AXIOMTEK

Q7M120

Freescale i.MX6 Series ARM-based Qseven System-on-Module

Hardware User's Manual

RoHS

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CAUTION

If you replace wrong batteries, it causes the danger of explosion. It is recommended by the manufacturer that you follow the manufacturer's instructions to only replace the same or equivalent type of battery, and dispose of used ones.

ESD Precautions

Computer boards have integrated circuits sensitive to static electricity. To prevent chipsets from electrostatic discharge damage, please take care of the following jobs with precautions:

■ Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.

■ Before holding the board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. It discharges static electricity from your body.

■ Wear a wrist-grounding strap, available from most electronic component stores, when handling boards and components.

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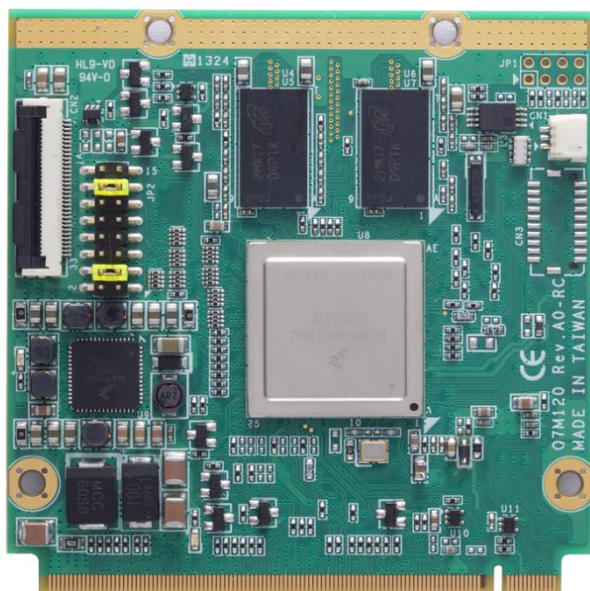
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Chapter 1
Introduction

The Q7M120 is a new Qseven module to support Freescale i.MX6series SoCs. It integrates system memory, storage as eMMC/SDHC socket, TTL LCD, audio, USB host/client, UARTs, CANBus and various I/O features. Taking the low power consumption advantages of ARM RISC architecture, the Q7M120 is extremely suitable to be deployed in the deeply embedded applications; such as HMI, data logger, extended temperature embedded controllers, etc.

1.1 Features

● Freescale i.MX6 family SoC information:

Feature	i.MX6Quad(1.2GHz)	i.MX6DualLite(800MHz)	i.MX6Solo(800MHz)
On-chip RAM	DDR3 1066MHz 1GB	DDR3 800MHz 1GB	DDR3 800MHz 512MB
Memory I/F	eMMC NAND Flash 1GB	eMMC NAND Flash 1 GB	eMMC NAND Flash 1 GB
Touchscreen	No	No	No
Ethernet	x1	x1	x1
Display	LVDS x1 24-bit TTL LCD HDMI x1	LVDS x1 24-bit TTL LCD HDMI x1	LVDS x1 24-bit TTL LCD HDMI x1
Storage	SATA x1 SD/SDHC x2	SD/SDHC x2	SD/SDHC x2
USB 2.0	OTG HS with HS PHY x1 HS Host with HS PHY x1	OTG HS with HS PHY x1 HS Host with HS PHY x1	OTG HS with HS PHY x1 HS Host with HS PHY x1
CAN	x2	x2	x2
JTAG	x1	x1	x1
SPI	x1	x1	x1
I2C	x3	x3	x3
UART	RS-232 x4	RS-232 x4	RS-232 x4
GPIO (w/ LED)	x8	x8	x8
Audio	Earphone x1 Line out x1 Mic-in x1	Earphone x1 Line out x1 Mic-in x1	Earphone x1 Line out x1 Mic-in x1
System Control	Buttons x2 (Power,Reset,) Touch Panel Wafer x1	Buttons x2 (Power,Reset,) Touch Panel Wafer x1	Buttons x2 (Power,Reset,) Touch Panel Wafer x1
Power	DC 5V, 5A CR2032 for Standby Power	DC 5V, 5A CR2032 for Standby Power	DC 5V, 5A CR2032 for Standby Power

● Onboard DDR3-1066 memory 1GB supports up to 2GB capacity
● Onboard eMMC flash as booting device
● 24-bit TTL LCD
● One USB 2.0 ports and One MicroUSB OTG port
● One 10/100/1000 Base-T Ethernet
● One 100/10 Base-T Ethernet
● IIS Audio

1.2 Specifications

- **CPU**
  - Freescale i.MX6 series SoC; default is i.MX6Q
  - ARM Cortex A9^{TM} CPU running at 1.2GHz.
  - 256KB integrated low power on-chip SRAM.
  - 64KB integrated mask-programmable on-chip ROM.

- **Boot ROM**
  - Linux kernel 3.0.35 compliant Android 4.3.1
    (Please contact your agent for detail shipping content).

- **System Memory**
  - 1GB Maximum up to 2GB DDR3-1066 memory.

- **USB Interface**
  - One USB 2.0 ports and One MicroUSB OTG port OTG comply with USB Spec. Rev. 2.0.

- **Storage Interface**
  - One eMMC NAND flash chip on module; default is 4GB.
  - One SATA Connector on base serial-ATA to interface with hard disk drives.
  - One SD/SDHC Connector on base with up to 32GB capacity.
  - One Micro SD Connector on base with up to 32GB capacity

- **Display**
  - Two LVDS channels, connectivity to displays with LVDS interface.
  - One parallel display ports, RGB Data of 18 or 24 bits.
  - One HDMI with up to 1920x1080 resolution.

- **Ethernet**
  - One 10/100/1000 Base-T with Freescale i.MX6 integrated MAC and Atheros AR8031 PHY, support IEEE std 1588-compatible hardware timestamp.
  - One 10/100 Base-T with AX88772B
  - Compatible with IEEE std 802.3.

- **Audio**
  - Freescale IIS SGTL5000 codec for MIC-in/headphone via Qseven MXM interface.

- **Serial Port**
  - Four RS-232, with 4-wire

- **CANBus**
  - Two 2.0B protocol-compatible Controller Area Network (CAN) via Qseven MXM interface.

- **I^{2}C**
  - Three I^{2}C Master/Slave interfaces (up to 400kbps) connected to Qseven MXM interface.

- **SPI**
  - One SPI channel for 2 chip select via Qseven MXM interface.

- **GPIO**
  - Eight GPIO interfaces (up to 400kbps) via Qseven MXM interface with buttons.

- **Power**
  - +5V ± 5% DC-in.

- **Form Factor**
  - 70mm x 70mm.
  - Thickness as 1.2mm ± 0.1mm.
  - Qseven specifications v2.0 compliant.

- **Environments**
  - Operating temperature with Imx6: -40 ~ 85ºC
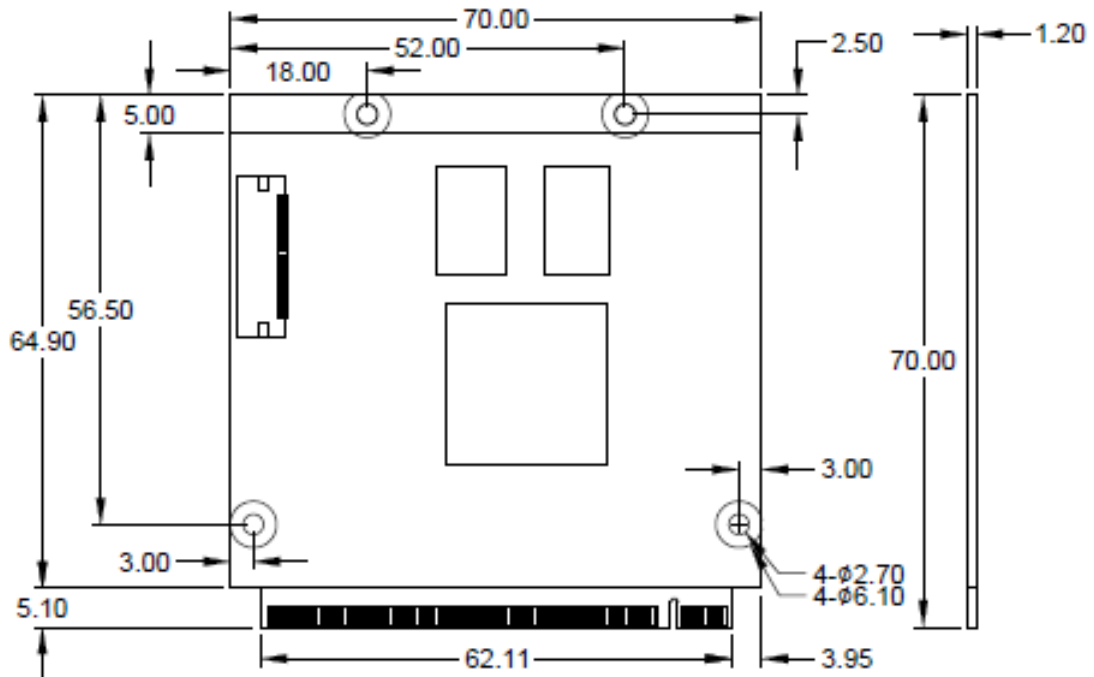 - Operating humidity: 10% RH ~ 85% RH relative humidity, non-condensing.

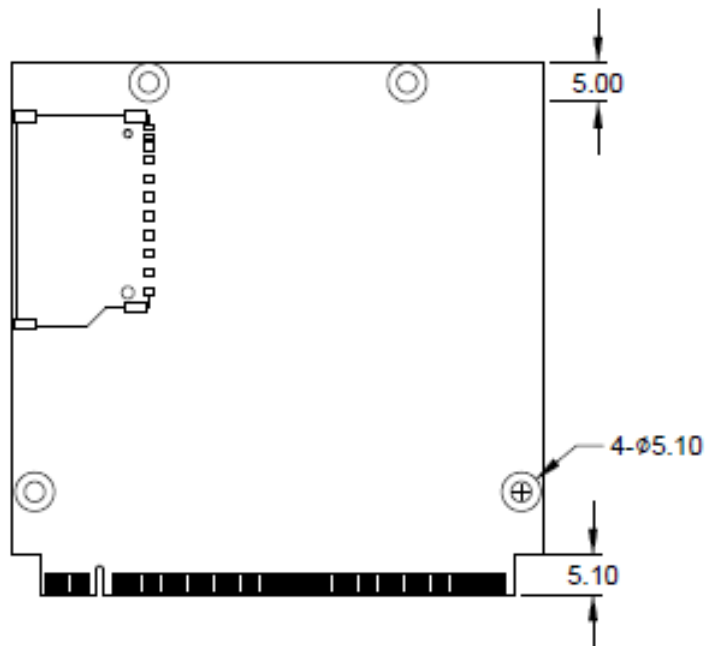*Note: **All specifications and images are subject to change without notice.***

Chapter 2
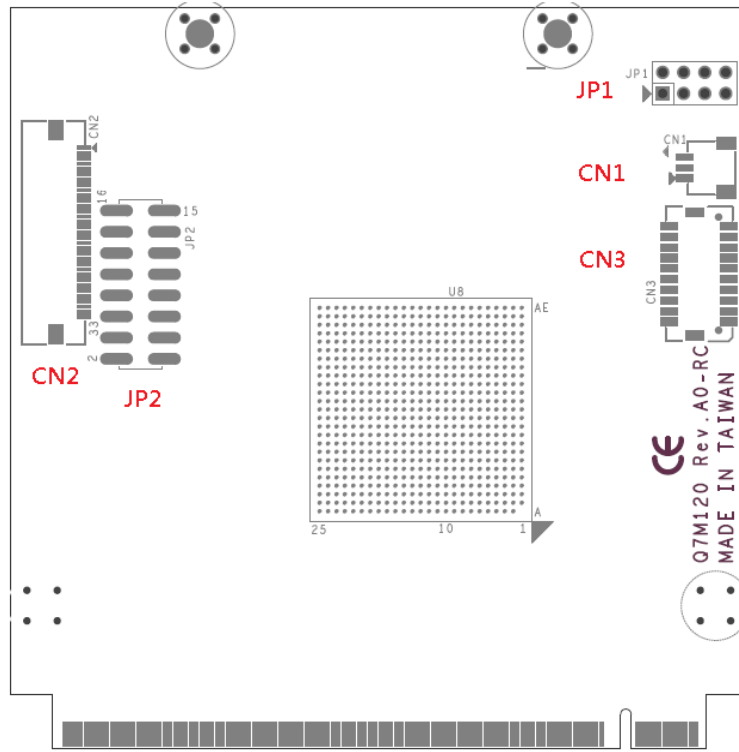# Board and Pin Assignments

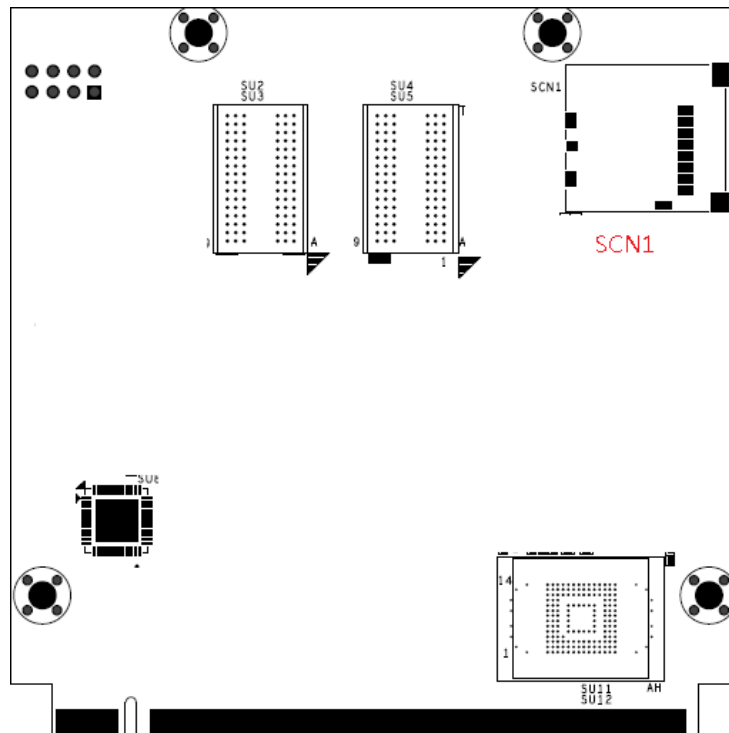## 2.1 Board Dimensions and Fixing Holes

Top View

Bottom View

2.2 Board Layout

Top View

Bottom View

2.3 Installing Heatsink & Heatspreader

For thermal dissipation, the heatsink & heatspreader enable the Q7M120 components to dissipate heat efficiently. All heat generating components are thermally conducted to the heatsink or heatspreader in order to avoid hot spots. Below procedures illustrate how to install the heatsink and heatspreader on Q7M120.

2.3.1 Heatsink

1. The heatsink is designed for the Q7M120 module. Before installing the heatsink to the CPU module, please ensure that the surface of the processor is clean and free of dust and finger oil. This is especially critical for Q7M120 module that is with high CPU speed to ensure that the heatsink acts as a proper thermal interface for cooling solutions.

2. Please tear the sticker protector, place the heatsink on top of the processor chip. It makes even contact all around


2.3.2 Heatspreader

1. The heatspreader is designed for the Q7M120 module. The thermal pad on the heatspreader is designed to make contact with the necessary components on the Q7M120 module. When mounting the heatspreader you must make sure that the thermal pads on the heatspreader make complete contact (no space between thermal pad and component) with the corresponding components on the Q7M120 module. This is especially critical for Q7M120 module that is with high CPU speed to ensure that the heat spreader acts as a proper thermal interface for cooling solutions.

2. This CPU module has four assembly holes for installing heat spreader plate. Use the four screws to secure the heat spreader plate to the Q7M120. Be careful not to over-tighten the screws

2.4 Connectors

Jumper is a small component consisting of jumper clip and jumper pins. Install jumper clip on 2 jumper pins to close. And remove jumper clip from 2 jumper pins to open. The following illustration shows how to set up jumper.
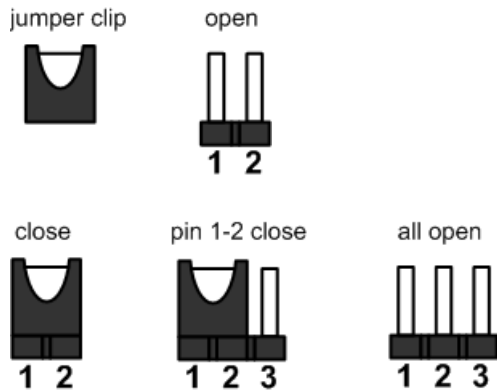
Below you can find a summary table of all jumpers and onboard default settings.

2.4.1   Boot Mode Selection (JP2)

These jumpers are for boot mode selection.

| Function	Setting
Copy image to eMMC	JP2 9-10, 11-12 Close
Boot to OS (Q7M120 eMMC) (Default)	JP2 1-2, 3-4 Close JP2 7-8, 11-12 Close JP2 13-14 Close
Boot to OS (Q7B120 SD Card)	JP2 3-4, 5-6,13-14 Close

2.5 Connectors

Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, please make sure all connectors are properly and firmly connected. Here is a summary table which shows all connectors on the hardware.

Connector	Description
CN1	Debug Port Connector
CN2	33-pin ZIF Connector

2.5.1   Debug Port Connector (CN1)

The CN1 is a 3-pin wafer connector for TX/RX debug UART port, see   table below.

Pin	Signal
1	Debug TX
2	Debug RX
3	GND
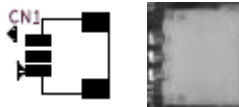
2.5.2   33-pin ZIF Connector (CN2)

This board has a 33-pin ZIF connector (CN2) for interfacing TTL LCD to baseboard.

Pin	Signal	Pin	Signal
1	GND	2	DISP0_DAT16
3	DISP0_DAT17	4	DISP0_DAT18
5	DISP0_DAT19	6	DISP0_DAT20
7	DISP0_DAT21	8	DISP0_DAT22
9	DISP0_DAT23	10	DISP0_DAT8
11	DISP0_DAT9	12	DISP0_DAT10
13	DISP0_DAT11	14	DISP0_DAT12
15	DISP0_DAT13	16	DISP0_DAT14
17	DISP0_DAT15	18	DISP0_DAT0
19	DISP0_DAT1	20	DISP0_DAT2
21	DISP0_DAT3	22	DISP0_DAT4
23	DISP0_DAT5	24	DISP0_DAT6
25	DISP0_DAT7	26	GND
27	DISP0_CLK	28	DISP0_CNTRST
29	DISP0_HSYNCH	30	DISP0_VSYNCH
31	DISP0_DRDY	32	GND
33	GND		

2.5.3 JTAG Connector (JP1)

This board has a JTAG Connector (JP1) for interfacing JTAG ICE TOOL.

Pin	Signal	Pin	Signal
1	GEN_3V3	2	JTAG_TMS
3	JTAG_nTRST	4	JTAG_TCK
5	JTAG_TDI	6	JTAG_TDO
7	GND	8	POR_B

2.5.4 20-pin Connector (CN3)

This board has a 20-pin connector (CN3) for interfacing to MIPI camera module.

Pin	Signal	Pin	Signal
1	GPIO_0_CLKO	2	PMIC_5V
3	CSI_RST_B	4	GND
5	INC_CSI_D2M	6	CSI_D1P
7	INC_CSI_D2P	8	CSI_D1M
9	GND	10	GND
11	INC_CSI_D3M	12	CSI_D0P
13	INC_CSI_D3P	14	CSI_D0M
15	GND	16	GND
17	I2C2_SCL	18	CSI_CLK0P
19	I2C2_SDA	20	CSI_CLK0M
21	NC	22	NC
23	NC	24	NC