_RX	I
D79	HDMI_CK-	DP	D80	UART2_RTS#	O
D81	GND	PWR	D82	UART2_CTS#	I
D83	HDMI_CEC	I/O	D84	UART3_TX	O
D85	HDMI_HPD	I	D86	UART3_RX	I
D87	HDMI_DDC_SDA	I/O	D88	UART3_RTS#	O
D89	HDMI_DDC_SCL	O	D90	UART3_CTS#	I
D91	GND	PWR	D92	GND	PWR
D93	PCAM_ON_CSI1#	O	D94	PCAM_ON_CSI0#	O
D95	CAM1_PWR#	O	D96	CAM0_PWR#	O
D97	CAM1_RST#	O	D98	CAM0_RST#	O
D99	GND	PWR	D100	GND	PWR

Table 2.54: SYSTEM BUS

	A	B	C	D
1	N/C	GND	N/C	N/C
2	GND	N/C	3.3V	3.3V
3	SYSBUS_INT3	SYSBUS_INT2	SYSBUS_INT1	SYSBUS_INT0
4	N/C	SYSBUS_A30	3.3V	3.3V
5	SYSBUS_A0	SYSBUS_A1	SYSBUS_A15	SYSBUS_A14
6	SYSBUS_A2	SYSBUS_A3	SYSBUS_A13	SYSBUS_A12
7	SYSBUS_A4	SYSBUS_A5	SYSBUS_A11	SYSBUS_A10
8	SYSBUS_A6	SYSBUS_A7	SYSBUS_A9	SYSBUS_A8
9	SYSBUS_A16	SYSBUS_A17	SYSBUS_A24	SYSBUS_A25

Table 2.54: SYSTEM BUS			
10	SYSBUS_A18	SYSBUS_A19	SYSBUS_A26	SYSBUS_OE#
11	SYSBUS_A20	SYSBUS_A21	SYSBUS_WE#	GND
12	SYSBUS_A22	SYSBUS_A23	SYSBUS_A27	SYSBUS_A28
13	3.3V	SYSBUS_A29	SYSBUS_CS0#	SYSBUS_CS1#
14	SYSBUS_D0	SYSBUS_D1	SYSBUS_D15	SYSBUS_D14
15	SYSBUS_D2	SYSBUS_D3	SYSBUS_D13	SYSBUS_D12
16	SYSBUS_D4	SYSBUS_D5	SYSBUS_D11	SYSBUS_D10
17	SYSBUS_D6	SYSBUS_D7	SYSBUS_D9	SYSBUS_D8
18	N/C	N/C	N/C	N/C
19	N/C	N/C	N/C	N/C
20	N/C	N/C	N/C	N/C
21	N/C	N/C	N/C	N/C
22	N/C	N/C	SYSBUS_CLK	GND
23	N/C	N/C	N/C	GND
24	N/C	N/C	SYSBUS_BE1#	3.3V
25	N/C	N/C	N/C	3.3V
26	SYSBUS_BE0#	N/C	N/C	N/C
27	N/C	SYSBUS_ALE	5V	5V
28	N/C	N/C	SYSBUS_WAIT#	N/C
29	N/C	N/C	N/C	N/C
30	N/C	N/C	GND	N/C

2.4.5 Switches and buttons

Table 2.55: SW2 (Boot selection)			
1	2	3	Feature
ON	ON	ON	Carrier SATA
OFF	ON	ON	Carrier SD
ON	OFF	ON	Carrier eMMC
OFF	OFF	ON	Carrier SPI
ON	ON	OFF	Module device* (reserved)
OFF	ON	OFF	Remote boot (reserved)
ON	OFF	OFF	Module eMMC
OFF	OFF	OFF	Module SPI

*default
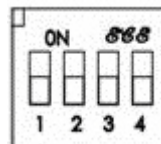
Table 2.56: SW3 (Reset button)			
Pin	**Signal**	**Pin**	**Signal**
1	RESET_IN#	2	GND

Table 2.57: SW5 (Sleep button)			
Pin	**Signal**	**Pin**	**Signal**
1	SLEEP#	2	GND

Table 2.58: SW4 (Power button, CPU)			
Pin	**Signal**	**Pin**	**Signal**
1	POWER_BTN#	2	GND

Table 2.59: SW6 (LID Switch)			
Pin	**Signal**	**Pin**	**Signal**
1	LID#	2	GND

2.4.6 LEDs

Position	Function	Position	Function
D2201	DC IN	D2205	+5V
D2202	RTX POWER GOOD	D2206	+12V
D2203	POWER ON	D2207	SUSPEND
D2204	+3V		

2.4.7 PCB Footprint of Board to Board Connector
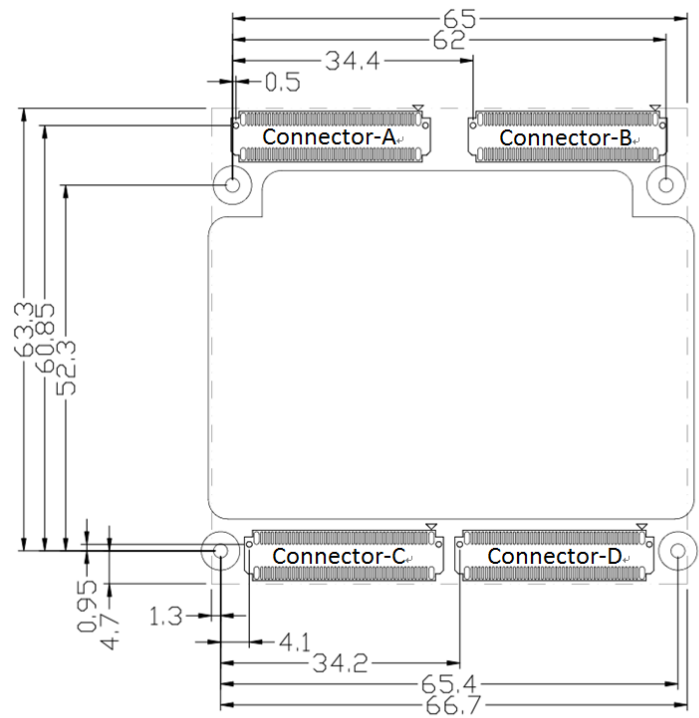
2.4.8 Module Board Installation

1. Align, and press the board down on all four corners equally. Do not flex. This preserves the solder joints. See below.

2. When you install the RTX module board onto the carrier board, please DO NOT press down on the center of the chipset.
3. Make sure the 4 screw holes are aligned with the carrier board as you press the module board into place. Insert the 4 screws to secure the module board.
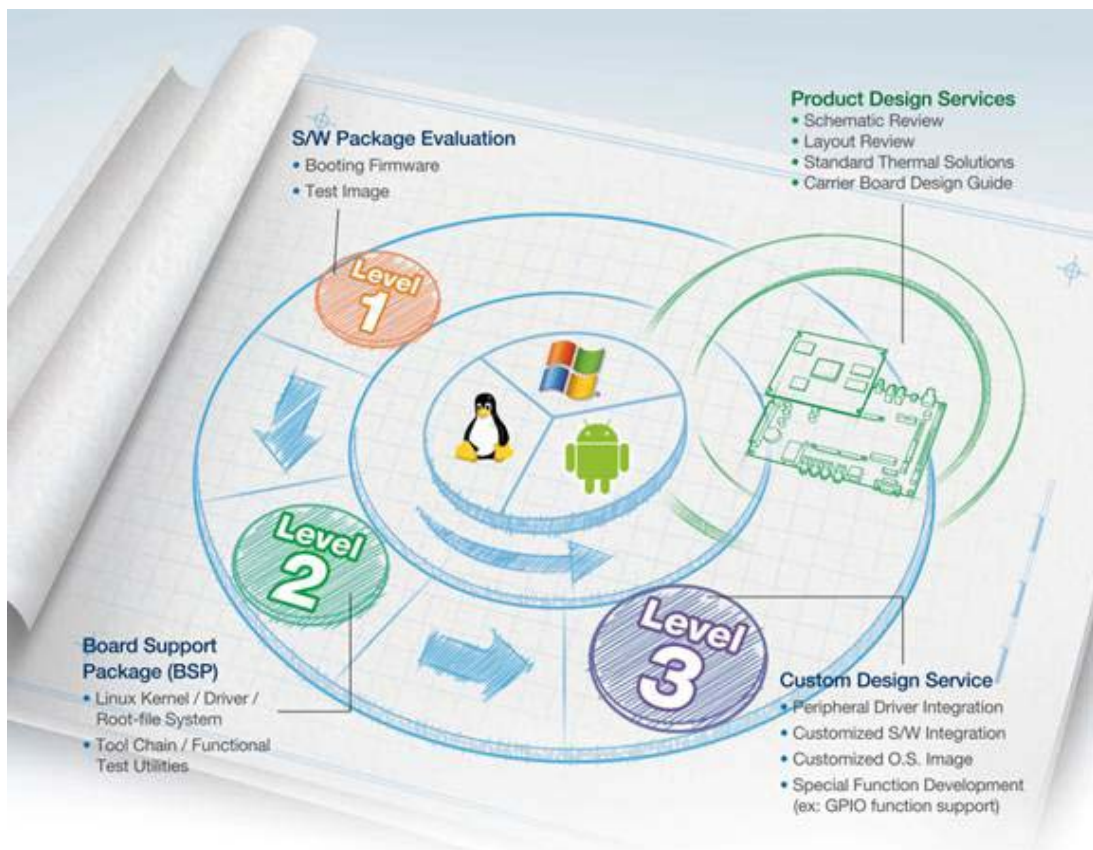
Chapter **3**

Advantech Services

This chapter introduces Advantech design-in serviceability, technical support and warranty policy for ROM-DB3900.

3.1 RISC Design-in Services

Advantech RISC Design-in Services help customers to reduce the time and work involved with designing new carrier boards. We handle the complexities of technical research and greatly minimize the development risk associated with carrier boards.

Easy Development

Advantech provides support for firmware, root file-system, BSP or other development tools for customers. These help customers to easily develop their carrier boards and differentiate their embedded products and applications.

- Full Range of RISC Product Offerings
- Comprehensive Document Support

Design Assistance Service

Advantech provides check list for engineer for easy check their schematics and also review service based on customer carrier board schematics. Those services are preventative, and help to catch design errors before they happen. It helps to save a lot of time and costs with regard to developing carrier boards.

- Schematic Review
- Placement and Layout Review
- Debugging Assistance Services
- General/Special Reference Design Database

Thermal Solution Services

In order to provide quicker and more flexible solutions for customer's thermal designs. Advantech provides thermal solution services including modularized thermal solutions and customized thermal solutions.

- Standard Thermal Solutions
- Customized Thermal Solutions

Embedded Software Services

Supports driver, software integration or customized firmware, root file-system and Linux image. Customers can save lot of time and focus on their core development.

- Embedded Linux/ Android OS
- Advantech boot loader Customization

With the spread of industrial computing, a whole range of new applications has 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 profes-

sional 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

On the other hand, 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 Technical Support and Assistance

For more information about this and other Advantech products, please visit our websites at:

<http://www.advantech.com/>

<http://www.advantech.com/ePlatform/>

For technical support and service, please visit our support website at:

<http://support.advantech.com.tw/support/>

1. Visit the Advantech web site at www.advantech.com/support 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

3.4 Global Service Policy

3.4.1 Warranty Policy

Below is the warranty policy of Advantech products:

3.4.2 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 defect 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.

3.4.3 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.

3.4.4 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 lighting strike, flood, earthquake, etc.
- Product updates/upgrades and tests upon the request of customers who are without warranty.

3.5 Repair Process

3.5.1 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.

3.5.2 Returning the Product for Repair

It's possible customers can save time and meet end-user requirements by returning defective products to an 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 un-repaired items at the customer's cost if inappropriately packed.

What's more, "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.

3.5.3 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 lighting 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.

3.5.4 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.

3.5.5 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.

3.5.6 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 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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www.advantech.com

Please verify specifications before quoting. This guide is intended for reference purposes only.

All product specifications are subject to change without notice.

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