

## PICO-IMX6

Freescale i.MX6 Dual Lite/Quad Processor

Onboard 1GB Memory

USB 2.0, I2C, CAN Bus

18-bit Single-Channel LVDS

4GB eMMC (Optional)

(Detailed Testing Instructions can be found in  
accompanying Test Guide in disk)

## Copyright Notice

This document is copyrighted, 2015. All rights are reserved. The original manufacturer reserves the right to make improvements to the products described in this manual at any time without notice.

No part of this manual may be reproduced, copied, translated, or transmitted in any form or by any means without the prior written permission of the original manufacturer. Information provided in this manual is intended to be accurate and reliable. However, the original manufacturer assumes no responsibility for its use, or for any infringements upon the rights of third parties that may result from its use.

The material in this document is for product information only and is subject to change without notice. While reasonable efforts have been made in the preparation of this document to assure its accuracy, AAEON assumes no liabilities resulting from errors or omissions in this document, or from the use of the information contained herein.

AAEON reserves the right to make changes in the product design without notice to its users.

## Acknowledgments

All other products' name or trademarks are properties of their respective owners.

- AMI is a trademark of American Megatrends Inc.
- Freescale™ is a trademark of Freescale Semiconductor, Inc.
- Microsoft Windows® is a registered trademark of Microsoft Corp.
- ITE is a trademark of Integrated Technology Express, Inc.
- IBM, PC/AT, PS/2, and VGA are trademarks of International Business Machines Corporation.

Please be notified that all other products' name or trademarks not be mentioned above are properties of their respective owners.

## Packing List

Before you begin installing your card, please make sure that the following materials have been shipped:

- 1 PICO-IMX6 Board
- 1 CD-ROM for manual (in PDF format)
- 2 UART Screws
- 1 UART Cable
- 1 Power Cable
- 1 USB Cable (by SKU)

If any of these items should be missing or damaged, please contact your distributor or sales representative immediately.

**China RoHS Requirements**  
**产品中有毒有害物质或元素名称及含量**

**AAEON Main Board/ Daughter Board/ Backplane**

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板 及其电子组件	×	○	○	○	○	○
外部信号 连接器及线材	×	○	○	○	○	○
<p><b>O:</b> 表示该有毒有害物质在该部件所有均质材料中的含量均在  <b>SJ/T 11363-2006</b> 标准规定的限量要求以下。</p> <p><b>X:</b> 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出  <b>SJ/T 11363-2006</b> 标准规定的限量要求。</p> <p>备注: 此产品所标示之环保使用期限, 系指在一般正常使用状况下。</p>						

**China RoHS Requirements**  
 Poisonous or Hazardous Substances or Elements in Products  
 AAEON Main Board/ Daughter Board/ Backplane

Component	Poisonous or Hazardous Substances or Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
PCB & Other Components	X	O	O	O	O	O <sub>o</sub>
Wires & Connectors for External Connections	X	O	O	O	O	O

O: The quantity of poisonous or hazardous substances or elements found in each of the component's parts is below the SJ/T 11363-2006-stipulated requirement.

X: The quantity of poisonous or hazardous substances or elements found in at least one of the component's parts is beyond the SJ/T 11363-2006-stipulated requirement.

**Note: The Environment Friendly Use Period as labeled on this product is applicable under normal usage only**

# Contents

## Chapter 1 General Information

1.1 Introduction.....	1-2
1.2 Features .....	1-3
1.3 Specifications .....	1-4

## Chapter 2 Quick Installation Guide

2.1 Safety Precautions .....	2-2
2.2 Dimensions.....	2-3
2.3 Jumpers and Connectors .....	2-4
2.4 List of Jumpers .....	2-6
2.4.1 Boot Mode Selection (JP30) .....	2-7
2.4.2 LVDS Backlight Inverter Voltage Selection (JP34) .....	2-7
2.4.3 LVDS Backlight Lightness Control Mode Selection (JP35) .....	2-7
2.4.4 LVDS Operating Voltage Selection (JP36).....	2-7
2.4.5 Auto Power Button Selection (JP44) .....	2-8
2.5 List of Connectors .....	2-9
2.5.1 CAN Bus Connector (CAN_BUS1).....	2-11
2.5.2 SPI Program Connector (CN3).....	2-11
2.5.3 Micro USB Connector (CN9) .....	2-12
2.5.4 ICSP Program Connector (CN19) .....	2-12
2.5.5 SATA Power Connector (CN20).....	2-13

2.5.6 LVDS Power Connector (CN31) .....	2-13
2.5.7 UART for Debug Port Connector (CN33) .....	2-14
2.5.8 DI/O Connector (CN37) .....	2-14
2.5.9 LVDS Connector (CN40) .....	2-15
2.5.10 Power Button & Reset (CN41) .....	2-17
2.5.11 Buzzer Connector (CN42) .....	2-17
2.5.12 Battery Connector (CN43) .....	2-17
2.5.13 UART Connector (COM1) .....	2-18
2.5.14 12V Connector (DCIN1) .....	2-18
2.5.15 Mini HDMI Connector (HDMI1) .....	2-19
2.5.16 Audio Connector (HPO1) .....	2-20
2.5.17 I2C Connector (I2C1) .....	2-21
2.5.18 MiniCard Connector (MINI_CARD1) .....	2-21
2.5.19 Micro SD Connector (MSD1) .....	2-24
2.5.20 LAN Connector (RJ45_1) .....	2-25
2.5.21 SATA Connector (SATA1) .....	2-24
2.5.22 SIM Card Connector (SIM1) .....	2-26
2.5.23 2-Port USB Connector (USB1) .....	2-27
2.5.24 USB 2.0 Port 3 Connector (USB3) .....	2-28
2.5.25 USB 2.0 Port 4 Connector (USB4) .....	2-28

## Appendix A Mating Connectors

A.1 List of Mating Connectors and Cables .....	A-2
------------------------------------------------	-----

## Appendix B Electrical Specifications for I/O Ports

B.1 Electrical Specifications for I/O Ports .....	B-2
---------------------------------------------------	-----



Chapter

1

**General  
Information**

## **1.1 Introduction**

---

This User's Manual contains all the essential information, such as detailed descriptions and explanations on the product's hardware and software features (if any), its specifications, dimensions, jumper/connector settings/definitions, and driver installation instructions (if any), to facilitate users in setting up their product.

Users may refer to the [AAEON.com](http://AAEON.com) for the latest version of this document.

## 1.2 Features

---

- Onboard Freescale i.MX6 DualLite Commercial/ Quad Automotive ARM Cortex A9 processor
- Onboard DDR3 Memory 1 GB, 533 MHz, (1066 MT/s)
- eMMC 4 GB (by SKU)
- Gigabit Ethernet x 1
- 18-bit Single-channel LVDS, up to 1024 x 768
- USB 2.0 x 1 (Optional up to 4)
- USB OTG
- I2C, CAN Bus, 2-pin SATA Power, SATA 3.0 Gb/s (Optional), MiniCard (Optional)
- Supports Linux Kernel 3.0.35, Android 4.4 Kernel 3.10.17

### 1.3 Specifications

---

#### System

- Form Factor Pico-ITX
- Processor Onboard Freescale i.MX6 Dual Lite  
Commerical/ Quad Automative ARM Cortex  
A9 Processor
- System Memory Onboard DDR3 1 GB
- Chipset Freescale i.MX6
- Supported OS (OS not bundled with product) Android 4.4  
Linux Kernel 3.0.35 (Ubuntu 11.10)
- I/O Chipset Freescale i.MX6
- Ethernet Gigbit Ethernet
- Wake On LAN No
- Watchdog Timer Integrated Watchdog and Timer
- H/W Status Monitoring Supports CPU Temperature Monitoring (by  
3<sup>rd</sup> party app or by command via debug port)
- Expansion Interface 8-bit DI/O
- Power Requirement +12 V
- Power Consumption Quad Core: 6-7W@12 V when running HD  
video
- Board Size (L x W) 100 x 72mm (3.94 x 2.76")
- Gross Weight 0.4 kg (0.88 lb)
- Operating Temperature 0 ~ 60°C (32 ~ 140 °F)  
-40 ~ 85°C (-40 ~ 185°F) (Optional)

- Storage Temperature -40 ~ 80°C (-40°F ~ 176°F)
- Operation Humidity 0% ~ 90% relative humidity, non-condensing

### ***Display***

- Chipset Freescale i.MX6
- Resolution LVDS up to 1920 x 1080 (Default at 1024 x 768)  
HDMI up to 1080p
- LCD Interface Supports 1ch 18-bit LVDS x 1
- LCD Power PWM only (default)  
DC Mode: Requires custom app

### ***I/O***

- Storage SATA 3.0 Gb/s x 1 (by SKU)  
Onboard eMMC (4 GB for Quad core SKU only)  
Micro SD Card (up to 32 GB)
- USB USB 2.0 x 5 (Type A Connectors x 2, USB wafer x 2, USB OTG x 1)
- Serial Port 4-wire UART x 1 (wafer, can be used as debug port)  
4-wire UART x 1 (DB9 connector, COM1)
- I2C 1 (Pin Header)
- Digital I/O 8-bit DI/O
- Audio I2S, WM8962B (speaker out, Mic-In )

Chapter

2

**Quick  
Installation  
Guide**

## 2.1 Safety Precautions

---

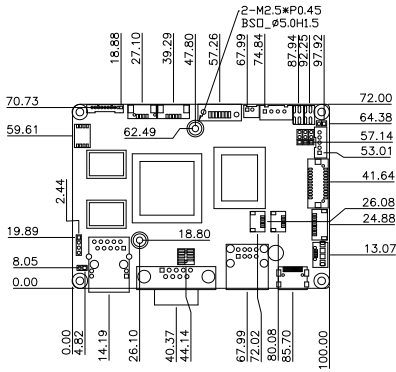
**Warning!**

*Always completely disconnect the power cord from your board whenever you are working on it. Do not make connections while the power is on, because a sudden rush of power can damage sensitive electronic components.*

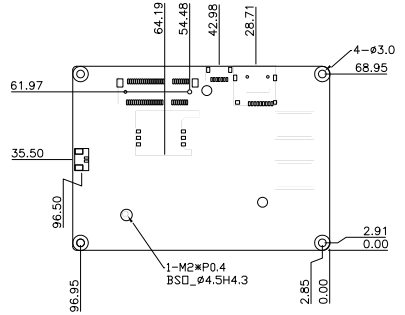
**Caution!**

*Always ground yourself to remove any static charge before touching the board. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis*

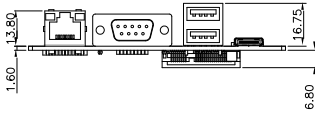
## 2.2 Dimensions



Component Side



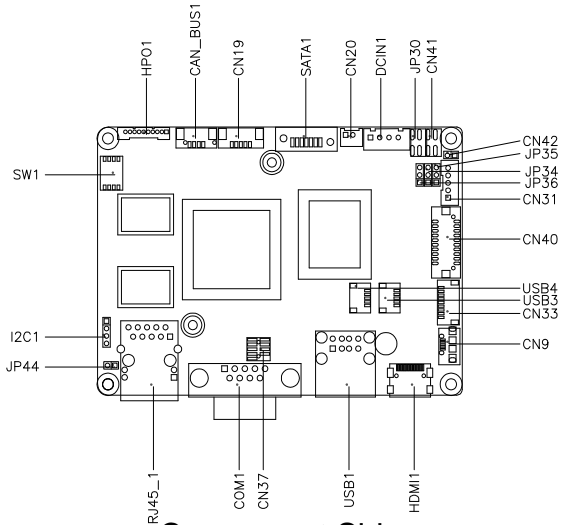
Solder Side



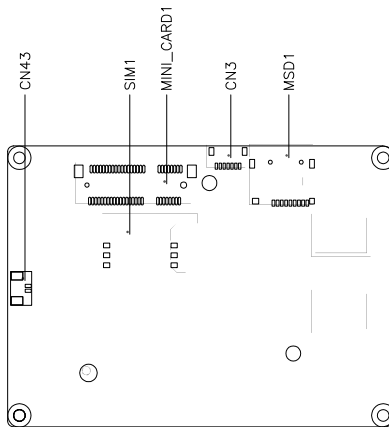


## 2.3 Jumpers and Connectors

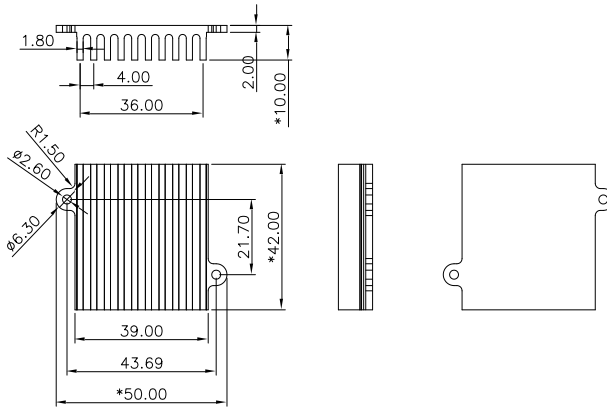
### Component Side



### Solder Side



## Heat Sink



## 2.4 List of Jumpers

---

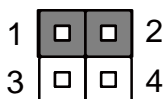
The board has a number of jumpers that allow you to configure your system to suit your application.

The table below shows the function of each of the board's jumpers:

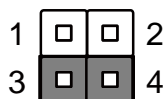
Label	Function
JP30	Boot Mode Selection
JP34	LVDS Backlight Inverter Voltage Selection
JP35	LVDS Backlight Lightness Control Mode Selection
JP36	LVDS Operating Voltage Selection
JP44	Auto Power Button Selection

### 2.4.1 Boot Mode Selection (JP30)

---



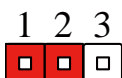
Internal Boot (Default)



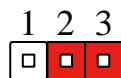
Serial Downloader

### 2.4.2 LVDS Backlight Inverter Voltage Selection (JP34)

---



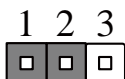
+12V



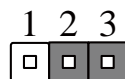
+5V (Default)

### 2.4.3 LVDS Backlight Lightness Control Mode Selection (JP35)

---



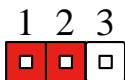
VR Mode



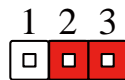
PWM Mode (Default)

### 2.4.4 LVDS Operating Voltage Selection (JP36)

---



+5V



+3.3V (Default)

### 2.4.5 Auto Power Button Selection (JP44)

---



**Disable**



**Enable (Default)**

## 2.5 List of Connectors

---

The board's connectors provide links to external devices such as hard disk drives and keyboards.

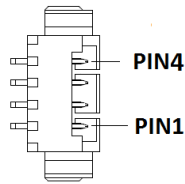
Label	Function
CAN_BUS1	CAN BUS Connector
CN3	SPI Program Connector
CN9	Micro USB Connector
CN19	ICSP Program Connector
CN20	SATA Power Connector
CN31	LVDS Backlight Power Connector
CN33	UART for debug port Connector
CN37	DIO Connector
CN40	LVDS Connector
CN41	Power Button & Reset
CN42	Buzzer Connector
CN43	Battery Connector
COM1	UART Connector
DCIN1	12V Connector
HDMI1	Mini HDMI Connector
HPO1	Audio Connector
I2C1	I2C Connector
MINI_CARD1	MINI CARD Connector
MSD1	Micro SD Connector

---

RJ45_1	LAN Connector
SATA1	SATA Connector
SIM1	SIM Card Connector
USB1	2 Port USB Connector
USB3	USB 2.0 Port 3 Connector
USB4	USB 2.0 Port 4 Connector

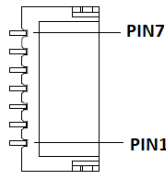
---

### 2.5.1 CAN Bus Connector (CAN\_BUS1)



Pin	Pin Name	Signal Type	Signal Level
1	NC		
2	CANH	I/O	
3	CANL	I/O	
4	GND	GND	

### 2.5.2 SPI Program Connector (CN3)

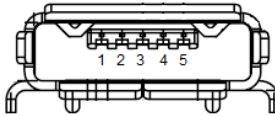


Pin	Pin Name	Signal Type	Signal Level
1	SPI_SO_F	OUT	
2	GND	GND	
3	SPI_SI_F	IN	
4	+3V3_SPI	PWR	+3.3V
5	SPI_SI_F	IN	



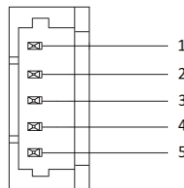
6	SPI_CS0#_F	IN
7	NC	

### 2.5.3 Micro USB Connector (CN9)



Pin	Pin Name	Signal Type	Signal Level
1	USB_OTG_VBUS	PWR	+5V
2	USB_OTG_D-	DIFF	
3	USB_OTG_D+	DIFF	
4	USB_OTG_ID	IN	
5	GND	GND	

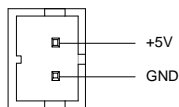
### 2.5.4 ICSP Program Connector (CN19)



Pin	Pin Name	Signal Type	Signal Level
1	MCLP#	IN	
2	+3V3SB	PWR	+3.3V
3	GND	GND	
4	ICSPDAT	I/O	+3.3V

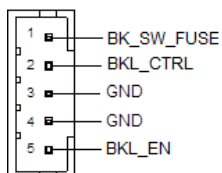
5	ICSPCLK	I/O	+3.3V
---	---------	-----	-------

### 2.5.5 SATA Power Connector (CN20)



Pin	Pin Name	Signal Type	Signal Level
1	+5V	PWR	+5V
2	GND	GND	

### 2.5.6 LVDS Power Connector (CN31)



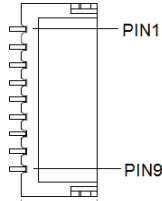
Pin	Pin Name	Signal Type	Signal Level
1	BK_SW_FUSE	PWR	+5V/ +12V
2	BKL_CTRL	OUT	
3	GND	GND	
4	GND	GND	
5	BKL_EN	OUT	+5V

\* BK\_SW\_FUSE can be set to +5V or +12V by JP34

\* BK\_EN can be set by JP35

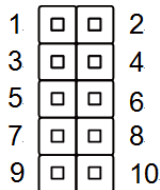
\* The driving current supports up to 2A

### 2.5.7 UART for Debug Port Connector (CN33)



Pin	Pin Name	Signal Type	Signal Level
1	NC		
2	NC		
3	RXC	IN	
4	RTS#C	OUT	±5.2V
5	TXC	OUT	±5.2V
6	CTS#C	IN	
7	NC		
8	NC		
9	GND	GND	

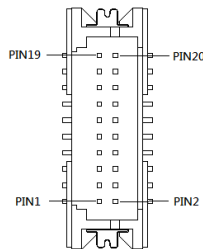
### 2.5.8 DI/O Connector (CN37)



Pin	Pin Name	Signal Type	Signal Level
-----	----------	-------------	--------------

**Pico-ITX Board****PICO-IMX6**

1	GPIO4_IO31	I/O	+3.3V
2	GPIO5_IO05	I/O	+3.3V
3	GPIO5_IO06	I/O	+3.3V
4	GPIO5_IO07	I/O	+3.3V
5	GPIO5_IO08	I/O	+3.3V
6	GPIO5_IO09	I/O	+3.3V
7	GPIO5_IO10	I/O	+3.3V
8	GPIO5_IO11	I/O	+3.3V
9	+3V3	PWR	+3.3V
10	GND	GND	

**2.5.9 LVDS Connector (CN40)**

\* VLCD can be set to +3.3V or +5V by JP36

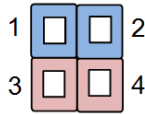
\*The max. driving current is 1A

LVDS			
Pin	Pin Name	Signal Type	Signal level
1	LVDS_BLEN	OUT	

LVDS			
Pin	Pin Name	Signal Type	Signal level
2	L_BKLTCTLD	OUT	
3	VLCD	PWR	+3.3V/+5V
4	VLCD	PWR	+3.3V/+5V
5	LVDS_DATA0_CLK_N	DIFF	
6	LVDS_DATA0_TX2_P	DIFF	
7	LVDS_DATA0_CLK_P	DIFF	
8	LVDS_DATA0_TX2_N	DIFF	
9	VLCD	PWR	+3.3V/+5V
10	GND	GND	
11	LVDS_DATA0_TX0_P	DIFF	
12	LVDS_DATA0_TX3_P	DIFF	
13	LVDS_DATA0_TX0_N	DIFF	
14	LVDS_DATA0_TX3_N	DIFF	
15	GND	GND	
16	GND	GND	
17	LVDS_DATA0_TX1_P	DIFF	
18	LVDS0_DAT	I/O	3.3V
19	LVDS_DATA0_TX1_N	DIFF	
20	LVDS0_CLK	I/O	3.3V

### 2.5.10 Power Button & Reset (CN41)

---



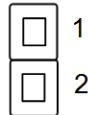
Pin	Pin Name	Signal Type	Signal level
1	PWRBTN#	IN	
2	GND	GND	
3	WDT_RST#	IN	
4	GND	GND	

\* Pin 1 – 2 are for the power button

\* Pin 3 – 4 are for the reset button

### 2.5.11 Buzzer Connector (CN42)

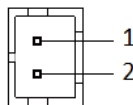
---



Pin	Pin Name	Signal Type	Signal level
1	+5V	PWR	+5V
2	SPKR	OUT	

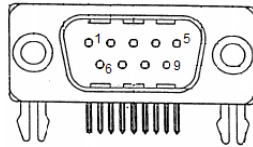
### 2.5.12 Battery Connector (CN43)

---



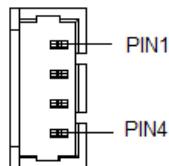
Pin	Pin Name	Signal Type	Signal level
1	RTCBAT	PWR	+3V
2	GND	GND	

### 2.5.13 UART Connector (COM1)



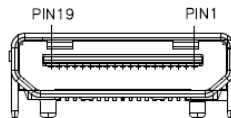
Pin	Pin Name	Signal Type	Signal level
1	NC		
2	RXD	IN	
3	TXD	OUT	$\pm 5.2V$
4	NC		
5	GND	GND	
6	NC		
7	RTS#	OUT	$\pm 5.2V$
8	CTS#	IN	
9	NC		

### 2.5.14 12V Connector (DCIN1)



Pin	Pin Name	Signal Type	Signal level
1	GND	GND	
2	GND	GND	
3	DCIN	PWR	+12V
4	DCIN	PWR	+12V

### 2.5.15 Mini HDMI Connector (HDMI1)

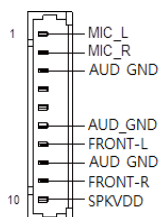


Pin	Pin Name	Signal Type	Signal level
1	GND	GND	
2	HDMI_D2P	DIFF	
3	HDMI_D2M	DIFF	
4	GND	GND	
5	HDMI_D1P	DIFF	
6	HDMI_D1M	DIFF	
7	GND	GND	
8	HDMI_D0P	DIFF	
9	HDMI_D0M	DIFF	
10	GND	GND	
11	HDMI_CLKP	DIFF	
12	HDMI_CLKM	DIFF	
13	GND	GND	



Pin	Pin Name	Signal Type	Signal level
14	NC		
15	HDMI_CLK_LV	I/O	
16	HDMI_DAT_LV	I/O	
17	NC		
18	+5V_HDMI	PWR	+5V
19	HDMI_HPD#	IN	

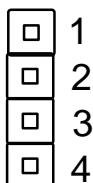
### 2.5.16 Audio Connector (HPO1)



Pin	Pin Name	Signal Type	Signal level
1	MIC_L	IN	
2	MIC_R	IN	
3	AUD_GND	GND	
4	NC		
5	NC		
6	AUD_GND	GND	
7	FRONT_L	OUT	
8	AUD_GND	GND	
9	FRONT_R	OUT	

Pin	Pin Name	Signal Type	Signal level
10	SPKVDD	PWR	+5V

### 2.5.17 I2C Connector (I2C1)



Pin	Pin Name	Signal Type	Signal level
1	+3V3	PWR	+3.3V
2	HDMI_DAT	I/O	+3.3V
3	HDMI_CLK	I/O	+3.3V
4	GND	GND	

Note: I2C is shared with I2C on HDMI

### 2.5.18 MiniCard Connector (MINI\_CARD1)

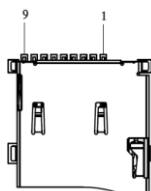
Pin	Pin Name	Signal Type	Signal level
1	PCIE_WAKE#	IN	
2	3.3V_3G	PWR	+3.3V
3	NC		
4	GND	GND	
5	NC		
6	MINI_1.5V	PWR	+1.5V

Pin	Pin Name	Signal Type	Signal level
7	NC		
8	UIM_PWR	PWR	
9	GND	GND	
10	UIM_DATA	I/O	
11	CLK_PCIE_100M#	DIFF	
12	UIM_CLK	IN	
13	CLK_PCIE_100M	DIFF	
14	UIM_RESET	IN	
15	GND	GND	
16	UIM_VPP	PWR	
17	NC		
18	GND	GND	
19	NC		
20	EN_3G	OUT	+3.3V
21	GND	GND	
22	PCIE_RST#	OUT	+3.3V
23	PCIE_RXN0	DIFF	
24	3.3V_3G	PWR	+3.3V
25	PCIE_RXP0	DIFF	

Pin	Pin Name	Signal Type	Signal level
26	GND	GND	
27	GND	GND	
28	MINI_1.5V	PWR	+1.5V
29	GND	GND	
30	I2C3_SCL	I/O	+3.3V
31	PCIE_TXN0	DIFF	
32	I2C3_SDA	I/O	+3.3V
33	PCIE_TXP0	DIFF	
34	GND	GND	
35	GND	GND	
36	USB_HUB_DM1	DIFF	
37	GND	GND	
38	USB_HUB_DP1	DIFF	
39	3.3V_3G	PWR	+3.3V
40	GND	GND	
41	3.3V_3G	PWR	+3.3V
42	NC		
43	GND	GND	
44	NC		

Pin	Pin Name	Signal Type	Signal level
45	NC		
46	NC		
47	NC		
48	MINI_1.5V	PWR	+1.5V
49	NC		
50	GND	GND	
51	NC		
52	3.3V_3G	PWR	+3.3V

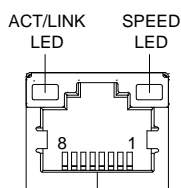
### 2.5.19 Micro SD Connector (MSD1)



Pin	Pin Name	Signal Type	Signal level
1	SD_DATA2	I/O	
2	SD_DATA3	I/O	
3	SD3_CMD	I/O	
4	+3.3V	PWR	+3.3V

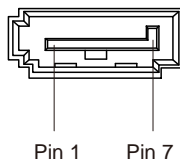
Pin	Pin Name	Signal Type	Signal level
5	SD3_CLK	I/O	
6	GND	I/O	
7	SD3_DATA0	I/O	
8	SD3_DATA1	I/O	
9	SD3_DET	I/O	

### 2.5.20 LAN Connector (RJ45\_1)



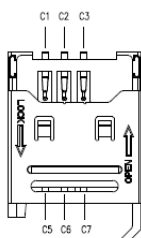
Pin	Pin Name	Signal Type	Signal level
1	MDI0+	DIFF	
2	MDI0-	DIFF	
3	MDI1+	DIFF	
4	MDI2+	DIFF	
5	MDI2-	DIFF	
6	MDI1-	DIFF	
7	MDI3+	DIFF	
8	MDI3-	DIFF	

### 2.5.21 SATA Connector (SATA1)



Pin	Pin Name	Signal Type	Signal level
1	GND	GND	
2	SATA_TXP0	DIFF	
3	SATA_TXN0	DIFF	
4	GND	GND	
5	SATA_RXN0	DIFF	
6	SATA_RXP0	DIFF	
7	GND	GND	

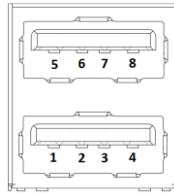
### 2.5.22 SIM Card Connector (SIM1)



Pin	Pin Name	Signal Type	Signal level
-----	----------	-------------	--------------

Pin	Pin Name	Signal Type	Signal level
1 (C1)	UIM_PWR	PWR	3V/1.8V from MiniCard
2 (C2)	UIM_RESET		
3 (C3)	UIM_CLK		
4 (C5)	GND		
5 (C6)	UIM_VAPP		
6 (C7)	UIM_DATA		

### 2.5.23 2-Port USB Connector (USB1)

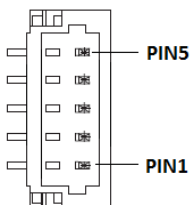


Pin	Pin Name	Signal Type	Signal level
1	USB_COR_VBUS1	PWR	+5V
2	USB_HUB_DM2	DIFF	
3	USB_HUB_DP2	DIFF	
4	GND	GND	
5	USB_COR_VBUS1	PWR	+5V
6	USB_HUB_DM3	DIFF	



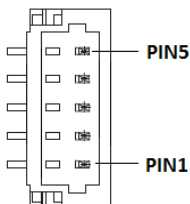
Pin	Pin Name	Signal Type	Signal level
7	USB_HUB_DP3	DIFF	
8	GND	GND	

### 2.5.24 USB 2.0 Port 3 Connector (USB3)



Pin	Pin Name	Signal Type	Signal level
1	USB_COR_VBUS1	PWR	+5V
2	USB_HUB_DM4	DIFF	
3	USB_HUB_DP4	DIFF	
4	GND	GND	
5	GND	GND	

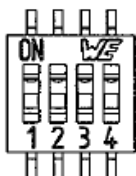
### 2.5.25 USB 2.0 Port 4 Connector (USB4)



Pin	Pin Name	Signal Type	Signal level
1	USB_COR_VBUS1	PWR	+5V
2	USB_HUB_DM6	DIFF	
3	USB_HUB_DP6	DIFF	
4	GND	GND	
5	GND	GND	

## 2.6 Boot Configuration Selection Switch (SW1)

This switch allows users to manually customize boot configurations for their needs.



Boot Device	Bit 1	Bit 2	Bit 3	Bit 4	
Micro SD	OFF	OFF	ON	OFF	Default
eMMC	ON	ON	ON	ON	
SATA	X	X	OFF	ON	Reserved

Appendix

**A**

# Mating Connectors

## A.1 List of Mating Connectors and Cables

The table notes mating connectors and available cables.

Connector Label	Function	Mating Connector		Available Cable	Cable P/N
		Vendor	Model no		
CAN_BUS1	CAN BUS Connector	MOLEX	53261-047 1	N.A	
CN3	SPI Program Connector	PINREX	710-74-07 TW01	SPI wafer Cable	1701140271
CN19	ICSP Program Connector	CATCH	1201-700- 05SM	N.A	
CN20	SATA Power Connector	PINREX	721-81-02 TW00	SATA power wafer cable	1702150155
CN31	LVDS Backlight Power Connector	PINREX	721-81-05 TW00	Backlight wafer cable	1705050205
CN33	UART for debug port Connector	PINREX	710-74-09 TWR6	Debug wafer cable	1701090152
CN37	DIO Connector	PINREX	232-92-05 GBE3	N.A	
CN40	LVDS Connector	E-CALL	0110-01-5 53-200	LVDS cable	1703200170
CN41	Power Button & Reset	Astron	27-24041- 202-1G-TB 1R	N.A	
CN42	Buzzer Connector	JIH VEI	21B12050- 02S10B-01 G-4/2.8	N.A	
CN43	Battery Connector	PINREX	712-73-02 TWE0	RTC battery cable	175011301C
DCIN1	12V Connector	CATCH	1191-700- 04S	DC power cable	170204010S

**Pico-ITX Board****PICO-IMX6**

HPO1	Audio Connector	CATCH	1201-700-10S	Audio wafer cable	1700100129
I2C1	I2C Connector	PINREX	220-96-04 GB01	N.A	
SATA1	SATA Connector	MOLEX	67800-500 5	SATA cable	1709070500
USB3	USB 2.0 Port 3 Connector	CATCH	1204-700-05SMR	USB wafer cable	170005020L
USB4	USB 2.0 Port 4 Connector	CATCH	1204-700-05SMR	USB wafer cable	170005020L

Appendix

**B**

# **Electrical Specifications for I/O Ports**

## B.1 Electrical Specifications for I/O Ports

I/O	Reference	Signal Name	Rate Output
Micro USB Port	CN9	USB_OTG_VBUS	5V/0.5A
SATA Power Connector	CN20	+5V	5V/2A
Backlight Connector	CN31	BK_SW_FUSE	5V/2A or 12V/2A
DIO Connector	CN37	+3.3V	3.3V/1A
LVDS Port	CN40	VLCD	3.3V/1A or 5V/1A
Buzzer Port	CN42	+5V	5V/1A
RTC Battery	CN43	RTCBAT	3V/1A
Mini HDMI Port	HDMI1	+5V_HDMI	5V/0.5A
Audio Port	HPO1	SPKVDD	5V/1A
I2C Connector	I2C1	+3.3V	3.3V/1A
Mini Card Slot	MINI_CARD1	3.3V_3G MINI_1.5V	3.3V/0.5A per pin 1.5V/0.5A per pin
Dual USB Connector	USB1	USB_COR_VBUS1	5V/0.5A per port
USB Port	USB3	USB_COR_VBUS1	5V/1A
USB Port	USB4	USB_COR_VBUS1	5V/1A



**PICO-IMX6 Test Guide**

## **Introduction**

---

This Test Guide contains basic testing methods for loading an image and performing basic I/O test in Ubuntu 11.01. Related images and BSPs can be obtained from your AAEON sales representatives or AAEON tech support.

Users may refer to the [AAEON.com](http://AAEON.com) for the latest version of this document.

# Contents

## Chapter 1 Environment Preparation

1.1 List of Tools .....	1-2
1.2 List of Cables.....	1-4
1.3 List of Connectors .....	1-5
1.4 Jumper and Switch Settings.....	1-7

## Chapter 2 OS Compatibility Test

2.1 PC Requirement for Image Burning .....	2-2
2.2 Mfgtool2 Guide .....	2-3
2.2.1 Mfgtool2 Settings .....	2-4
2.2.2 Downloading Image to Mfgtool2 .....	2-6
2.2.3 Burning Images.....	2-7

## Chapter 3 OS Environment Setup

3.1 Debug Port Setup.....	3-2
3.2 Date and Time Settings for Linux.....	3-5

## Chapter 4 Basic I/O Function Test

4.1 Video Resolution and Function Test for Linux .....	4-2
4.2 Audio Function Test .....	4-8
4.3 LAN Function Test.....	4-11
4.4 USB Function Test .....	4-12
4.5 SPI Flash Test.....	4-18
4.6 SATA Function Test .....	4-20

4.7 CAN Bus Function Test.....	4-21
4.8 Mini PCIe Function Test.....	4-24
4.9 GPI/O Function Test.....	4-26

## **Chapter 5 Watchdog Timer Test**

5.1 Watchdog Timer Test.....	5-2
------------------------------	-----

Chapter

1

**Environment  
Preparation**

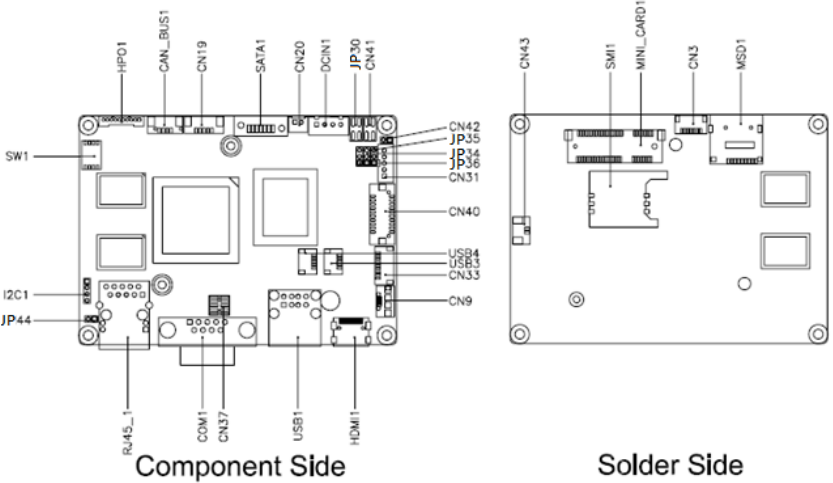
## 1.1 List of Tools

Usage	Tool Name	Description
Debug port Test	UART debug cable	RS232 cable(F-F null modem) for PC COM port
		USB to UART cable(F) for NB USB port
	putty.exe	Print debug message and communicate with iMX6
MCU FW burning	MPLAB_IDE_8_80 / MPLAB IPE v3.00.02-beta	MCU Burning tool

## 1.2 List of Cables

Function	Item Number	Description
DC IN	170204010S	(TF)Power Cable.1*4P, Pitch=2.5mm, Housing.大 4P.10cm
Audio	1700100129	(TF)Audio Cable.1.25mm 10P Housing.Audio Jack(Line-Out).Audio Jack(MIC).12cm.for TKS-G50-QM77
Internal USB	170005020L	(TF)USB Cable.USB Type A 4P(F).5P 1.25mm Housing.20cm
Micro USB to USB-A	1700050309	(TF)USB OTG Cable.MICRO USB B Type Plug(Male) 5P.USB A Type Receptacle(Female).4P.30cm
RS232(debug)	1701090152	(TF)Flat Cable.D-Sub 9P(M).9P 1.0mm Housing.15cm
LVDS	1703200170	(TF)LVDS TRANS Cable.2*15P, DF-13, Housing.2*10P, DF-13, Housing.17cm
	9697CV0110-S	(TF)SMD ASS'Y.PICO-CV01.Rev.A0.1_0_0.LVDS TRANS BD (20P to 30P)
Backlight	1705050205	(TF)Led drive Cable.5P JST 2.0mm.to 5P WL1256-H-05.20cm.for AHP-1122 (AU)
SATA Power	1702150155	(TF)Power Cable.15P SATA(F).2P 2.0mm Housing(PH).15cm
SPI	1701140271	(TF)Flat Cable.2*7P.2.54mm.7P.1mm Housing.27cm.for FlashBios

### 1.3 List of Connectors



Label	Function
CAN_BUS1	CAN BUS Connector
CN3	SPI Program Connector
CN9	Micro USB Connector
CN19	ICSP Program Connector
CN20	SATA Power Connector
CN31	LVDS Backlight Power Connector
CN33	UART for debug port Connector
CN37	DIO Connector
CN40	LVDS Connector
CN41	Power Button & Reset



---

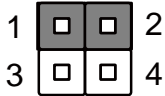
CN42	Buzzer Connector
CN43	Battery Connector
COM1	UART Connector
DCIN1	12V Connector
HDMI1	Mini HDMI Connector
HPO1	Audio Connector
I2C1	I2C Connector
MINI_CARD1	MINI CARD Connector
MSD1	Micro SD Connector
RJ45_1	LAN Connector
SATA1	SATA Connector
SIM1	SIM Card Connector
USB1	2 Port USB Connector
USB3	USB 2.0 Port 3 Connector
USB4	USB 2.0 Port 4 Connector

---

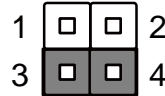
## 1.4 Jumper and Switch Settings

---

### Boot Mode Selection (JP30)

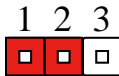


Internal Boot (Default)

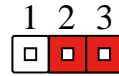


Serial Downloader

### LVDS Backlight Inverter Voltage Selection (JP34)

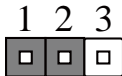


+12V

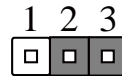


+5V (Default)

### LVDS Backlight Lightness Control Mode Selection (JP35)



VR Mode

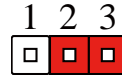


PWM Mode (Default)

### LVDS Operating Voltage Selection (JP36)

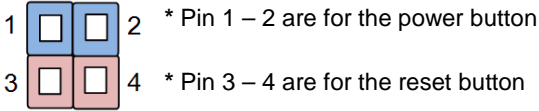


+5V



+3.3V (Default)

### Power Button & Reset (CN41)



### Auto Power Button Selection (JP44)

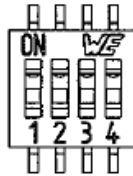


Disable



Enable (Default)

### Boot Device Selection (SW1)



Boot Device	Bit 1	Bit 2	Bit 3	Bit 4	
Micro SD	OFF	OFF	ON	OFF	
eMMC	ON	ON	ON	ON	
SATA	X	X	OFF	ON	Reserved

Chapter

2

**OS  
Compatibility  
Test**

## 2.1 PC Requirement for Image Burning

---

- CPU Intel® Celeron® E3400 or higher, Frequency: 2GHz or above
- Memory: 4GB or above
- OS: Windows® XP/ Windows® 7
- USB 2.0 root hub

## 2.2 Mfgtool2 Guide

---

The four different burning tools as shown below will be used for the tests, please make sure to use the correct version for your chip and OS, which can be found at [Freescale.com](http://Freescale.com).

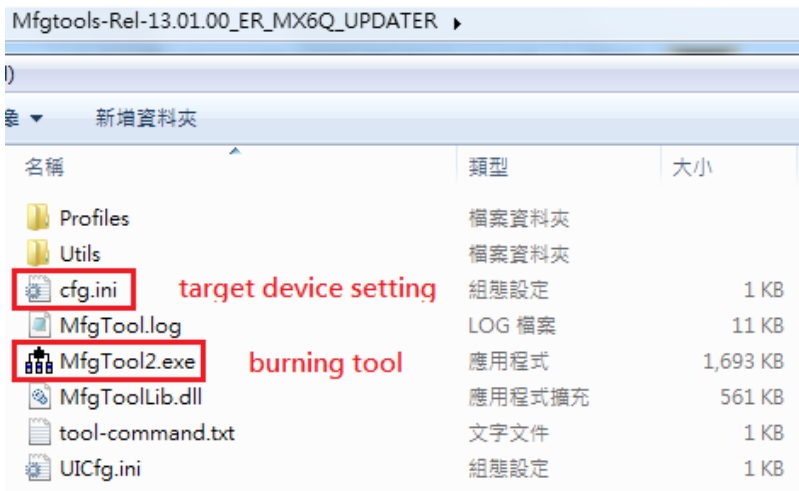
In case of a change in OS, you may get the latest version of the tool at the URL above.

OS Version	Tool Name	Chip	Note
Android 4.4 Kernel 3.10.17	Mfgtools-Rel-13.01.00_ER_MX6Q_UPDATER	i.MX6Q	
	Mfgtools-Rel-13.01.00_ER_MX6DL_UPDATER	i.MX6DL	
Linux Kernel 3.0.35	Mfgtools-Rel-4.0.0_130424_MX6Q_UPDATER	i.MX6Q	
	Mfgtools-Rel-4.1.0_130816_MX6DL_UPDATER	i.MX6DL	

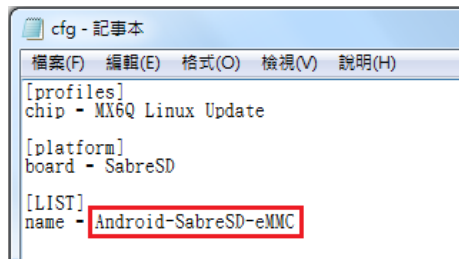
## 2.2.1 Mfgtool2 Settings

Mfgtool2 can burn image/kernel into eMMC or micro SD. Please confirm the setting is correct in **cfg.ini** file.

1. Find **Cfg.ini** in the same folder with **Mfgtool2.exe**.



2. Change [LIST] name to the proper setting. Refer to the table below for details



## List of cfg.ini settings

OS	Device	[List] Name	
Android - 6Q	eMMC	Android-SabreSD-eMMC	Full Image
	eMMC-clear	Android-SabreSD-eMMC-clean	
	SD	Android-SabreSD-SD	
Android - 6DL	SD	Android-SabreSD-SD-non-eMMC	
Linux - 6Q	eMMC	ubuntu-SabreSD-eMMC	Full Image (First time)
	SD	ubuntu-SabreSD-SD	
Linux – 6DL	SD	i.MX6DL-ubuntu-SabreSD-SD-noneMMC	
Linux – 6Q	eMMC	SabreSD-uboot-kernel	<b>Only kernel (update)</b>
	SD	SabreSD-SD-uboot-kernel	
Linux – 6DL	SD	i.MX6DL-kernel-SD-noneMMC	



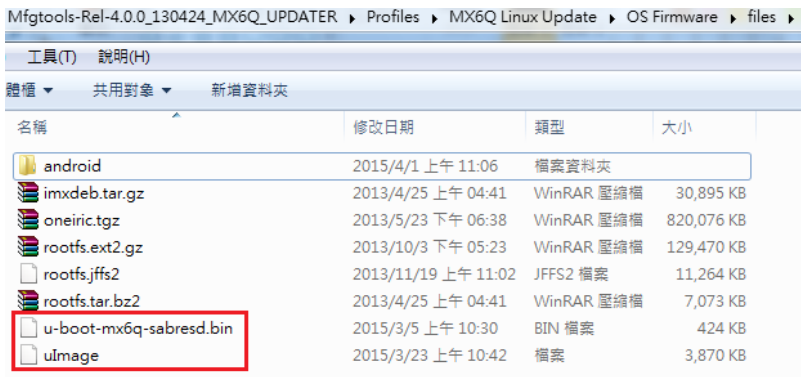
## 2.2.2 Downloading Image to Mfgtool2

Download these files and put them into the Mfgtool2

folder :Mfgtools-Rel-4.0.0\_130424\_MX6Q\_UPDATER\Profiles\MX6Q Linux Update\OS Firmware\files

- i. **ulmage**
- ii. **u-boot-mx6q-sabresd.bin/ u-boot-mx6dl-sabresd.bin**

File names must be the same as the ones listed

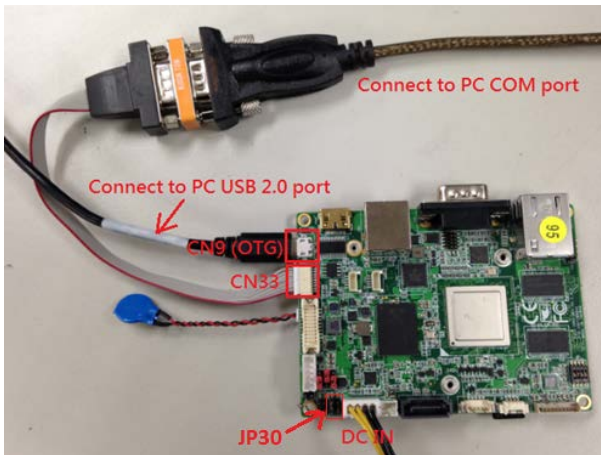


名稱	修改日期	類型	大小
android	2015/4/1 上午 11:06	檔案資料夾	
imxdeb.tar.gz	2013/4/25 上午 04:41	WinRAR 壓縮檔	30,895 KB
oneiric.tgz	2013/5/23 下午 06:38	WinRAR 壓縮檔	820,076 KB
rootfs.ext2.gz	2013/10/3 下午 05:23	WinRAR 壓縮檔	129,470 KB
rootfs.jffs2	2013/11/19 上午 11:02	JFFS2 檔案	11,264 KB
rootfs.tar.bz2	2013/4/25 上午 04:41	WinRAR 壓縮檔	7,073 KB
u-boot-mx6q-sabresd.bin	2015/3/5 上午 10:30	BIN 檔案	424 KB
ulmage	2015/3/23 上午 10:42	檔案	3,870 KB

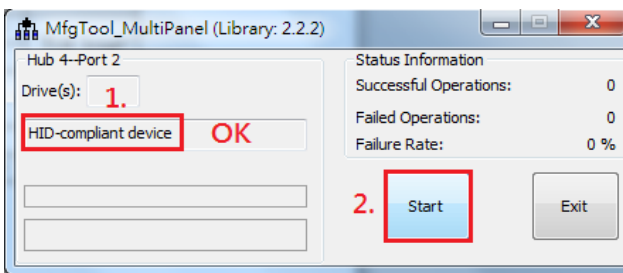
### 2.2.3 Burning Images

---

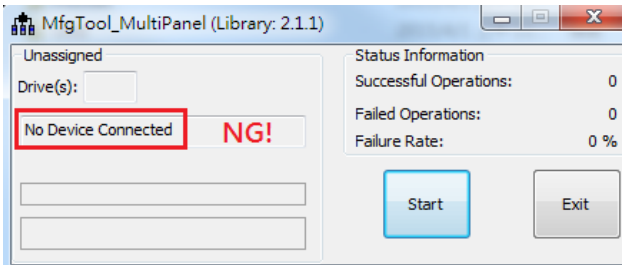
1. Set JP30 to download mode (pin 3-4)
2. Connect the PICO-IMX6 to PC with the USB OTG cable



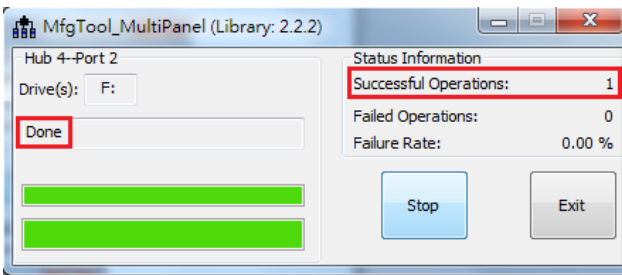
3. Run **MfgTool2.exe**
4. Check the board is recognized as a **HID-Compliant Device**. If so, press **start** to begin burning the image.



If “**No Device Connected**” is shown, make sure the OTG cable is properly connected and the board is set to download mode and try again.



5. Press **Cancel** when you are asked to format the disk.
6. When the progress bar turns green and a **Done** message is shown. Press **Stop** and exit the program.



7. Reset the power source. Set JP30 to normal mode and check if the image is properly loaded to the PICO-IMX6.

Chapter

3

**OS  
Environment  
Setup**

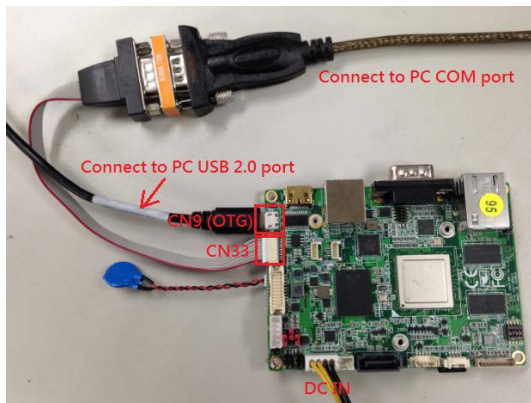
### 3.1 Debug Port Setup

---

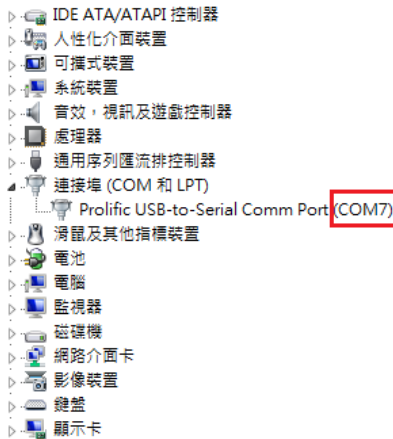
1. Download **putty.exe** for showing debug messages and communication with PICO-IMX6.



2. Connect the PICO-IMX6 with the PC with a RS-232 cable.



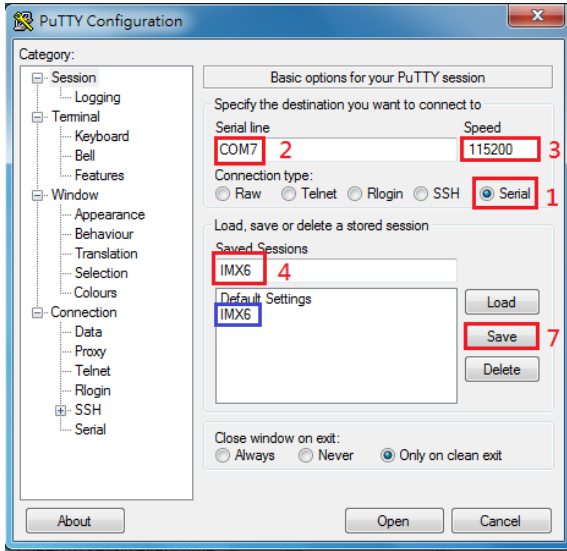
3. Check for the COM port number your PC recognizes your PICO-IMX6 as in the Device Manager.



4. Perform the following steps to set up Putty.exe
  - i. Select **Serial**
  - ii. Enter the COM port number from step 3 and **115200** in the speed column.
  - iii. Create a name for this setting
  - iv. Go to the Logging page and check “**All session output**” and “**Always append to the end of it**”. A log file will be created.



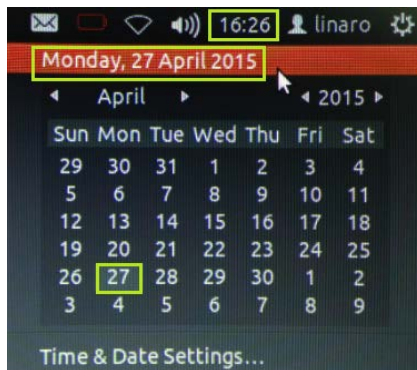
- v. Return to the Session page, save to remember your details



### 3.2 Date and Time Settings for Linux

---

1. Enter the following commands to set date and time in the PC serial console
  - i. Command 1: set date and time  
**Date MMDDhhmmYYYY**
  - ii. Command 2: Copy system time to BIOS  
**hwclock -w**
  - iii. Command 3: Confirm date and time are correct  
**date**
2. Confirm if the system information is correct





Chapter

4

# Basic I/O Function Test

## 4.1 Video Resolution and Function Test for Linux

---

### HDMI 1920 x 1080 – 6Q

1. Set HDMI out in u-boot with the following command

- i. Command 1-1 for eMMC:

```
setenv bootargs_mmc 'setenv bootargs ${bootargs}
root=/dev/mmcblk0p1 rootwait rw
video=mxcfb1:dev=ldb,LDB-XGA,if=RGB666 video=
mxcfb0:dev=hdmi,1920x1080M@60,if=RGB24'
```

- ii. Command 1-1 for uSD:

```
setenv bootargs_mmc 'setenv bootargs ${bootargs}
root=/dev/mmcblk1p1 rootwait rw
video=mxcfb1:dev=ldb,LDB-XGA,if=RGB666 video=
mxcfb0:dev=hdmi,1920x1080M@60,if=RGB24'
```

- iii. Command 2-1 for eMMC:

```
setenv bootcmd_mmc 'run bootargs_base
bootargs_mmc;mmc dev 3;mmc read ${loadaddr}
0x800 0x2000;bootm'
```

- iv. Command 2-1 for uSD:

```
setenv bootcmd_mmc 'run bootargs_base
bootargs_mmc;mmc dev 2;mmc read ${loadaddr}
0x800 0x2000;bootm'
```

- v. Command 3:  
**saveenv**
  - vi. Command 4:  
**boot**
2. Confirm if the monitor can display images properly.

**HDMI 1920 x 1080 – 6DL**

1. Set HDMI out in u-boot with the following command

i. Command 1:

```
setenv bootargs_mmc 'setenv bootargs ${bootargs}  
root=/dev/mmcblk0p1 rootwait rw  
video=mxcfb1:dev=ldb,LDB-XGA,if=RGB666  
video=mxcfb0:dev=hdmi,1920x1080M@60,if=RGB24
```

ii. Command 2:

```
setenv bootcmd_mmc 'run bootargs_base  
bootargs_mmc;mmc dev 2;mmc read ${loadaddr}  
0x800 0x2000;bootm'
```

iii. Command 3:

```
saveenv
```

iv. Command 4:

```
boot
```

**LVDS (18-bit) 1024 x 768 – 6Q**

1. Make sure that the jumper setting is correct for LVDS panel
2. Set HDMI out in u-boot with the following command

- i. Command 1-1 for eMMC:

```
setenv bootargs_mmc 'setenv bootargs ${bootargs}  
root=/dev/mmcblk0p1rootwait rw  
video=mxcfb0:dev=ldb,LDB-XGA,if=RGB666  
ldb=sin0'
```

- ii. Command 1-2 for uSD:

```
setenv bootargs_mmc 'setenv bootargs ${bootargs}  
root=/dev/mmcblk1p1 rootwait rw  
video=mxcfb0:dev=ldb,LDB-XGA,if=RGB666  
ldb=sin0'
```

- iii. Command 2-1 for eMMC:

```
setenv bootcmd_mmc 'run bootargs_base  
bootargs_mmc;mmc dev 3;mmc read ${loadaddr}  
0x800 0x2000;bootm'
```

- iv. Command 2-2 for uSD:

```
setenv bootcmd_mmc 'run bootargs_base  
bootargs_mmc;mmc dev 2;mmc read ${loadaddr}  
0x800 0x2000;bootm'
```

- v. Command 3:  
**saveenv**
  - v. Command 4:  
**boot**
3. Confirm if the LVDS panel can display images properly.
  4. Panel backlight can be controlled by the command  
**echo 0 >**  
**/sys/class/backlight/pwm-backlight.0/brightness**  
**echo 248 >**  
**/sys/class/backlight/pwm-backlight.0/brightness**

*Note: Value can be set from 0 to 248*

**LVDS (18-bit) 1024 x 768 – 6DL**

1. Make sure that the jumper setting is correct for LVDS panel
2. Set HDMI out in u-boot with the following command

- i. Command 1:

```
setenv bootargs_mmc 'setenv bootargs ${bootargs}  
root=/dev/mmcblk0p1 rootwait rw  
video=mxcfb0:dev=ldb,LDB-XGA,if=RGB666  
ldb=sin0'
```

- ii. Command 2:

```
setenv bootcmd_mmc 'run bootargs_base  
bootargs_mmc;mmc dev 2;mmc read ${loadaddr}  
0x800 0x2000;bootm'
```

- iii. Command 3:

```
saveenv
```

- iv. Command 4:

```
boot
```

## 4.2 Audio Function Test

---

1. Set output volume of speaker-out in serial console

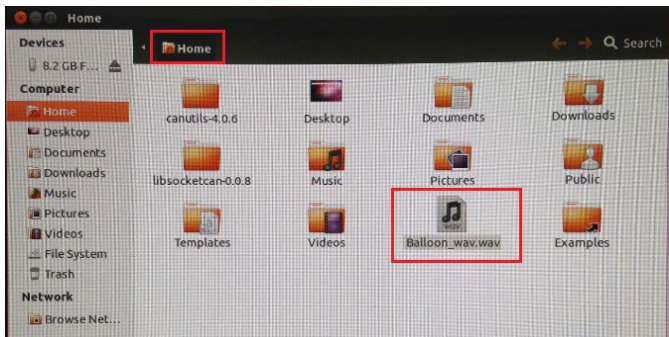
i. Command:

```
amixer cset numid=22 100
```

*Note: Value for "100" can be alternatively set from 0 to 127*

2. Set output volume of speaker-out in serial console

i. Copy the example audio file **Balloon\_wav.wav** to the "Home" folder



ii. Enter commands to play the file in "Home" folder

Command 1:

```
cd /home/linaro/
```

Command 2: Audio from speaker (press ctrl+c to stop)

```
aplay -D hw:0,0 Balloon_wav.wav
```

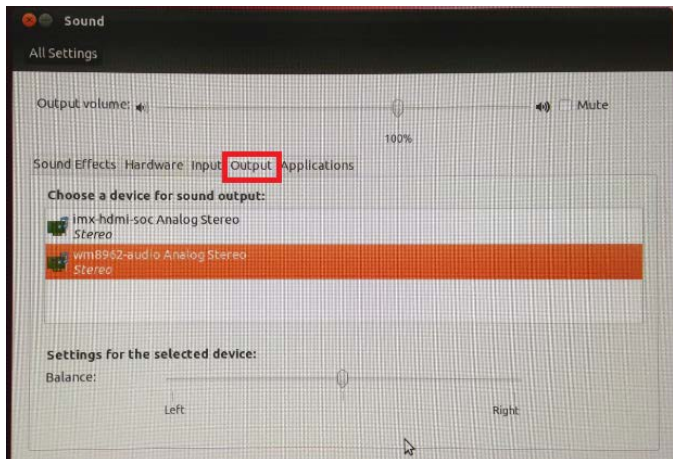


Command 3: Audio from HDMI (press ctrl+c to stop)

```
aplay -D hw:1,0 Balloon_wav.wav
```

3. Play audio in Linux
  - i. Confirm if the sound setting is right

**System Settings → Sound → Output**



- ii. Double click audio file to play
4. Setting in serial console before microphone test
  - i. Type command to setp up codec

**Command 1:**

```
amixer sset 'MIXINR IN3R' on
```

**Command 2:**

**amixer sset 'INPGAR IN3R' on**

5. Open Sounder Recorder and record voice



6. Play to confirm the function is working properly

### 4.3 LAN Function Test

---

1. Open the Terminal in Linux
2. Ping an IP and check if it works properly

#### Ping 168.95.1.1

```
linaro@linaro-ubuntu-desktop: ~/libsocketcan-0.0.8
64 bytes from 192.168.1.1: icmp_req=33 ttl=64 time=3.80 ms
64 bytes from 192.168.1.1: icmp_req=34 ttl=64 time=1.85 ms
64 bytes from 192.168.1.1: icmp_req=35 ttl=64 time=0.798 ms
64 bytes from 192.168.1.1: icmp_req=36 ttl=64 time=5.85 ms
64 bytes from 192.168.1.1: icmp_req=37 ttl=64 time=0.746 ms
64 bytes from 192.168.1.1: icmp_req=38 ttl=64 time=1.71 ms
64 bytes from 192.168.1.1: icmp_req=39 ttl=64 time=1.50 ms
64 bytes from 192.168.1.1: icmp_req=40 ttl=64 time=1.35 ms
64 bytes from 192.168.1.1: icmp_req=41 ttl=64 time=4.55 ms
64 bytes from 192.168.1.1: icmp_req=42 ttl=64 time=2.72 ms
64 bytes from 192.168.1.1: icmp_req=43 ttl=64 time=0.710 ms
64 bytes from 192.168.1.1: icmp_req=44 ttl=64 time=1.78 ms
64 bytes from 192.168.1.1: icmp_req=45 ttl=64 time=3.79 ms
64 bytes from 192.168.1.1: icmp_req=46 ttl=64 time=1.80 ms
64 bytes from 192.168.1.1: icmp_req=47 ttl=64 time=2.11 ms
64 bytes from 192.168.1.1: icmp_req=48 ttl=64 time=2.46 ms
64 bytes from 192.168.1.1: icmp_req=49 ttl=64 time=0.707 ms
64 bytes from 192.168.1.1: icmp_req=50 ttl=64 time=1.72 ms
64 bytes from 192.168.1.1: icmp_req=51 ttl=64 time=2.24 ms
AC
--- 192.168.1.1 ping statistics ---
51 packets transmitted, 51 received, 0% packet loss, time 50054ms
rtt_min/avg/max/mdev = 0.597/2.144/5.859/1.253 ms
linaro@linaro-ubuntu-desktop:~/libsocketcan-0.0.8
```

## 4.4 USB Function Test

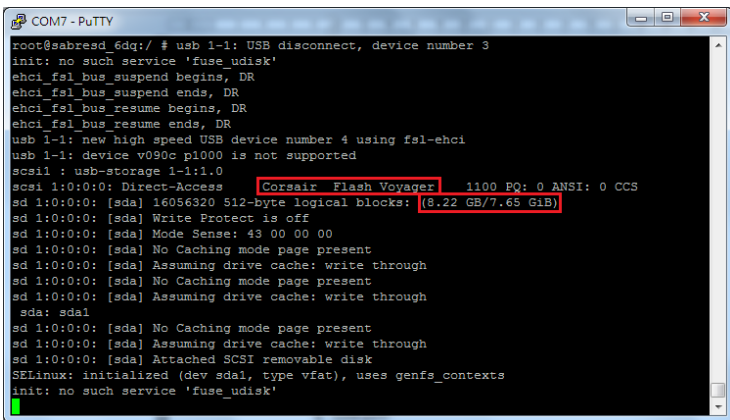
---

### USB Keyboard and mouse

1. Connect a USB keyboard and mouse to connector USB1, USB3, and USB4
2. Confirm if letters, numbers, and symbols can be typed from the keyboard.
3. Confirm if the mouse controls a cursor and is clickable

## USB 2.0 Removable device

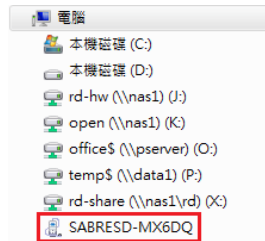
1. Connect a USB flash drive to connector USB1, USB3, and USB4
2. Confirm if the drive can be detected and the information in putty is correct



```
COM7 - PuTTY
root@esabresd 6dq:/ # usb 1-1: USB disconnect, device number 3
init: no such service 'fuse_udisk'
ehci_fsl_bus_suspend begins, DR
ehci_fsl_bus_suspend ends, DR
ehci_fsl_bus_resume begins, DR
ehci_fsl_bus_resume ends, DR
usb 1-1: new high speed USB device number 4 using fsl-ehci
usb 1-1: device v090c p1000 is not supported
scsi1 : usb-storage 1-1:1.0
scsi 1:0:0:0: Direct-Access   Corsair Flash Voyager   1100 PQ: 0 ANSI: 0 CCS
sd 1:0:0:0: [sda] 16056320 512-byte logical blocks: (8.22 GB/7.65 GiB)
sd 1:0:0:0: [sda] Write Protect is off
sd 1:0:0:0: [sda] Mode Sense: 43 00 00 00
sd 1:0:0:0: [sda] No Caching mode page present
sd 1:0:0:0: [sda] Assuming drive cache: write through
sd 1:0:0:0: [sda] No Caching mode page present
sd 1:0:0:0: [sda] Assuming drive cache: write through
'sda: sdal
sd 1:0:0:0: [sda] No Caching mode page present
sd 1:0:0:0: [sda] Assuming drive cache: write through
sd 1:0:0:0: [sda] Attached SCSI removable disk
SELinux: initialized (dev sda1, type vfat), uses genfs_contexts
init: no such service 'fuse_udisk'
```

## USB OTG

1. Connect the USB keyboard, mouse, and flash drive to CN9
2. Confirm if the peripherals can work properly under host mode
3. Connect the PICO-IMX6 (CN9) with the PC with the USB OTG cable
4. Confirm if a new storage device **SAVRESD-MX6DQ** is recognized by the PC.



## UART Function Test – Method 1

1. Debug port (same test method as Android. Refer to section 5.1)
2. COM Port

i. Insert the **COM port loopback tool** in connector **COM1**

ii. Set speed as 115200 by command in PC serial console

```
stty -F /dev/ttymx1 115200
```

iii. Enter COM port setting

```
minicom -s
```

```
+-----[configuration]-----+
| Filenames and paths          |
| File transfer protocols     |
| Serial port setup          |
| Modem and dialing           |
| Screen and keyboard         |
| Save setup as dfl           |
| Save setup as..             |
| Exit                         |
| Exit from Minicom          |
+-----+
```

iv. Type A to G to change settings. Confirm if the **Serial Device**, **Bps/Par/Bits** and **Hardware Flow Control** are set correctly. Press Enter to quit.

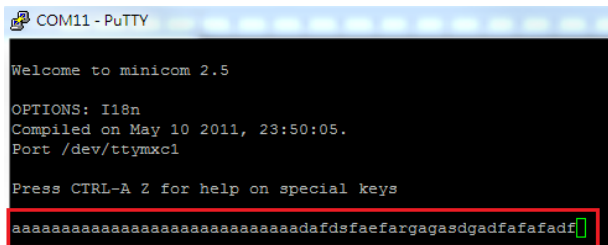
```
+-----+
| A - Serial Device           : /dev/ttymxc1 |
| B - Lockfile Location       : /var/lock   |
| C - Callin Program          :             |
| D - Callout Program         :             |
| E - Bps/Par/Bits           : 115200 8N1  |
| F - Hardware Flow Control   : Ng       |
| G - Software Flow Control   : No         |
|                             |           |
| Change which setting? [ ] |
+-----+
```

- v. **Save setup as dfl and Exit.**

```
+-----[configuration]-----+
| Filenames and paths |
| File transfer protocols |
| Serial port setup |
| Modem and dialing |
| Screen and keyboard |
| Save setup as dfl |
| Save setup as.. |
| Exit |
| Exit from Minicom |
+-----+

```

- vi. Entered text will be shown.



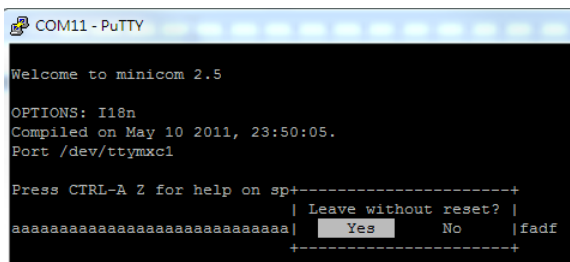
```
COM11 - PuTTY
Welcome to minicom 2.5
OPTIONS: I18n
Compiled on May 10 2011, 23:50:05.
Port /dev/ttyxc1
Press CTRL-A Z for help on special keys
aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaadafdsfaefargagasdgadfafafadf

```

- vii. If the COM port is set correctly, skip step ii to v and enter the following command to start the test

**minicom -D /dev/ttyxc1**

- viii. Press **Ctrl+A, Q** to leave minicom



```
COM11 - PuTTY
Welcome to minicom 2.5
OPTIONS: I18n
Compiled on May 10 2011, 23:50:05.
Port /dev/ttyxc1
Press CTRL-A Z for help on sp+-----+
| Leave without reset? |
aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa| Yes No |fadf
+-----+

```



## UART function Test – Method 2

1. Insert the **COM port loopback tool** in connector **COM1**
2. Copy **comport-test** to home folder in Linux
3. Enter the following command to start test

Command 1:

```
cd /home/linaro
```

Command 2:

```
chmod 777 comport-test
```

Command 3:

```
./comport-test
```

4. Confirm if the test results are shown as “PASS”

```
root@linaro-ubuntu-desktop:~# cd /home/linaro
root@linaro-ubuntu-desktop:/home/linaro# chmod 777 comport-test
root@linaro-ubuntu-desktop:/home/linaro# ./comport-test
PASS
root@linaro-ubuntu-desktop:/home/linaro# █
```

## 4.5 SPI Flash Test

---

1. Enter U-boot mode: Press **Enter** before the countdown finishes.

```
Writing to MMC(3)... done
JEDEC ID: 0xc2:0x20:0x16
MAC address = ff:ff:ff:ff:ff:ff
i2c_addr:chip address cycle fail(a1)
i2c_addr failed
Error reading the chip.
Hit any key to stop autoboot: 0
MX6Q SABRESB U-Boot >
```

2. Enter Command 1 to show the SPI device M25P32:

**sf probe 0**

```
MX6Q SABRESB U-Boot > sf probe 0
JEDEC ID: 0xc2:0x20:0x16
4096 KiB M25P32 - 4MB at 0:0 is now current device
MX6Q SABRESB U-Boot >
```

3. Enter Command 2 to erase the data at address 0x10000 of SPI flash

**sf erase 0 0x10000**

4. Enter Command 3 and Command 4 to write data into SPI flash. "SUCCESS" will be shown after the process completes.

**mw.l 0x12000000 0x54612354 0x100000** (Command 3)

**sf write 0x12000000 0x0 0x1000** (Command 4)

```

MX6Q SABRESD U-Boot > sf probe 0
JEDEC ID: 0xc2:0x20:0x16
4096 KiB M25P32 - 4MB at 0:0 is now current device
MX6Q SABRESD U-Boot > sf erase 0 0x10000
MX6Q SABRESD U-Boot > mw.l 0x12000000 0x54612354 0x100000
MX6Q SABRESD U-Boot > sf write 0x12000000 0x0 0x1000
..... SUCCESS
MX6Q SABRESD U-Boot > █

```

5. Enter Command 5 and Command 6 to read back the value 54612354 written in the SPI flash previously.

**sf read 0x13000000 0x0 0x1000** (Command 5)

**md 0x13000000** (Command 6)

```

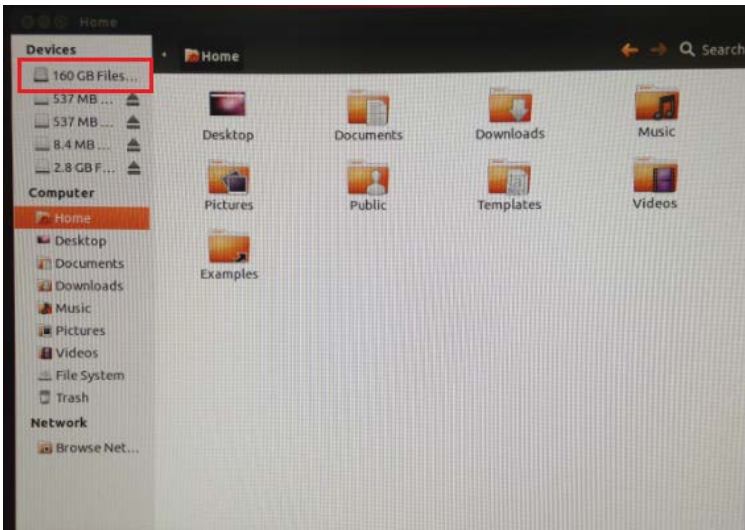
COM7 - PuTTY
MX6Q SABRESD U-Boot > sf read 0x13000000 0x0 0x1000
MX6Q SABRESD U-Boot > md 0x13000000
13000000: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
13000010: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
13000020: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
13000030: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
13000040: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
13000050: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
13000060: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
13000070: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
13000080: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
13000090: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
130000a0: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
130000b0: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
130000c0: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
130000d0: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
130000e0: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
130000f0: 54612354 54612354 54612354 54612354 54612354 T#aTT#aTT#aTT#aT
MX6Q SABRESD U-Boot > █

```

## 4.6 SATA Function Test

---

1. Connect a SATA HDD to SATA1 and CN20
2. Check if the SATA HDD is recognized as a storage device and that it worked properly in Linux.



3. Enter the command below in the terminal to confirm SATA HDD  
**cat /proc/partitions**

## 4.7 CAN Bus Function Test

---

1. Install the CAN Bus test tool
  - i. Copy **canutils-4.0.6.tar.bz2** and **libsocketcan-0.0.8.tar.bz2** to “Home Folder” and extract them.
  - ii. Enter command in serial console to install CAN Bus tool (Note: Check if date and time is correct before install)

Command 1:

**cd /home/linaro/libsocketcan-0.0.8**

Command 2:

**./configure**

Command 3:

**make**

Command 4:

**make install**

Command 5:

**cd**

Command 6:

**cd canutils-4.0.6**

Command 7:

**./configure**

Command 8:

**make**

Command 9:

**make install**

Command 10:

**Ldconfig**

2. Prepare two PICO-IMX6 as transmitter and receiver
3. Connect them together with CAN\_BUS1 as outlined below  
**CANH to CANH; CANL to CANL; GND to GND**
4. In Linux, enter the following commands into the **receiver's terminal**

Command 1:

**canconfig can0 bitrate 500000**

Command 2:

**ifconfig can0 up**

Command 3:

**canecho can0 -v**

5. In Linux, enter the following commands into **transmitter's terminal**

Command 1:

**canconfig can0 bitrate 500000**

Command 2:

**ifconfig can0 up**

Command 3:

**cansend can0 -i0x100 0x33 0x22 0x55 0x66**

6. Confirm if the receiver receives the correct value

```
COM1:115200baud - Tera Term VT
File Edit Setup Control Window Help

root@linaro-ubuntu-desktop:~# canconfig can0 bitrate 500000
can0 bitrate: 500000, sample-point: 0.866
root@linaro-ubuntu-desktop:~# ifconfig can0 up
root@linaro-ubuntu-desktop:~# cansend can0 -i0x100 0x33 0x22 0x55 0x66
interface = can0, family = 29, type = 3, proto = 1
root@linaro-ubuntu-desktop:~# cansend can0 -i0x100 0x66 0xAA 0xCC 0xFF
interface = can0, family = 29, type = 3, proto = 1
root@linaro-ubuntu-desktop:~#
```

Send data

Transmitter

```
COM5:115200baud - Tera Term VT
File Edit Setup Control Window Help

root@linaro-ubuntu-desktop:~# canconfig can0 bitrate 500000
can0 bitrate: 500000, sample-point: 0.866
root@linaro-ubuntu-desktop:~# ifconfig can0 up
root@linaro-ubuntu-desktop:~# canecho can0 -v
interface-in = can0, interface-out = can0, family = 29, type = 3, proto = 1
0100: [4] 33 22 55 66
0100: [4] 66 aa cc ff
```

received data

Receiver

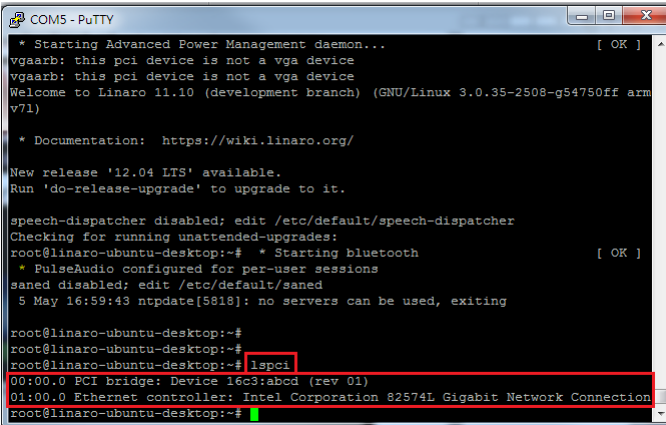
## 4.8 Mini PCIe Function Test

---

### mPCIe LAN and USB Card

1. Insert **PER-C11L** to connector **MINI\_CARD1**
2. Check if the mPCIe device is ready by entering the following command into the serial console

#### lspci



```
COMS - PuTTY
* Starting Advanced Power Management daemon... [ OK ]
vgaarb: this pci device is not a vga device
vgaarb: this pci device is not a vga device
Welcome to Linaro 11.10 (development branch) (GNU/Linux 3.0.35-2508-g54750ff armv7l)

* Documentation: https://wiki.linaro.org/

New release '12.04 LTS' available.
Run 'do-release-upgrade' to upgrade to it.

speech-dispatcher disabled; edit /etc/default/speech-dispatcher
Checking for running unattended-upgrades:
root@linaro-ubuntu-desktop:~# * Starting bluetooth [ OK ]
* PulseAudio configured for per-user sessions
saned disabled; edit /etc/default/saned
5 May 16:59:43 ntpdate[5818]: no servers can be used, exiting

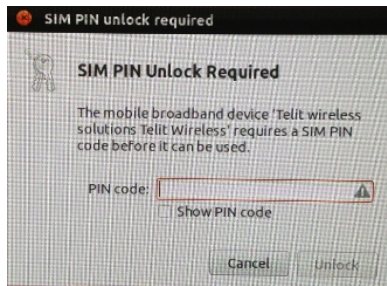
root@linaro-ubuntu-desktop:~#
root@linaro-ubuntu-desktop:~#
root@linaro-ubuntu-desktop:~# lspci
00:00.0 PCI bridge: Device 16c3:abcd (rev 01)
01:00.0 Ethernet controller: Intel Corporation 82574L Gigabit Network Connection
root@linaro-ubuntu-desktop:~#
```

3. Confirm if the LAN and USB functions are correct



## mPCIe 3G Card

1. Insert HE910D to connector **MINI\_CARD1** and SIM card to **SIM1**
2. In Linux, when a dialog box asking for a PIN code is shown, the 3G card is ready to be used.



3. Enter the following command to check SIM card ID

Command 1:

```
cat /dev/ttyACM0 &
```

Command 2:

```
echo -en "AT+CCID\r" > /dev/ttyACM0
```

```
root@linaro-ubuntu-desktop:/home/linaro# cat /dev/ttyACM0 &
[1] 6668
root@linaro-ubuntu-desktop:/home/linaro# echo -en "AT+CCID\r" > /dev/ttyACM0
root@linaro-ubuntu-desktop:/home/linaro#
+CCID: 89886920032035152988
OK
```

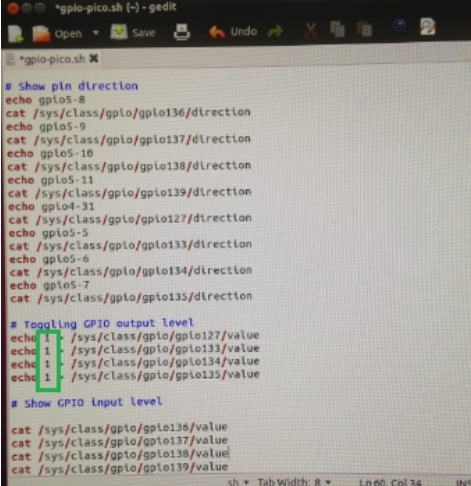
## 4.9 GPIO Function Test

---

1. Connect CN37 with the testing fixture



2. Use **GPIO-PICO.sh** for this test
  - i. Copy **GPIO-PICO.sh** to the Home folder in Linux
  - ii. In the PC serial console, change the authority of **GPIO-PICO.sh** by entering the following command:  
 Command 1:  
**cd /home/linaro/**  
 Command 2:  
**chmod 777 gpio-pico.sh**
  - iii. Open **GPIO-PICO.sh** and modify GPIO127, GPIO133, GPIO134, and GPIO135

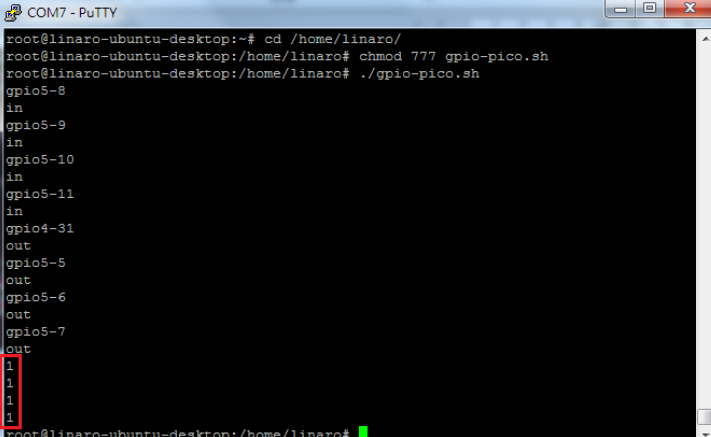


```
*gpio-pico.sh (-) - gedit
*gpio-pico.sh
# Show pin direction
echo gpio5-8
cat /sys/class/gpio/gpio136/direction
echo gpio5-9
cat /sys/class/gpio/gpio137/direction
echo gpio5-10
cat /sys/class/gpio/gpio138/direction
echo gpio5-11
cat /sys/class/gpio/gpio139/direction
echo gpio4-31
cat /sys/class/gpio/gpio127/direction
echo gpio5-5
cat /sys/class/gpio/gpio133/direction
echo gpio5-6
cat /sys/class/gpio/gpio134/direction
echo gpio5-7
cat /sys/class/gpio/gpio135/direction

# Toggling GPIO output level
echo 1 > /sys/class/gpio/gpio127/value
echo 1 > /sys/class/gpio/gpio131/value
echo 1 > /sys/class/gpio/gpio134/value
echo 1 > /sys/class/gpio/gpio135/value

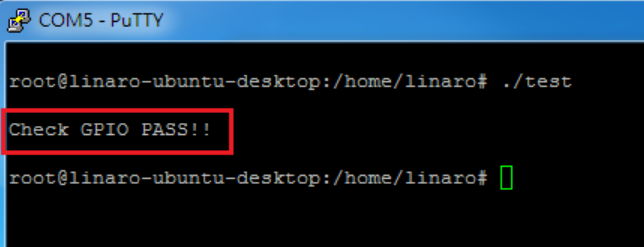
# Show GPIO input level
cat /sys/class/gpio/gpio136/value
cat /sys/class/gpio/gpio137/value
cat /sys/class/gpio/gpio138/value
cat /sys/class/gpio/gpio139/value
sh TabWidth: 8 Ln:60, Col:34 INS
```

- iv. Return to the PC serial console and enter the following command  
**./gpio-pico.sh**
- v. Check if the result is correct



```
COM7 - PuTTY
root@linaro-ubuntu-desktop:~# cd /home/linaro/
root@linaro-ubuntu-desktop:/home/linaro# chmod 777 gpio-pico.sh
root@linaro-ubuntu-desktop:/home/linaro# ./gpio-pico.sh
gpio5-8
in
gpio5-9
in
gpio5-10
in
gpio5-11
in
gpio4-31
out
gpio5-5
out
gpio5-6
out
gpio5-7
out
1
1
1
1
1
root@linaro-ubuntu-desktop:/home/linaro#
```

3. Use **sensor\_test.c** for auto test
  - i. Copy **sensor\_test.c** to the Home folder
  - ii. Use the following command in the serial console to compile the tool  
**cd /home/linaro/**  
**gcc -o test sensor\_test.c**
  - iii. Start test in the serial console and confirm the result  
**cd /home/linaro/**  
**./test**



```
COM5 - PuTTY
root@linaro-ubuntu-desktop:/home/linaro# ./test
Check GPIO PASS!!
root@linaro-ubuntu-desktop:/home/linaro#
```

Chapter

5

# Watchdog Timer Test

## 5.1 Watchdog Timer Test

---

1. In the Linux serial console, enter the following command to trigger the watchdog function.

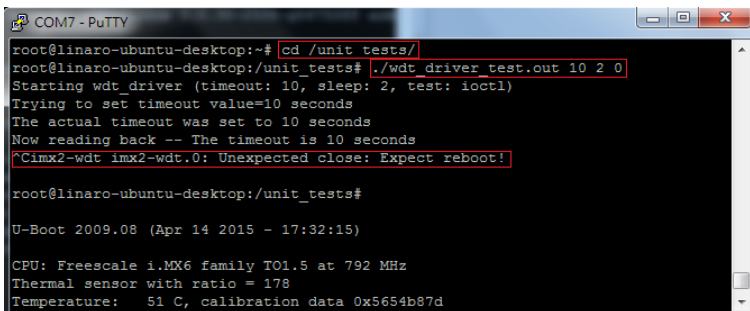
Command 1:

```
cd /unit_tests/
```

Command 2:

```
./wdt_driver_test.out 10 2 0
```

2. Stop the watchdog timer with **Ctrl+C** and the system will reset in 10 seconds.



```
COM7 - PuTTY
root@linaro-ubuntu-desktop:~# cd /unit_tests/
root@linaro-ubuntu-desktop:/unit_tests# ./wdt_driver_test.out 10 2 0
Starting wdt_driver (timeout: 10, sleep: 2, test: ioctl)
Trying to set timeout value=10 seconds
The actual timeout was set to 10 seconds
Now reading back -- The timeout is 10 seconds
^Cimx2-wdt imx2-wdt.0: Unexpected close: Expect reboot!

root@linaro-ubuntu-desktop:/unit_tests#

U-Boot 2009.08 (Apr 14 2015 - 17:32:15)

CPU: Freescale i.MX6 family T01.5 at 792 MHz
Thermal sensor with ratio = 178
Temperature: 51 C, calibration data 0x5654b87d
```