CompactIMX6 Reference User Manual

V3. 2

Boardcon Embedded Design

www. boardcon. com

1. Introduction

1.1. About this Manual

This manual is intended to provide the user with an overview of the board and benefits, complete features specifications, and set up procedures. It contains important safety information as well.

1.2. Feedback and Update to this Manual

To help our customers make the most of our products, we are continually making additional and updated resources available on the Boardcon website (www.boardcon.com , www.armdesigner.com). These include manuals, application notes, programming examples, and updated software and hardware. Check in periodically to see what's new!

When we are prioritizing work on these updated resources, feedback from customers is the number one influence, If you have questions, comments, or concerns about your product or project, please no hesitate to contact us at support@armdesigner.com.

1.3. Limited Warranty

Boardcon warrants this product to be free of defects in material and workmanship for a period of one year from date of buy. During this warranty period Boardcon will repair or replace the defective unit in accordance with the following process:

A copy of the original invoice must be included when returning the defective unit to Boardcon. This limited warranty does not cover damages resulting from lighting or other power surges, misuse, abuse, abnormal conditions of operation, or attempts to alter or modify the function of the product.

This warranty is limited to the repair or replacement of the defective unit. In no event shall Boardcon be liable or responsible for any loss or damages, including but not limited to any lost profits, incidental or consequential damages, loss of business, or anticipatory profits arising from the use or inability to use this product.

Repairs make after the expiration of the warranty period are subject to a repair charge and the cost of return shipping. Please contact Boardcon to arrange for any repair service and to obtain repair charge information.

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1 CompactIMX6 Introduction

1.1 Summary

CompactIMX6 is a new card size computer with rich peripherals but size is only slightly larger than IC card.

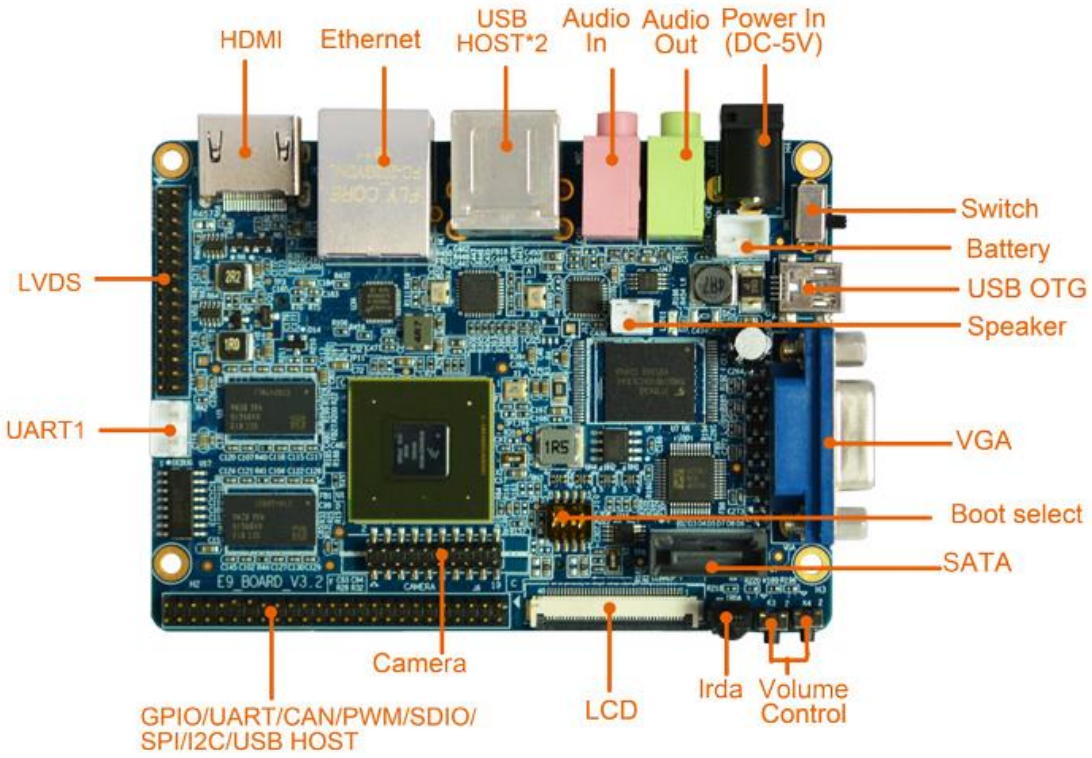
The design of the CompactIMX6 is based on Freescale's i.MX6Q, and mainly used in a variety of large-screen terminal display device. It provides comprehensive connectivity, including FPC, HDMI, VGA, LVDS, UART, USB Host, OTG USB, SATA, Audio, TF-CARD, Camera, 3G, CAN-Bus, G-Sensor, wifi, BlueTooth, Ir, RTC and so on, supports a variety of expansion modules, but size is only 100mm * 72mm.

The Freescale i.MX6Q processor is tailored for use in multimedia-centric smart mobile devices, driver information systems including infotainment and graphical instrument clusters, and portable medical devices. The i.MX 6 is based on the ARM Cortex A9 MPCore™ Platform, designed in 40 nm process, operation frequency up to 1.2GHz with ARMv7TM, Neon, VFPV3 and Trustzone support. The processor is 64/32 bit bus structure, 32/32KB L1 I/D-Cache,1M L2-Cache, 12000DMIPS, built-in 3D graphics acceleration engine, 2D graphics acceleration, supports up to 4096*4096 pixels resolution. Video encoding supports MPEG-4/H.263/H.264 1080p @ 30fps; video decoding MPEG2/VC1/Xvid up to 1080p @ 30fps. And it also supports HD HDMI TV output.

i.MX6Q is a high-performance, low-power processor. It's applied to Handheld Electronic Equipment, Communication Equipment, Medical Application Equipment, Learning Machine, Notebook, Video, Surveillance Equipment and a variety of Man-machine interface, etc., such as HD Games, Wireless GPS Navigation, Mobile Video Playback, Intelligent Control, Instrumentation, Navigation Devices, PDA Devices, Remote Monitoring, Game Development and so on.

CompactIMX6 leads out most of i.MX6Q functional interfaces, and supports multi-system operation. Android4.2 and Ubuntu 12.04 have been achieved and released.

1.2 CompactIMX6 Specifications

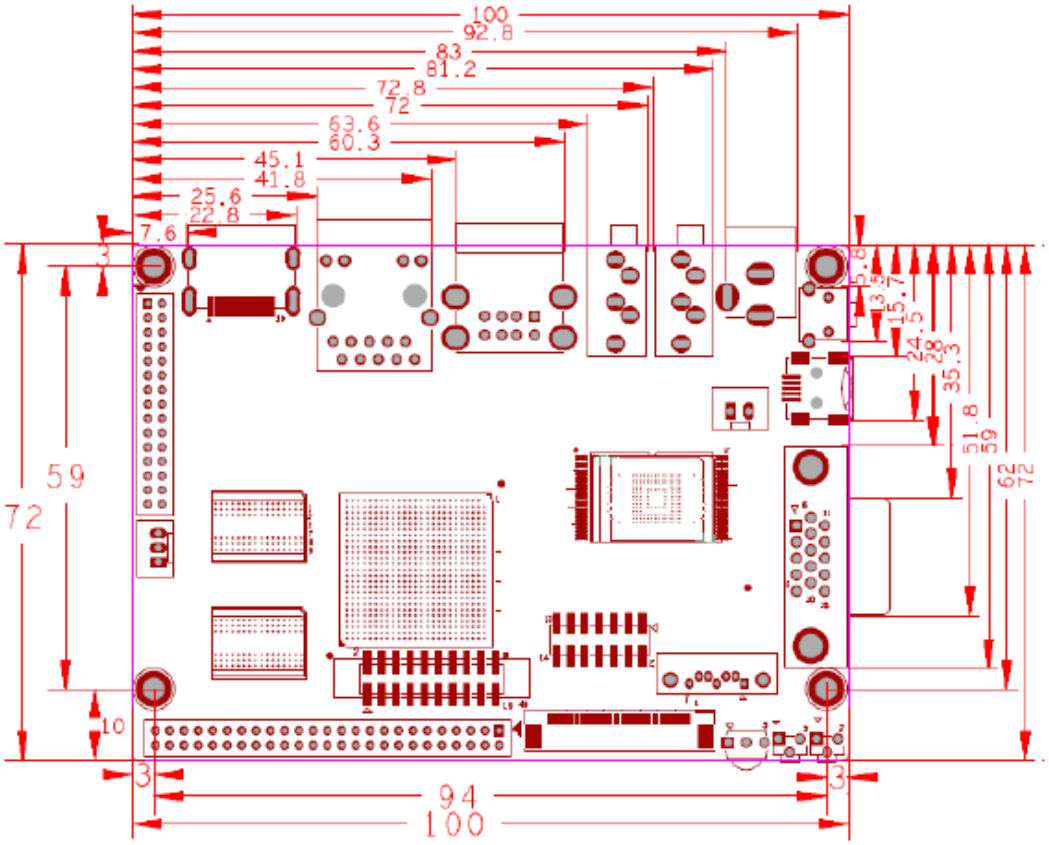


Feature	Specifications
CPU	Freescale™ i.MX6Q Quad-core/ i.MX6D Dual-core, Cortex-A9 @ 1.2GHz
Memory	2GB / 1GB DDR3, 1066MHz, soldered
Flash	optional on-board 4GB/8GB (Ext 64G) eMMC Flash, Nand Flash customized
Power	12V/2A
Power on/off	One key to power on/off, sleep/wake
Boot mode	Support boot from eMMC, Micro SD
Power consumption	< 5W (5V-800mA, the stand-alone boot peak)
USB OTG	1 x USB2.0 OTG
USB HOST	2 x USB2.0 Host, 2-ch Extendable USB Host
Speaker	1W (8Ω)
HDMI	HDMI V1.4, 1080p@30fps
VGA	Maximum resolution 1360*768
LVDS	Dual-CH LVDS. Capacitive screen or resistive screen
Audio	MIC/ Phone interface
Ethernet	10/100M/1000M Ethernet, RJ45 Interface
UART	1 x Three-wire RS232 serial port(debug) 3 x Extendable Serial ports

SATA	1x SATA-II Interface (3Gbit/s, not for Single-Core CPU)
LCD	40pin FPC interface, support capacitive / resistive touch screen
RTC	Real Time Clock, powered by external lithium battery
SD card	1 x micro SD card slot
Camera	CMOS camera interface
IrDA	Infrared remote control
User buttons	2 x User buttons, for Volume control
Expandable Interface	2x USB Host, 15x interrupt IO, 2x CAN, 3x UART, 1x SPI, 1x SDIO, 1x I2C, 2x PWM
PCB layer	8 Layers, complying with EMC/EMI
Dimension	100 x 72 x 20mm

1.3 PCB Dimension

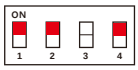
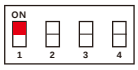
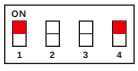
Unit: mm. Border Size: 100 * 72. Positioning hole outside diameter: Φ5; inner diameter: Φ3



2 Schematic Introduction

2.1 Boot Mode

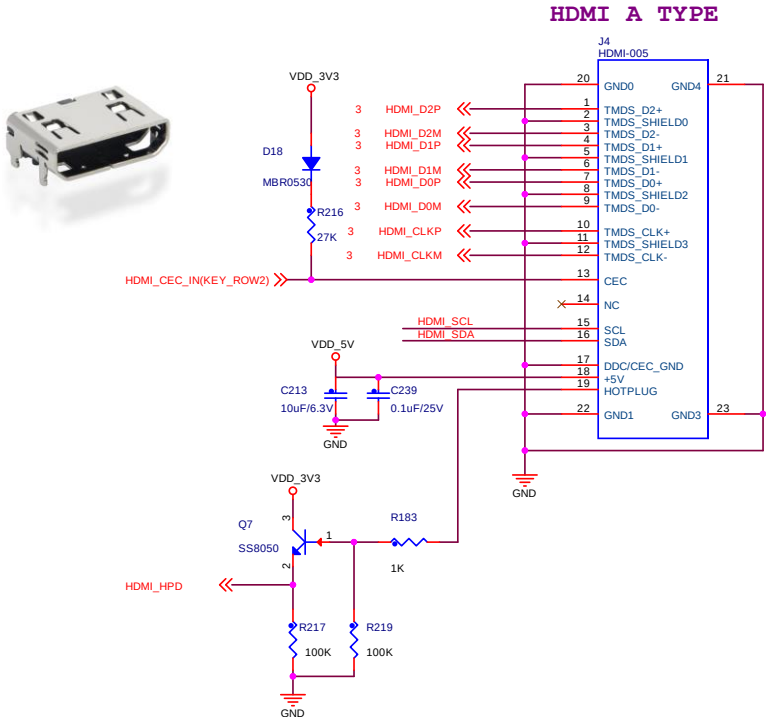
J10 dial switch for system boot mode selection, different mode can achieve different booting mode. The board is default as Flash(eMMC) booting. When the user needs to reburn image or change the operation system, it must set the booting mode in advance. The booting mode setting as following:

J10 / Boot Mode	1	2	3	4	 = ON
eMMC	1	1	0	1	
SD Card	1	0	0	0	
USB	1	0	0	1	

"1"= ON, "0" = OFF, "X" = ON/OFF

2.2 HDMI

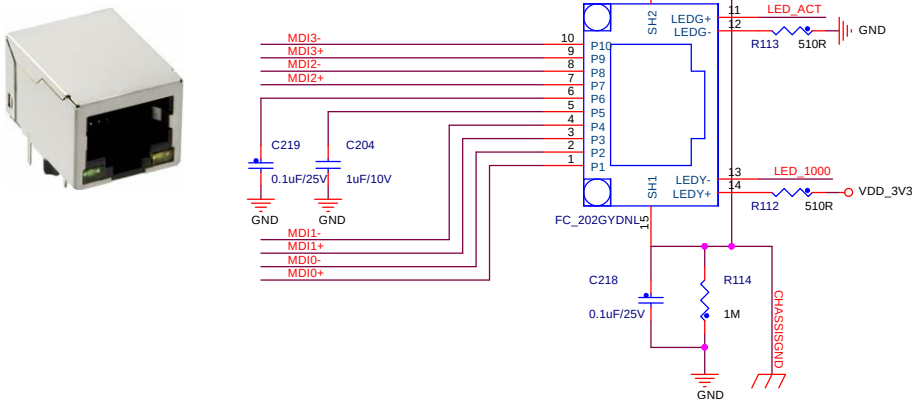
CompactIMX6 supports HDMI v1.4,1080p@30fps high-definition digital output and also can realize audio video synchronization output. The HDMI interface is the regular 19pins HDMI type A, with width 13.9mm and thickness 4.45mm.



2.3 1000M Ethernet

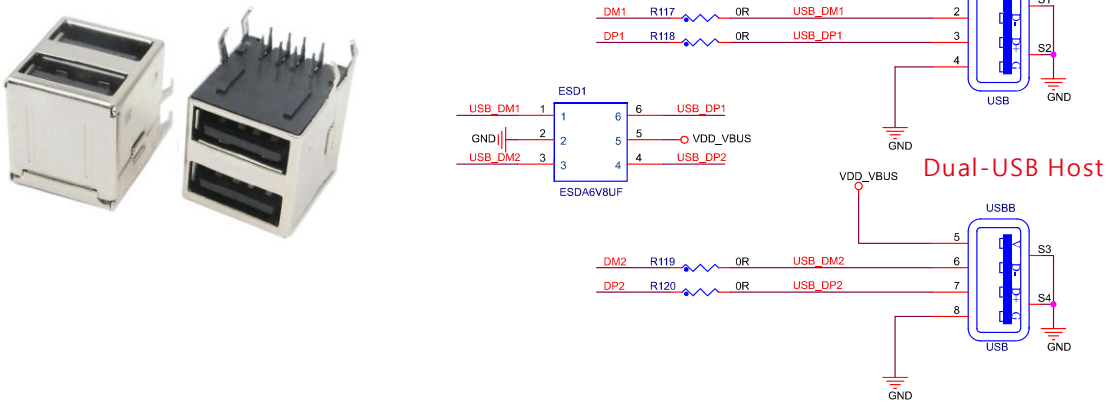
As Freescale i.MX6Q has integrated Gigabit Ethernet MAC, just need an external PHY chip can be used. The platform adopts AR8035 as the Ethernet chip, working in Gigabit mode, crystal 25M. Mode can be configured through the resistor R87 ~ R95. (Please refer to the Base Board Diagram and AR8035 Manual for detailed configuration). The board is configured as Gigabit full-duplex mode by default.

RJ-45 Connector (with Ethernet magnetic)



2.4 Dual-USB Host

The 4-ch USB HOST interface is extended by USB2514B which is an USB-HUB chip with high performance, low power and cost-effective. Support hot plug. Through the double-USB interface (USB1) and extended interface (J6), it can extend to 4-channel HOST. It supports external connection of USB WIFI, USB Bluetooth, USB mouse & keyboard, U disk and so on.



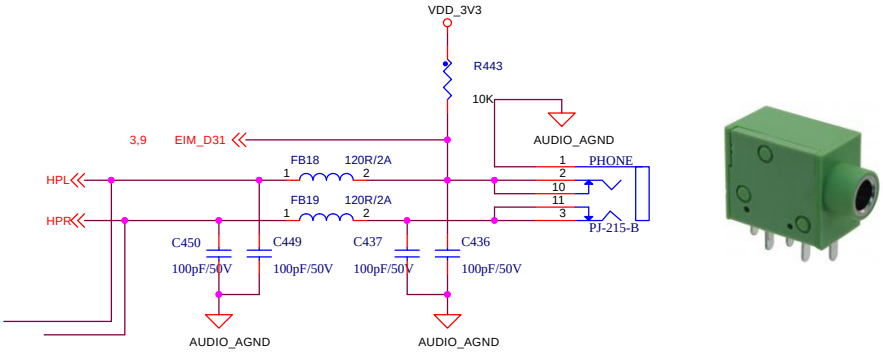
2.5 I2S Audio I/O

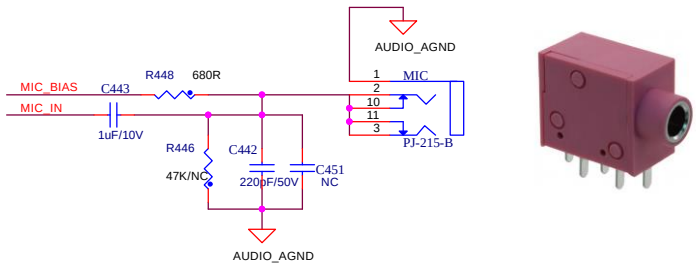
I2S Audio Circuit adopts Wolfson Microelectronics audio converter chip-- SGTL5000-XNAA3, which

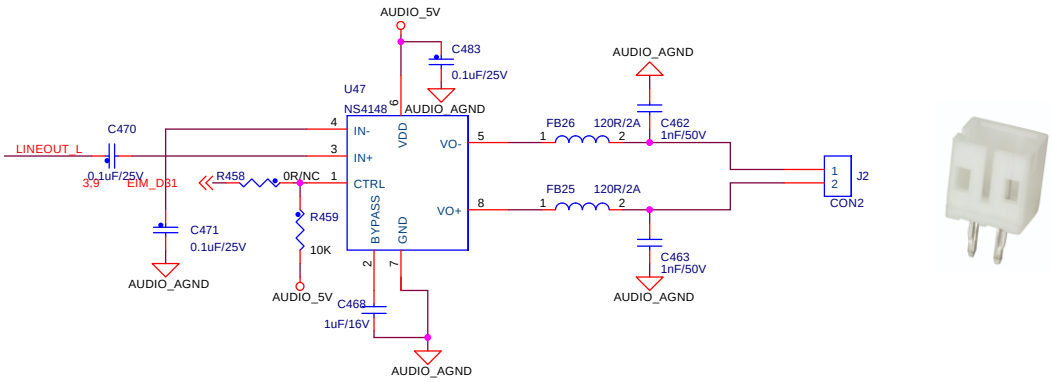
is a low power, high quality stereo coder-decoder, especially designed for portable digital audio applications.

SGTL5000-XNAA3 integrates a complete microphone interface and a stereo headphone driver. 24-bit sigma-delta ADC and DAC.

3.5mm Audio jack for output (green) and input (pink), 2pin header(white) for Speaker.



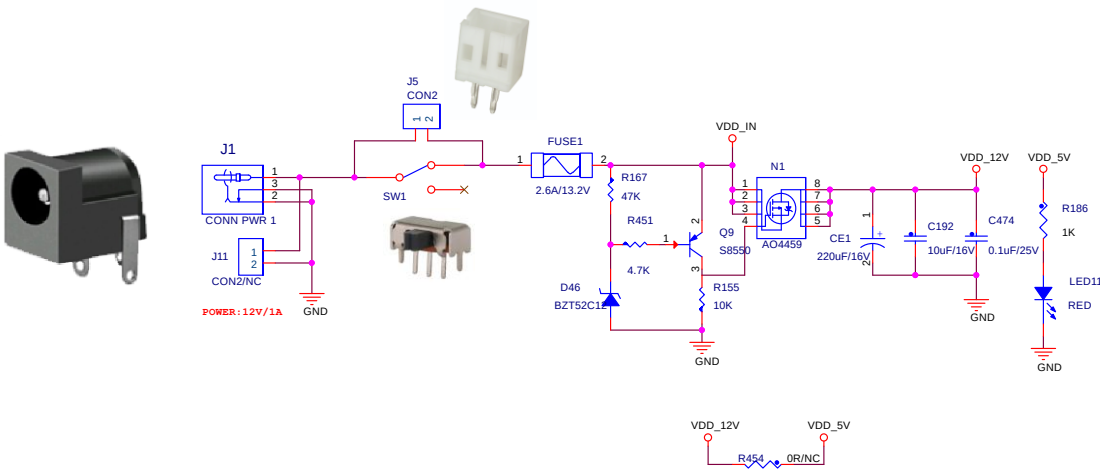




2.6 Power Input

- **12V Power In (J1)**

Standard **12V@2A** power adapter. BZT52C12 transient pipe and 13.2V recoverable fuse to protect the overcurrent of the power.



- **Reserved Power Switch (J5)**

J5 is the reserved power switch interface, 2.54mm pitch (white). It requires docking external switch leads when using. The function is skipping the power management circuit to control the board's power on/off.

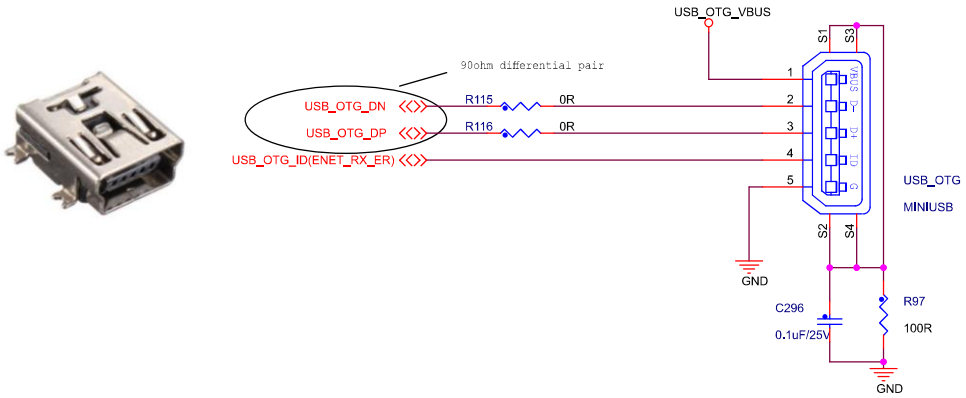
It can't be shut down after power on causing by soft shutdown if J5 is used as the power switch. In this case, it needs to modify the program to cancel the software control or remove the MOS N1 on the circuit.

- **Power ON/OFF Key**

SW1 is the power switch on/off for the board. The board is required 9V-12V, 2A-3A power supply.

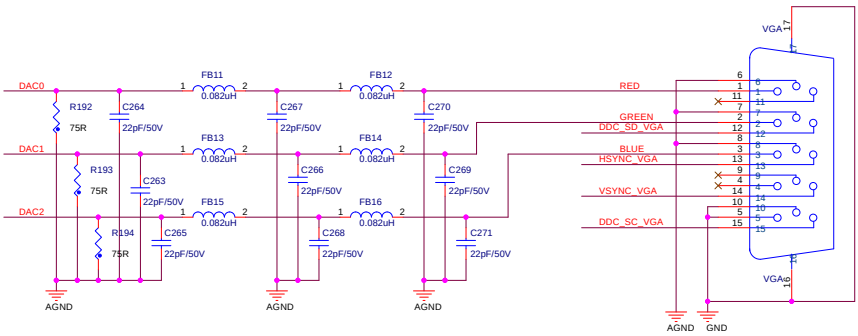
2.7 USB-OTG

USB-OTG is used as the USB slave.



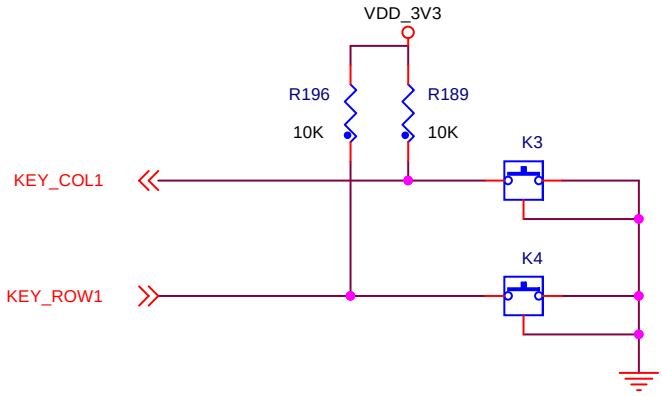
2.8 VGA

Standard 15-pin female connector. GM7123C DAC chipset.



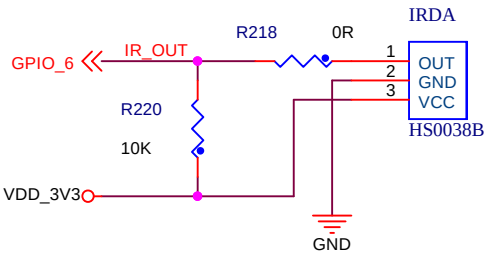
2.9 User Button

K3 and K4 are used for volume control.



2.10 IRDA

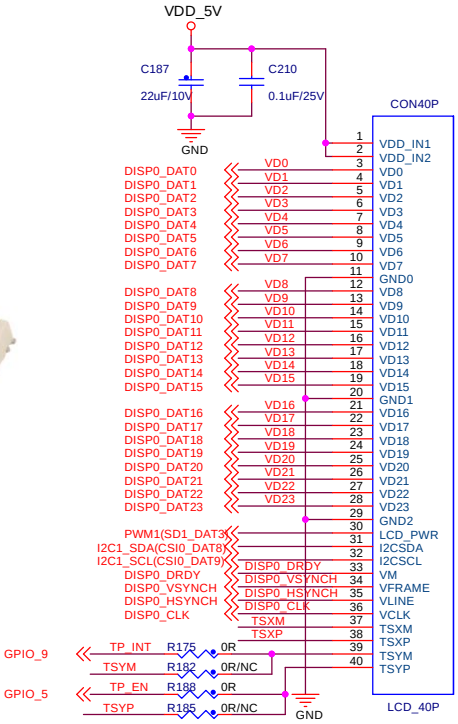
HS0038B miniature infrared receiver. Easy to use, low output level, compatible with TTL and CMOS, low power consumption, strong anti-interference.



2.11 LCD

40-Pin 0.5mm connector. Support resistive screen or capacitive screen (default capacitive screen). The touch signal is located at pins 37~39 of the interface.

Touch Screen	Soldering	NC
Resistive	U20, R182, R185	R175, R188
Capacitive	R175, R188	U20, R182, R185



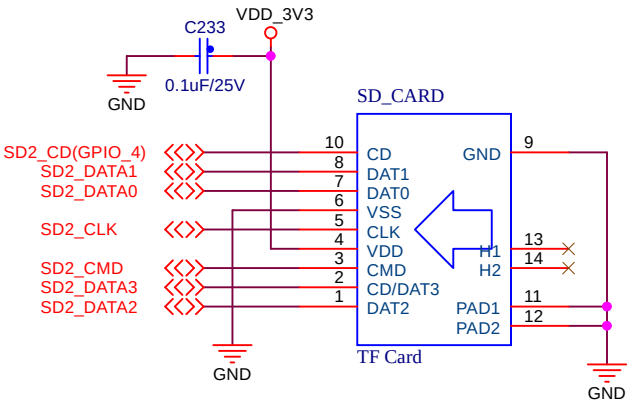
2.12 Camera

20-Pin 2.00mm connector. 3M pixel OV3640 module.

Pay attention to the direction, anti-plug will damage the camera module. The triangle symbol on the module must be inserted to the corresponding triangle symbol on the board.

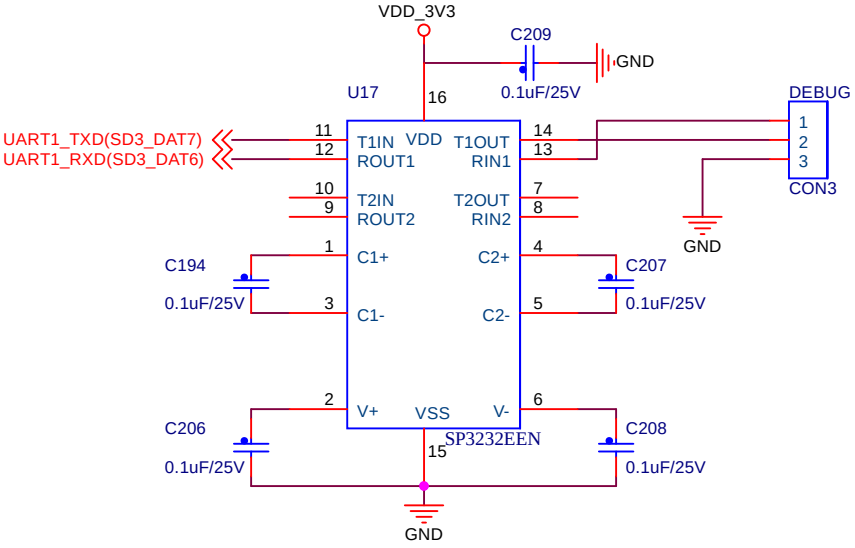
2.13 Micro SD

Micro SD slot is on the back side of CompactIMX6. If there is no program, set the mode as boot from SD card. The SD card can be set as automatic/manual flashing or U-Boot bootable card. After the system booted, Micro SD card can be used as an external storage device.



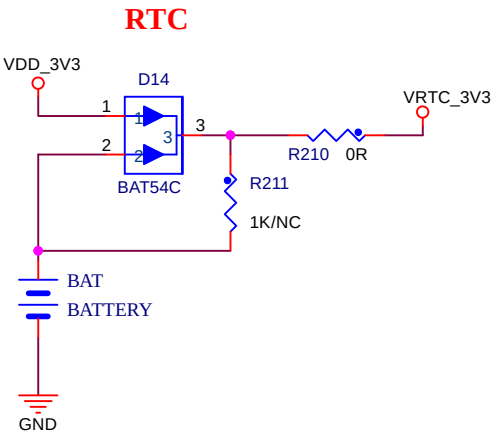
2.14 Debug Serial Port

3-Pin 2.00mm connector, RS232 UART.



2.15 RTC

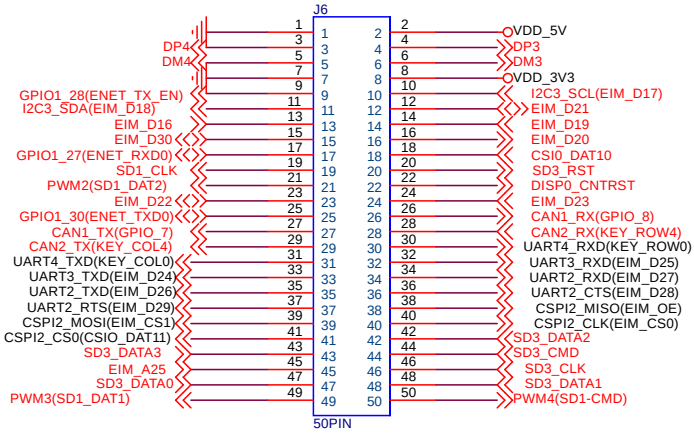
RTC is powered by external lithium battery. Battery model: CR1220. It is on the back side of the board.



2.16 Expandable Interface

2.00mm pitch 50-pin extension interface.

Interfaces: 5V & 3.3V power supply, 2-channel USB Host, 17-channel GPIO with interrupt function, 2-channel CAN, 3-channel UART, 1-channel SPI, 1-channel SDIO, 1-channel I2C, 2-channel PWM.



Pin	Signal	Descriptions
1	GND	Ground
2	5V	5V Power
3	DP4	3 work with 5, used as USB Host
4	DP3	4 work with 6, used as USB Host
5	DM4	3 work with 5, used as USB Host
6	DM3	4 work with 6, used as USB Host
7	GND	Ground
8	3.3V	3.3V Power
9	GPIO1_28	GPIO interface
10	GPIO1_27	GPIO interface
11	EIM_D17	external interrupt 4, used as IO
12	EIM_D21	external interrupt 5, used as IO
13	EIM_D16	external interrupt 6(work with IrDA), used as IO
14	EIM_D19	external interrupt 8, used as IO
15	EIM_D30	external interrupt 16, used as IO or matrix keyboard
16	EIM_D20	external interrupt 17, used as IO or matrix keyboard
17	EIM_D18	external interrupt 18, used as IO or matrix keyboard
18	CSI0_DATA10	external interrupt 19, used as IO or matrix keyboard
19	SD1_CLK	external interrupt 20, used as IO or matrix keyboard
20	SD3_RST	external interrupt 21, used as IO or matrix keyboard
21	GPIO_5	external interrupt 22, used as IO or matrix keyboard
22	GPIO_18	external interrupt 23, used as IO or matrix keyboard
23	EIM_D22	external interrupt 24, used as IO or matrix keyboard
24	EIM_D23	external interrupt 25, used as IO or matrix keyboard
25	GPIO1_30	external interrupt 26, used as IO or matrix keyboard

26	CAN1_RX	2-channel CAN Bus
27	CAN1_TX	
28	CAN2_RX	
29	CAN2_TX	
30	UART4_RXD	3.3V serial port
31	UART4_TXD	
32	UART3_RXD	3.3V serial port
33	UART3_TXD	
34	UART2_RXD	3.3V serial port, work with CTS and RTS, can be used as 5-wire serial port
35	UART2_TXD	
36	UART2_CTS	
37	UART2_RTS	
38	CSPI2_MISO	SPI interface, connect gravity sensor or other SPI devices
39	CSPI2_CS0	
40	CSPI2_CLK	
41	CSPI2_CS0	
42	SD3_DATA2	SD3, connect to SDIO wifi etc.
43	SD3_DATA3	
44	SD3_CMD	
45	EIM_A25	
46	SD3_CLK	
47	SD3_DATA0	
48	SD3_DATA1	
49	PWM3	PWM
50	PWM4	PWM