ADVANTECH Enabling an Intelligent Planet

ROM-DK3420 ARM Starter Kit

Quick Starter Guide

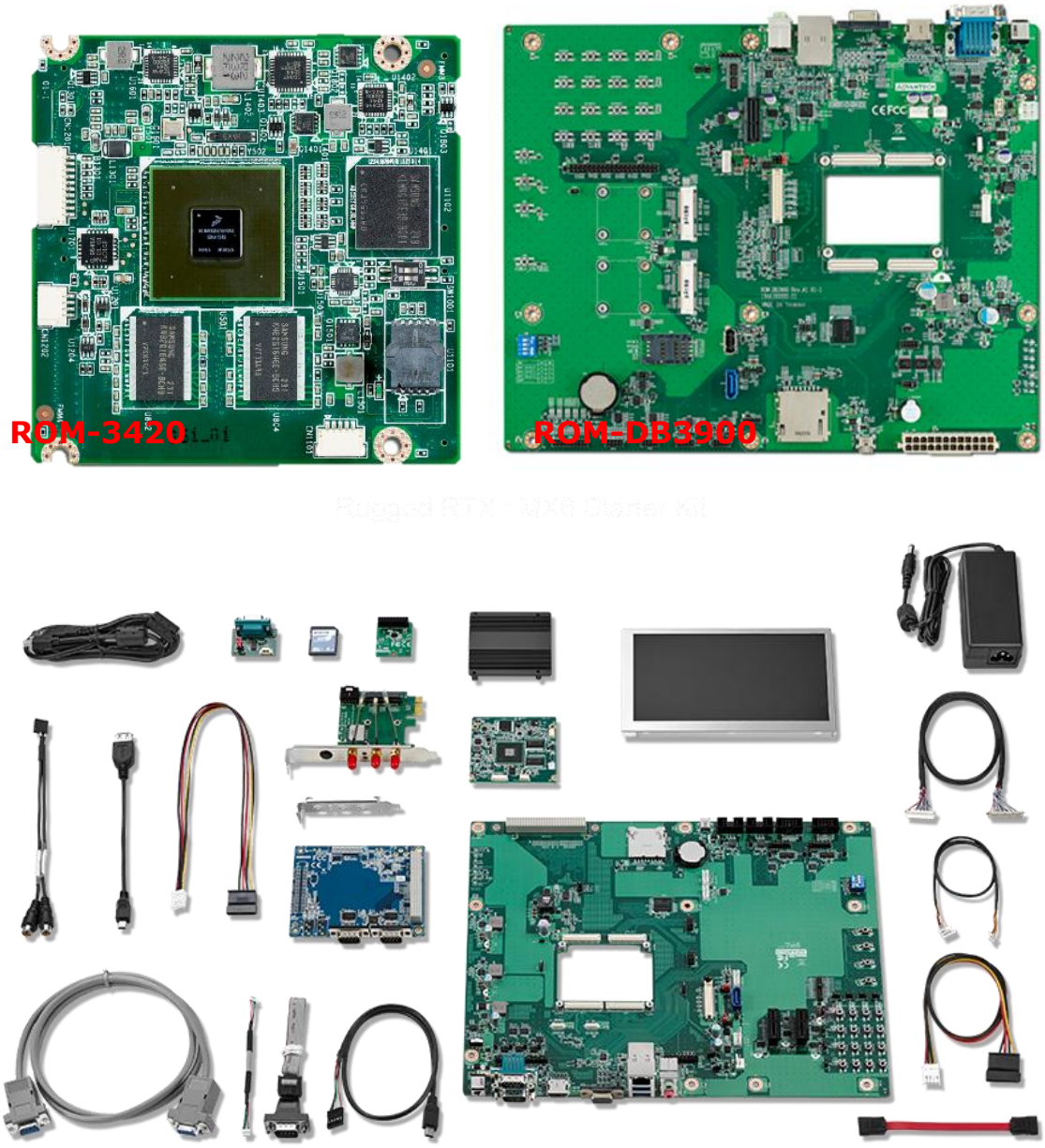
Copyright Notice

Introduction

Advantech ARM-based Starter Kits provide a shortcut for ARM platform evaluation and development. The kit includes key elements of a development environment including main boards with high performance CPU, cables, adapter cards, LCD panel and power adapter. The Advantech ARM Starter Kit is designed to give you more time to concentrate on your own product innovation and make the whole process faster, easier and less stressful.

The Advantech ARM Starter Kit was released along with a built-in OS image in Linux which allows users start their evaluation immediately after they open the box. Other OS such as Android, Yocto Linux and Ubuntu are also available for different applications; each carefully verified for online download. The source codes of these supported OS are all open and available for users to help develop application code easier. In addition, Advantech offers tools for application development including Qt, a cross-platform tool for device creation, UI and application development, and Advantech WISE-PaSS/RMM APIs for device access, control and monitoring. All add-on software offerings are totally verified and 100% free of charge. Advantech is committed to offering the embedded community the best, most compact and reliable development platform for ARM-based solution development.

1. Board Overview

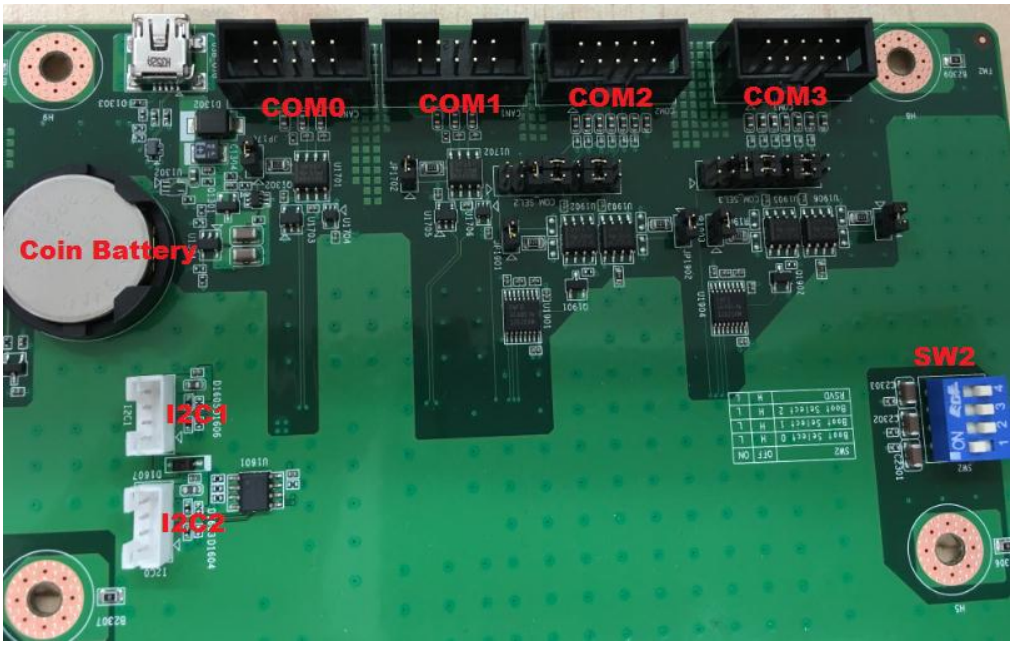


2. Packing List

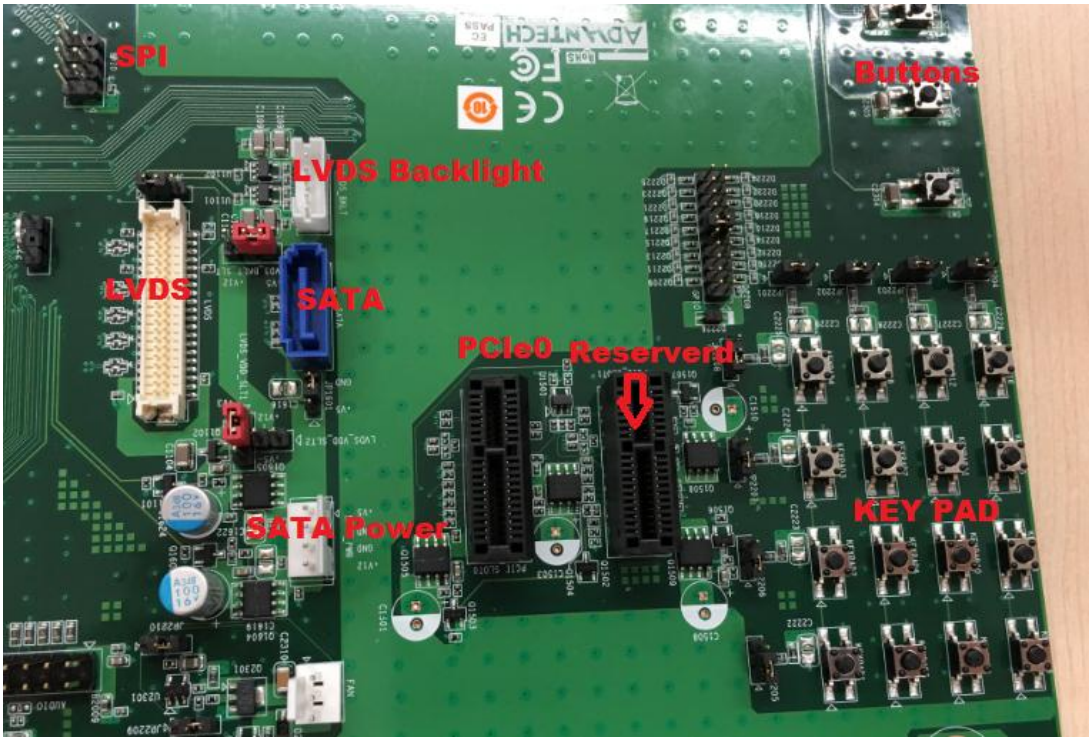
1700001524	US Power Cord
1700004711	SATA Cable
1700006911	USB OTG to Type A Cable
1700019077-11	USB OTG Cable
1700019474	Debug port to PC Cable
1700021882-01	LVDS Backlight Cable
1700021883-01	LVDS Cable
1700021941-01	SATA Power Cable
1700022373-01	Debug Port Cable
1700022840-01	SPDIF Cable (Reserved)
1701100300	COM Cable
1930004835	Screw M2.5x12.3L F/S D=5 H=0.8 (1+) ST Ni
1935020402	Screw M2.5x4L R/S D=4.5 H=1.7 (1+) ST Ni
1960065189N001	Heatsink
9680015491	Mini-PCIe to PCIe adapter card
9696ED2000E	ROM-ED20 Debug Port Adapter Board
9696M34200E	ROM-3420 Dual Core 1GHz 0~60℃
9696M39000E	ROM-DB3900 RTX 2.0 Carrier Board 0~60℃
9696MEG510E	ROM-EG51 CODEC Board
9696MX5300E	SYSTEM BUS to UART Adapter Board
96LEDK-A070WV40NB1	7" LED PANEL 400N 800X480 Resolution
96PSA-A90W19V1-1	Adapter 100-240V 90W 19V
SQF-ISDS1-4G-82C	SDHC Class 10 4GB SD Card (0~70°C)

3. Board introduction

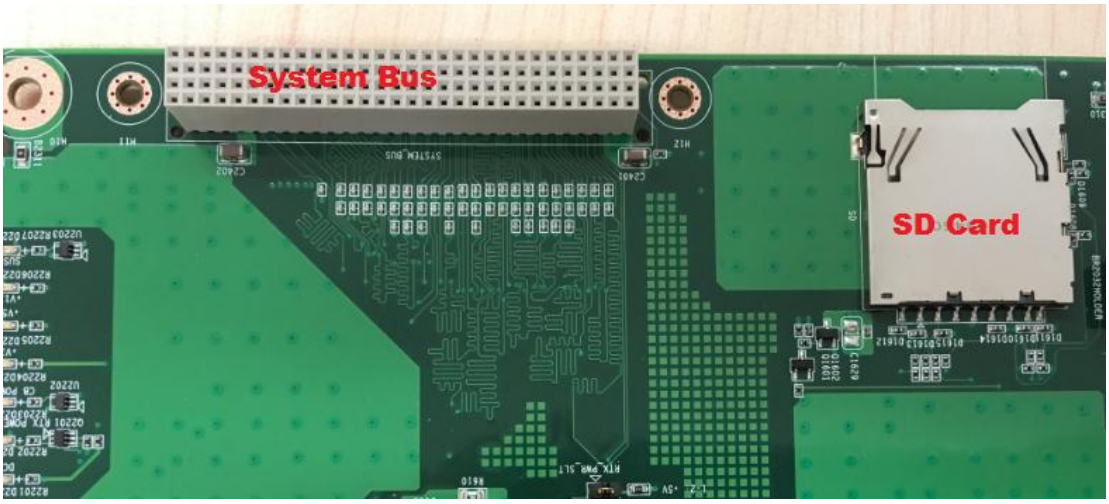
<PART A>



<PART B>


SPI
Buttons
LVDS Backlight
LVDS
SATA
PCIe0
Reserverd
SATA Power
KEY PAD

<PART C>


System Bus
SD Card

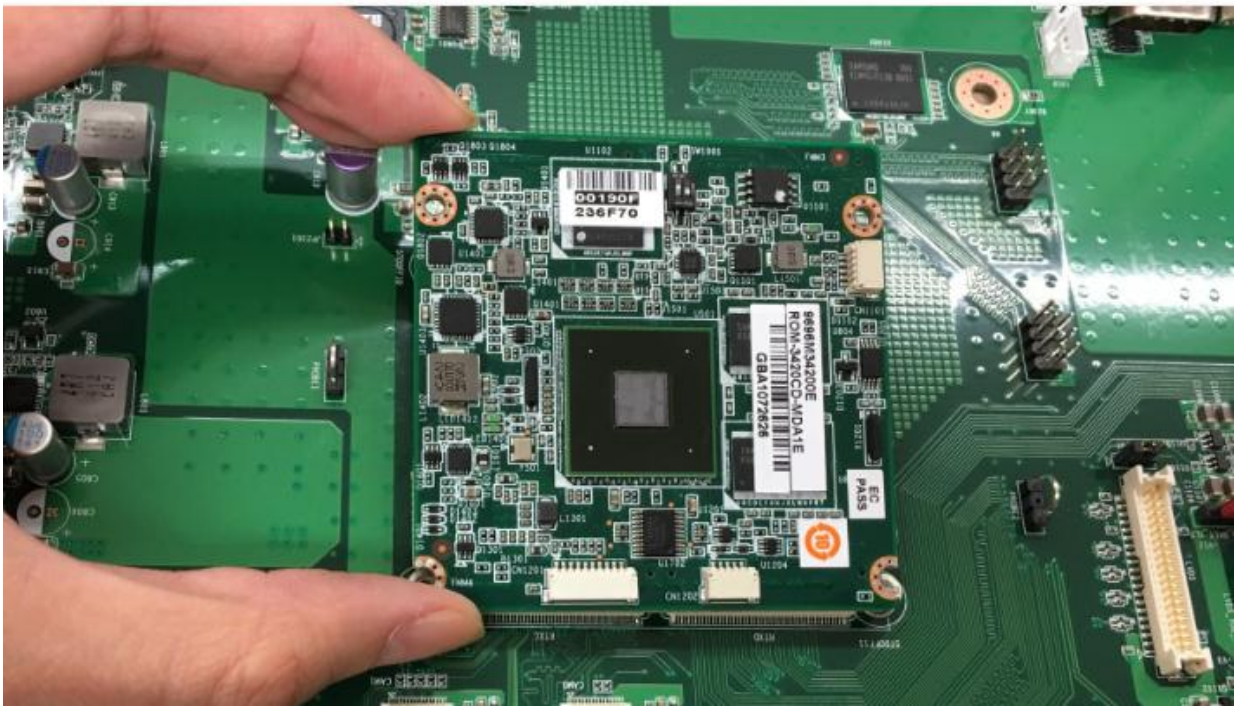
4. Screws

There are 3 different types of screws in this Starter Kit, they are designed for different purpose

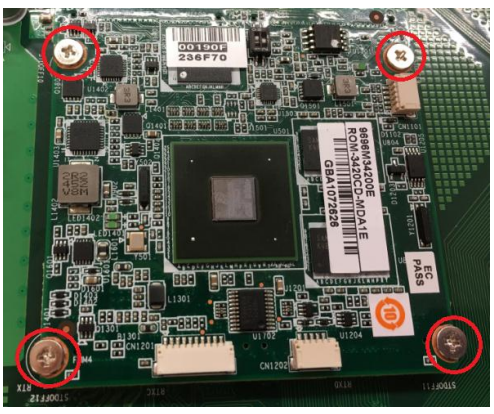
5. Board Assembly

5.1 Assemble ROM-3420 to its carrier board ROM-DB3900

①Assemble module to carrier board



②Fix the screws properly



5.2 Assemble 9696MX5300E to carrier board ROM-DB3900

①Assemble 9696MX5300E to carrier board

②Push Down

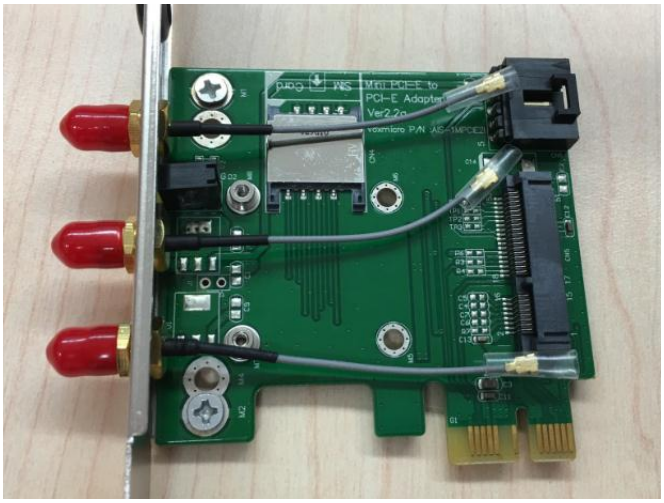
5.3 Assemble ROM-EG51 CODEC Board to carrier board ROM-DB3900

①Take out ROM-EG51 CODEC Board

②Assemble ROM-EG51 CODEC Board to ROM-DB3900

5.4 Assemble 9680015491 PCIe to miniPCIe board to carrier board ROM-DB3900

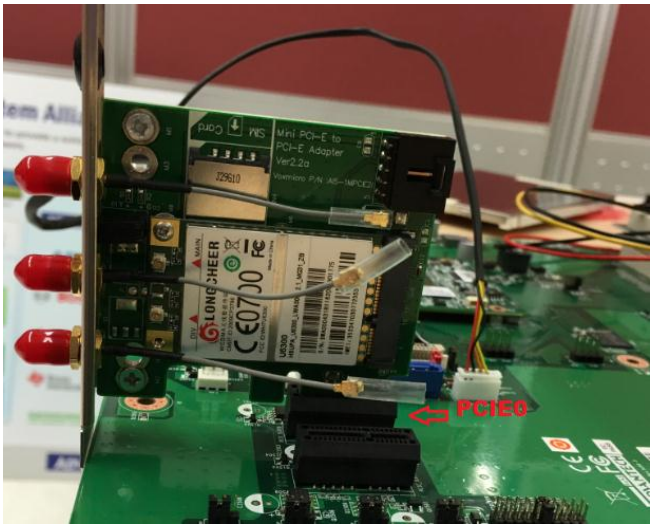
①Take out 9680015491 PCIe to miniPCIe board



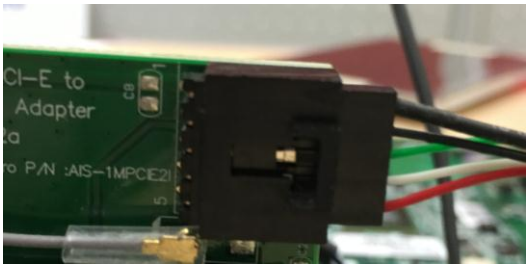
② Insert mini-PCIe card if needed. Mini-PCIe card is optional peripheral which is not included in the package of ROM-3420 Starter Kit

③ Fix the screws of mini-PCIe card

④ Insert the adapter card to ROM-DB3900



⑤ Connect USB Cable if your mini-PCIe card needs USB signal

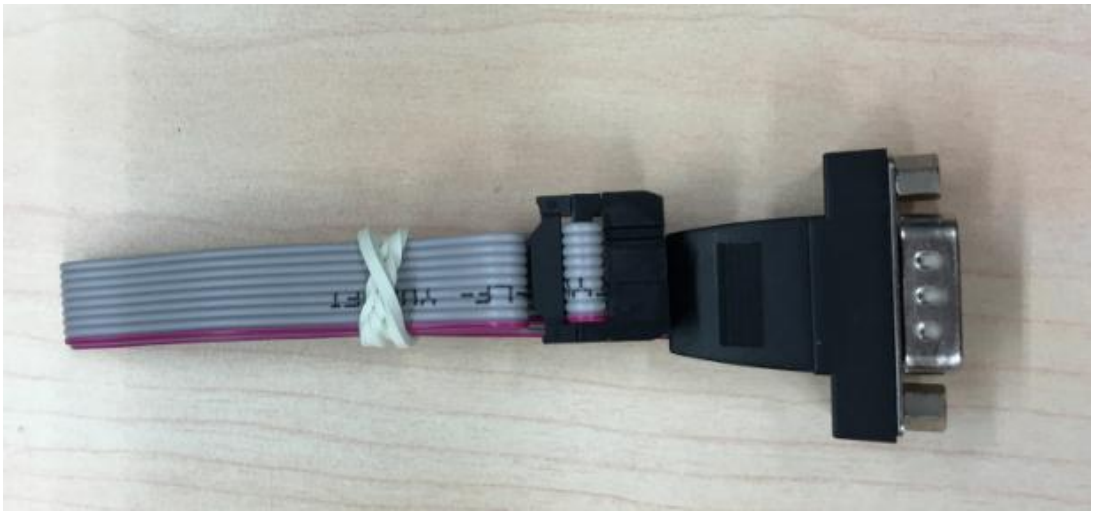


Use this Cable pulls USB signal to 9680015491 PCIe to miniPCIe adapter board

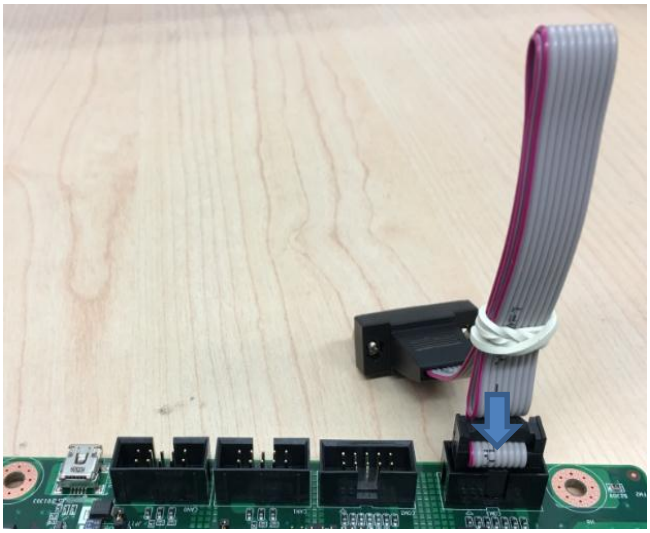
6. Cable Assembly

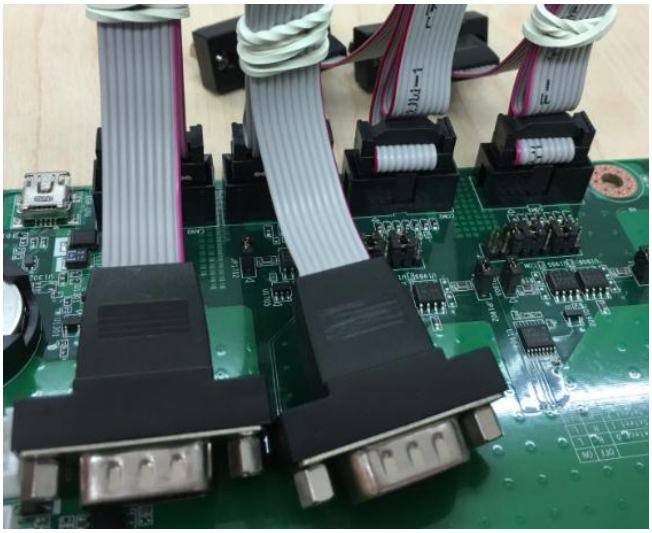
6.1 COM Port Cable

① Cable overview



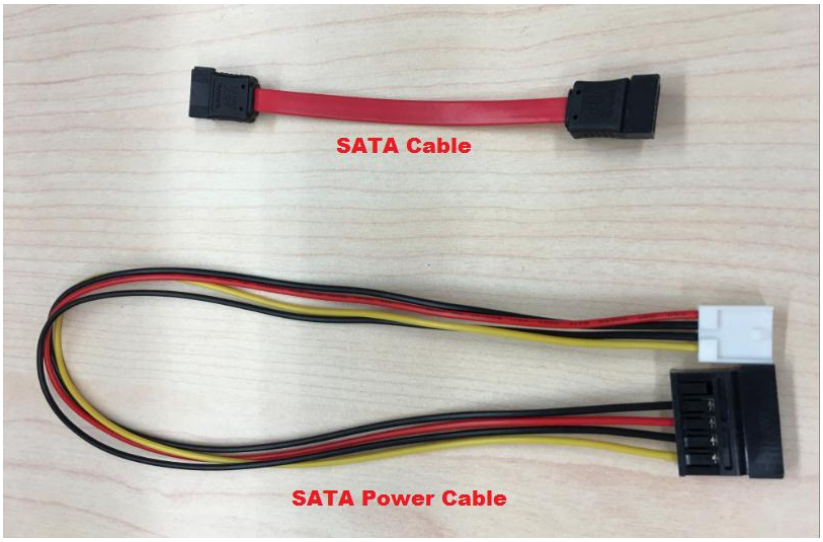
② Connect COM Port cable to Carrier board COM0~COM4



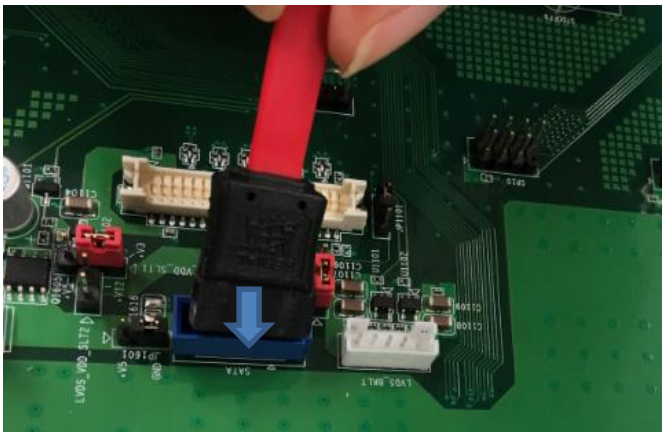


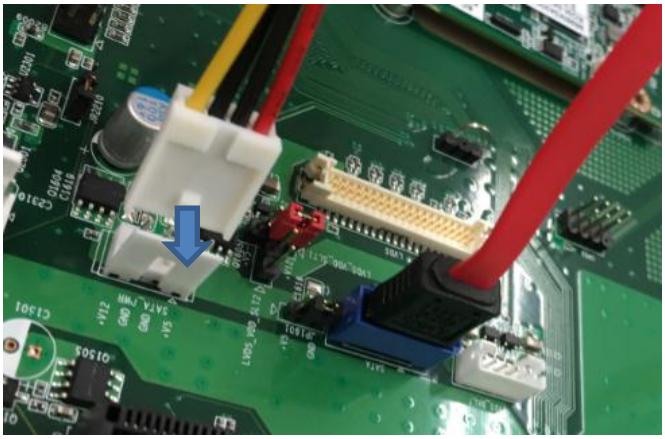
6.2 SATA Cable

① SATA Cable Overview



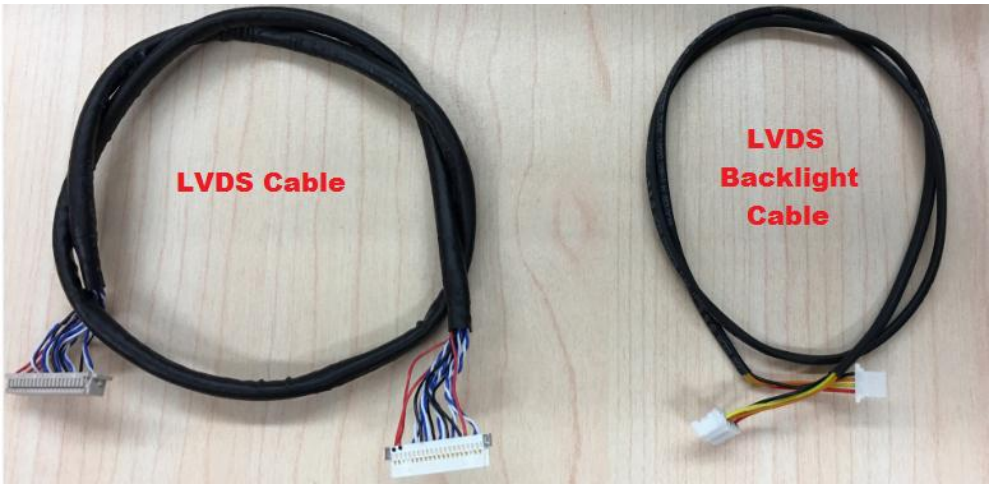
② Connect SATA cable and SATA Power Cable



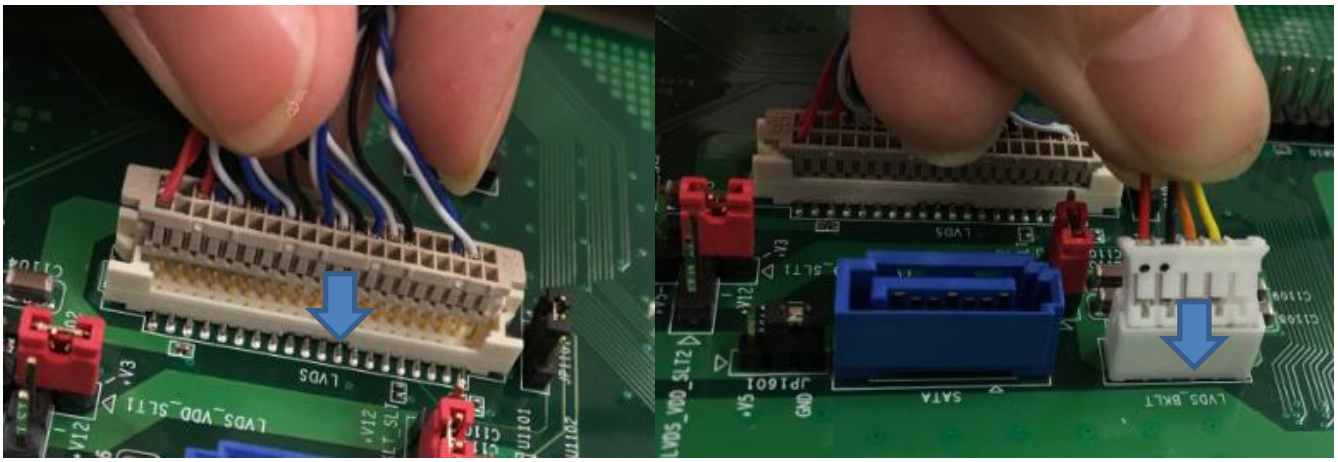


6.3 LVDS Cable

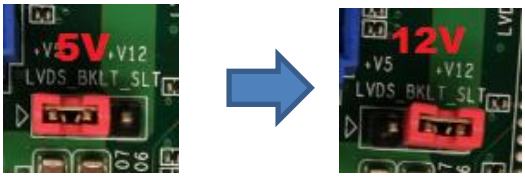
① LVDS Cable Overview



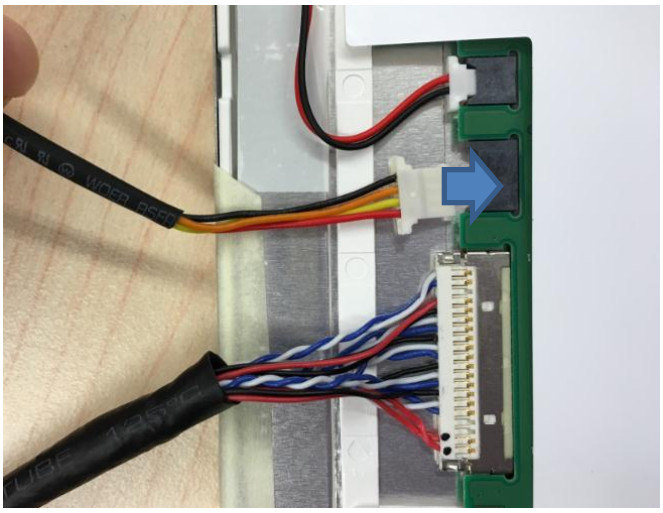
② Connect LVDS cable and Backlight Cable to ROM-DB3900



③ Adjust the Backlight Jumper. Default is 5V but the Panel 96LEDK-A070WV40NB1 is 12V.



④ Connect to 96LEDK-A070WV40NB1



7. Other Peripheral Assembly

7.1 SD Card insertion

① You need to refresh the onboard e.MMC image through SD card, please insert SD card to SD slot as indicated in below photos.

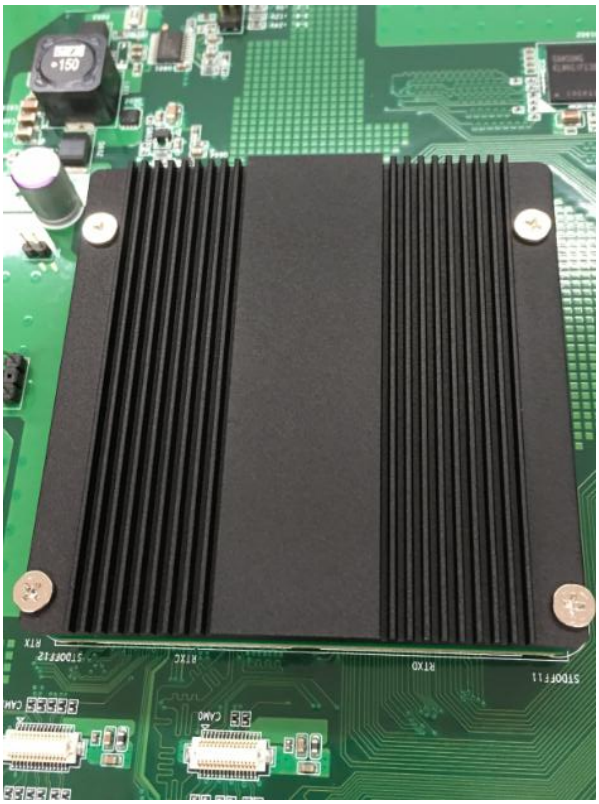
7.2 Heat Spreader Assembly

① ROM-3420 Heat Spreader

② Peel off the protection film in the back

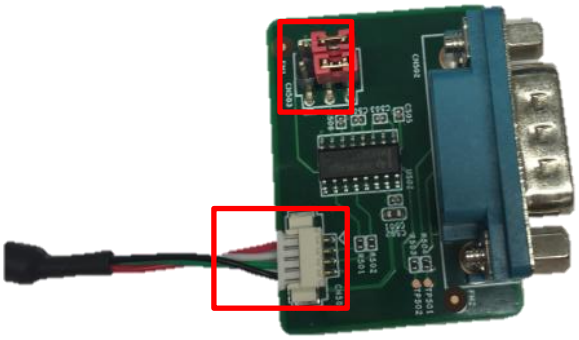
③ Assemble Heat Spreader to ROM-3420

④ Fix Screws

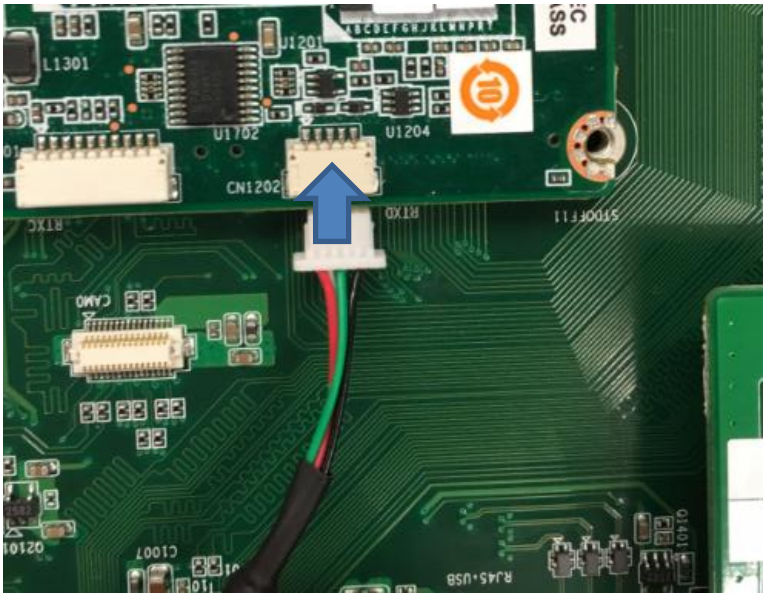


8. Debug Port Connection

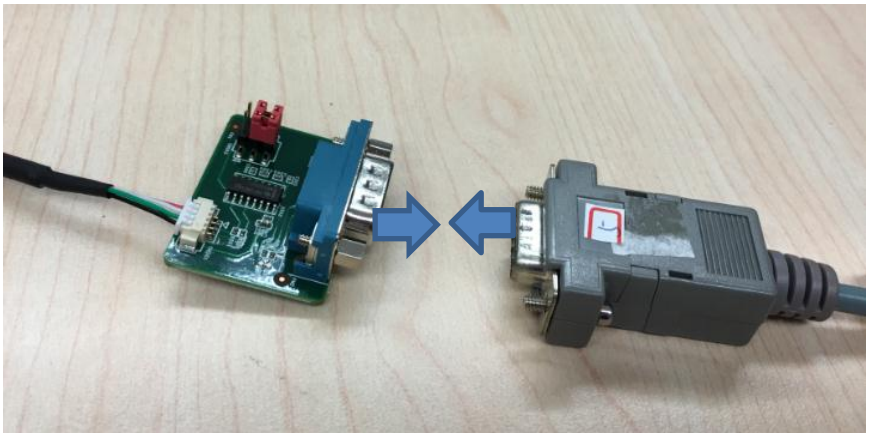
① Connect debug port cable to debug port adapter board, make sure the jumpers are set as below:



② Connect debug port to ROM-3420



③ Connect debug adapter board to a COM port cable



④ Connect COM cable to PC

④Set hyper terminal in your PC as below

9. ROM-3420 Jumper/Switch Setting

External IO Connector

Position	Description	
U1101	Flash ROM	A
SW1001	Boot selection	B
CN1201	JTAG connector	C
CN1101	MCU programming port	D
CN1202	Debug port	E

SW1001 (Boot selection)

Jumper	Mode	Jumper	Mode
1-ON 2-OFF	SPI-ROM (Default)	1-OFF 2-ON	SD (Reserved for recovery)

CN1101 (MCU programming port)

Pin	Signal	Pin	Signal
1	+3.3 V	2	MCU_TXD
3	MCU_RXD	4	MCU_PROGRAM#
5	GND		

CN1201 (JTAG connector)

Pin	Signal	Pin	Signal
1	+3.3 V	2	JTAG_TRST#
3	JTAG_TMS	4	JTAG_TDO
5	JTAG_TDI	6	JTAG_TCK
7	-	8	GND
9	-	10	GND

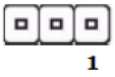
CN1202 (Debug connector)

Pin	Signal	Pin	Signal
1	+3.3 V	2	UART1_TX
3	UART1_RX	4	GND

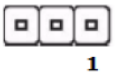
10. Carrier Board Jumper Setting

Please adjust the jumpers before starting evaluation

JP2201 (GPIO/Keypad selection for GPIO0/10)	
Pin	**Signal**
1-2	GPIO0
2-3	GPIO10



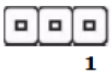
JP2202 (GPIO/Keypad selection for GPIO1/11)	
Pin	**Signal**
1-2	GPIO1
2-3	GPIO11



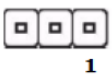
JP2203 (GPIO/Keypad selection for GPIO2/12)	
Pin	**Signal**
1-2	GPIO2
2-3	GPIO12

JP2204 (GPIO/Keypad selection for GPIO3/13)	
Pin	**Signal**
1-2	GPIO3
2-3	GPIO13

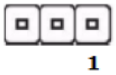
JP2205 (GPIO/Keypad selection for GPIO4/14)	
Pin	**Signal**
1-2	GPIO4
2-3	GPIO14



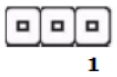
JP2206 (GPIO/Keypad selection for GPIO5/15)	
Pin	**Signal**
1-2	GPIO5
2-3	GPIO15



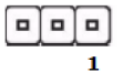
JP2207 (GPIO/Keypad selection for GPIO6/16)	
Pin	**Signal**
1-2	GPIO6
2-3	GPIO16



JP2208 (GPIO/Keypad selection for GPIO7/17)	
Pin	**Signal**
1-2	GPIO7
2-3	GPIO17



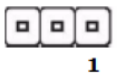
JP2208 (GPIO8)	
Pin	**Signal**
1-2	GPIO8
2-3	-



JP22 (GPIO9)	
Pin	**Signal**
1-2	GPIO9
2-3	-

JP1801~JP1804, JP1901~JP1904 (UART 120om terminal resister)	
Pin	**Signal**
1-2	120 OM (Default)
2-3	Without 120 OM

JP1101 (EDP_HPD for LVDS)			
Pin	**Signal**	**Pin**	**Signal**
1	GND	2	EDP_HDP_A
3	EDP_HPD		

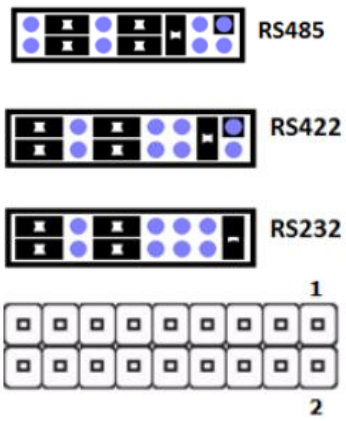


JP1601 (SATA-DOM Jumper, default 2-3)			
Pin	**Signal**	**Pin**	**Signal**
1	+5V	2	SATA-DOM Pin7
3	GND	-	-

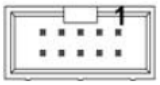
JP1701 (CAN0 bus, 120OM terminal resistor)			
Jumper	**Mode**	**Jumper**	**Mode**
1-2	120 OM (Default)	-	Without 120 OM

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

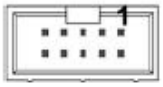
COM_SEL0/1/2/3 (UART0/1/2/3 function selection			
Pin	**Signal**	**Pin**	**Signal**
1	SER2_RX	2	RXD485_A
3	SER2_RX	4	RXD422_A
5	SER2_RX	6	RXD232_A
7	-	8	COM2_RXD
9	NDCD#TXD485-	10	NRXD2TXD485+
11	TXD485-_A	12	TXD485+_A
13	COM2_TXD	14	-
15	NTXD2_RXD485+	16	NDTR#2_RXD485-
17	RSD485+_A	18	RSD485-_A



(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	-



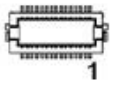
(UART3, 2wires)			
Pin	**Signal**	**Pin**	**Signal**
1	TXD485-	2	-
3	RXD/TXD485+	4	RTS
5	TXD/RXD485+	6	CTS
7	RXD485-	8	-
9	GND	10	-



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

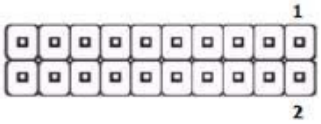
CAM2 (Camera 2, MIPI)

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



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

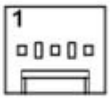


JP2301 (External WDT)

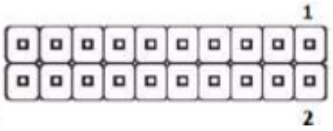
Pin	Signal	Pin	Signal
1	WDT_Time_Out#	2	GND

FAN (System FAN)

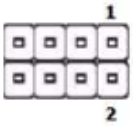
Pin	Signal	Pin	Signal
1	GND	2	+12V
3	+5V		



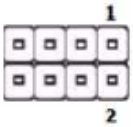
AUDIO (I2S0, audio codec)			
Pin	**Signal**	**Pin**	**Signal**
1	Audio_VDDA	2	GND
3	Audio_VDDA	4	I2S0_SDIN_C
5	I2S0_SDOUT_C	6	I2S0_LRCK_C
7	I2S0_CK_C	8	AUDIO_MCK_C
9	-	10	GND
11	Audio_I2C_CK	12	MIC_BIAS
13	Audio_I2C_DAT	14	GND
15	-	16	HP_R
17	MIC_IN	18	GND
19	GND	20	HP_L



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

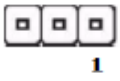


SPI0 (SPI0)			
Pin	**Signal**	**Pin**	**Signal**
1	+3V	2	GND
3	SPI0_CS0#	3	SPI0_CK
5	SPI0_DO_C	6	SPI0_DIN_C
7	-	8	SPI0_CS1#_C



LVDS_BK_SLT (LVDS backlight selection)			
Jumper	**Mode**	**Jumper**	**Mode**
1-2	+5V (Default)	2-3	+12V

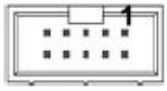
* +VDD_BKLT_LVDS, pin1



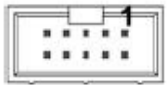
LVDS_VDD_SLT1 (LVDS VDD Power selection)			
Jumper	**Mode**	**Jumper**	**Mode**
1-2	+3.3V	2-3	+5V

LVDS_VDD_SLT2 (LVDS VDD Power selection2)			
Jumper	**Mode**	**Jumper**	**Mode**
1-2	+12V		

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

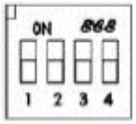


CAN0 (CAN bus 0)			
Pin	**Signal**	**Pin**	**Signal**
1	-	2	-
3	CAN0_D-	4	-
5	CAN0_D+	6	-
7	-	8	-
9	GND	10	-



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



SW3 (Reset button)			
Pin	**Signal**	**Pin**	**Signal**
1	RESET_IN#	2	GND

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

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

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

11. Software Functionality

Build Instructions

This section will guide you on how to build the u-boot & Linux kernel.

Build u-boot Image

Advantech has written a script to help build u-boot quickly. You can build a u-boot image by following the steps below:

1. Open "Terminal" on Ubuntu 10.04 LTS
2. `$sudo su` (Change to "root" authority)
3. Input user password
4. Change directory to BSP's scripts folder
5. `#. setenv.sh` (To configure the development environment automatically)
6. `#./cfg_uboot.sh mx6q_rom-3420_1G_config` (To set the u-boot configuration automatically)
7. `#./mk_uboot.sh` (Start to build the u-boot)
8. Then you can see u-boot_crc.bin and u-boot_crc.bin.crc are being built and located in ../image.

Build Linux Kernel Image

Advantech offer you a script to build the "uImage" quickly. You can build a uImage by following these steps:

1. Open "Terminal" on Ubuntu 10.04 LTS.
2. `$sudo su` (Change to "root" authority)
3. Input user password.
4. Change directory to BSP's scripts folder
5. `#. setenv.sh` (To configure the development environment automatically)
6. `#./cfg_kernel.sh imx6_rom3420_defconfig` (To set the uImage configuration automatically)
7. `#./mk_kernel.sh` (Start to build the uImage)
8. Then you can see uImage is being built and located in ../image.

Build Log

You can find the build log file from the directory of ROM-3420 BSP. If you got any error messages when building the Linux kernel, it is suggested to look into the log file to find the problem.

Source Code Modification

This section will guide you how to use the Linux source code. You will see some examples of using BSP source code in this section.

Add a Driver to Kernel by menuconfig

You can add a driver to the kernel by menuconfig. Here is an example to guide you how to add a RTC driver (Seiko Instruments S-35390A) to Linux kernel. Please refer to the following steps:

1. Open "Terminal" on Ubuntu 10.04 LTS.
2. `$sudo su` (Change to "root" authority)
3. Input user password.
4. Change directory to BSP's scripts folder
5. `#. setenv.sh` (To configure the development environment automatically)
6. `#./cfg_kernel.sh menuconfig`
7. Then you will see a GUI screen (Linux Kernel Configuration) as below:

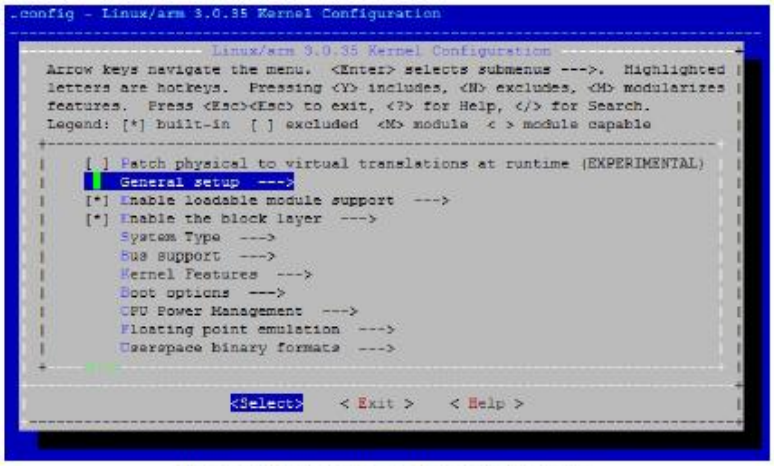


Figure 3.1 Linux Kernel Configuration

8. Select "Device Drivers"→"Real Time Clock", you will see an option "Seiko Instruments S-35390A" on the list. Choose this option then exit and save your configuration.

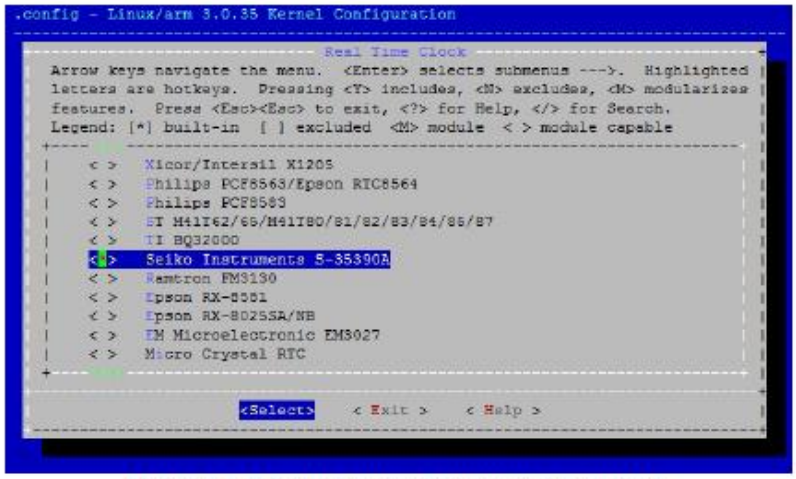


Figure 3.2 Selecting Seiko Instruments S-35390A

9. Change directory to "source/linux-3.0.35/arch/arm/mach-mx6", edit the "board-mx6q_ROM-3420.h" and "board-mx6q_advantech.c".
Please add below codes to source/linux-3.0.35/arch/arm/mach-mx6/board-mx6q_ROM-3420.h:

```
static struct i2c_board_info mxc_i2c6_board_info[] __initdata = {
        /* switch 3 */
        { /* rtc - S35390A */
                I2C_BOARD_INFO("s35390a", 0x30),
        },
};
```

Please add below codes to source/linux-3.0.35/arch/arm/mach-mx6/board-mx6q_advantech.c

```
i2c_register_board_info(6, mxc_i2c6_board_info,
    ARRAY_SIZE(mxc_i2c6_board_info));
```

10. Please refer to former Chapter 3.4.2 Build Linux Kernel Image to rebuild the kernel with RTC driver (Seiko Instruments S-35390A) after completing above steps

Note! *If you cannot find the driver for your device from the list, please contact your hardware vendor.*

Boot up from the SD card, onboard eMMC or SATA DOM

Boot up from the SD card

Create a bootable SD card

1. Open one terminal console and change directory to BSP scripts folder
2. Perform following command: (assume SD card's device name is /dev/sdf)

```
sudo ./mksd-linux.sh /dev/sdf
```

3. Remove SD card from PC/NB

Set the DIP switch

1. Open one debug console
2. Turn off ROM-3420
3. Plug a bootable SD card into ROM-DB3900's SD slot
4. Set Dip switch to 1-OFF/2-ON/3-ON
5. Turn on ROM-3420

Boot up from the onboard eMMC

Transfer whole system to onboard eMMC

1. Boot up from SD card (refer to Chapter 3.6.1)
2. Login as root and perform following commands:

```
$ cd /mk_inand
$ ./mkinand-linux.sh /dev/mmcblk0
```

Set the DIP switch

1. Open one debug console
2. Turn off ROM-3420
3. Set Dip switch to 1-ON/2-OFF/3-OFF
4. Turn on ROM-3420

Boot up from SATA DOM

Transfer whole system to SATA DOM

1. Turn off ROM-3420
2. Plug SATA DOM into ROM-DB3900's SATA slot
3. Boot up from SD card (refer to Chapter 3.6.1)
4. Login as root and perform the following commands:(assume SATA DOM's device name is /dev/sdf)

```
$ cd /mk_inand
$ ./mkinand-linux.sh /dev/sdf
```

Set the DIP switch

1. Open one debug console
2. Turn off ROM-3420
3. Set Dip switch to 1-ON/2-ON/3-ON
4. Turn on ROM-3420

For more SW/Tool, please refer to:

http://downloadt.advantech.com/ProductFile/Downloadfile1/1-Y0QMII/ROM-3420_User_Manual_Ed.2-FINAL.pdf