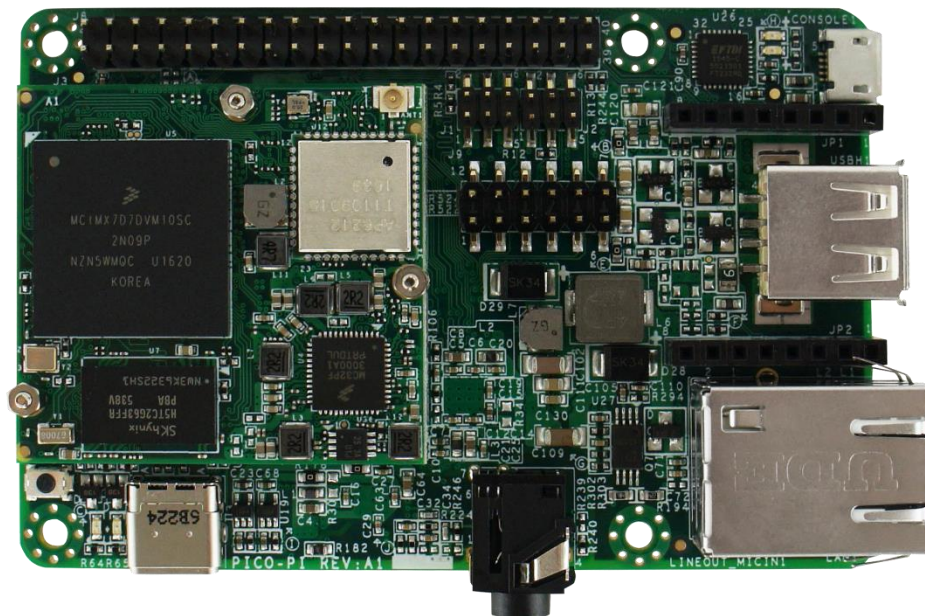




Pico i.MX7 Development Kit for Android Things Hardware Manual

REV B1

NXP i.MX7

April 5, 2017

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1. PICO-PI-IMX7 Product Overview

The PICO-PI-IMX7 is a 2 board development board consisting of a System-on-Module and a carrier baseboard and optimized for the Internet-of-Things (IoT).

Figure 1 - PICO-PI-IMX7 IC Identification and Overview

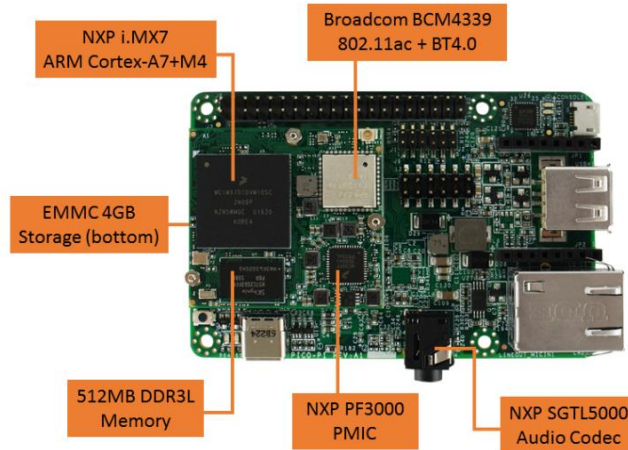


Figure 2 - PICO-PI-IMX7 Connector Overview

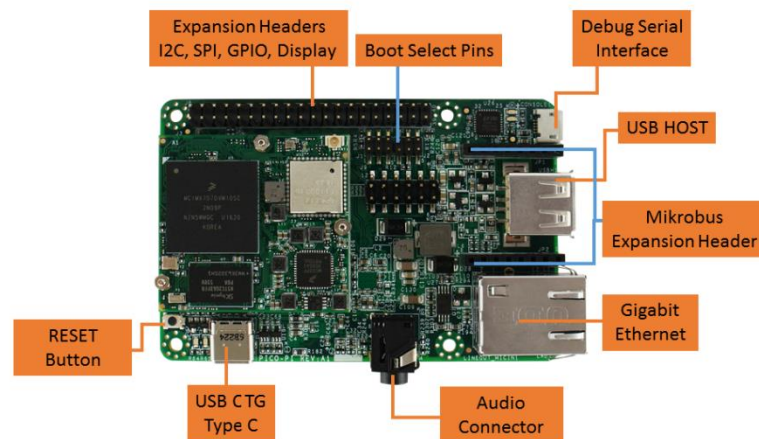
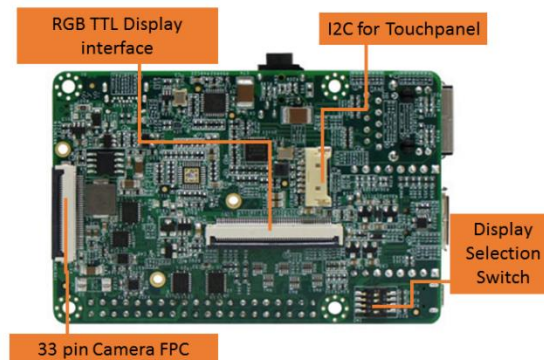


Figure 3 – PICO-PI-IMX7 Bottom Side Connector Overview



1.1. PICO-IMX7 System-on-Module Overview

The PICO-IMX7 System-on-Module (PICO-IMX7-EMMC) has 3 Hirose high-speed 70 pin board-to-board connectors and integrates the NXP i.MX7, Memory, eMMC, Power Management IC (PMIC) and WiFi / Bluetooth on the module.

Figure 4 - PICO-IMX7 System-on-Module

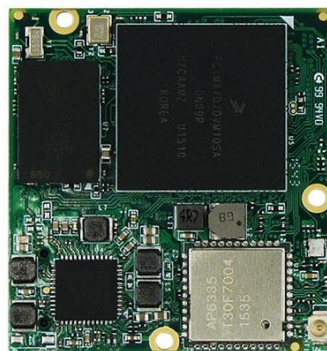


Figure 5 - PICO-IMX7 System-on-Module Block Diagram Overview

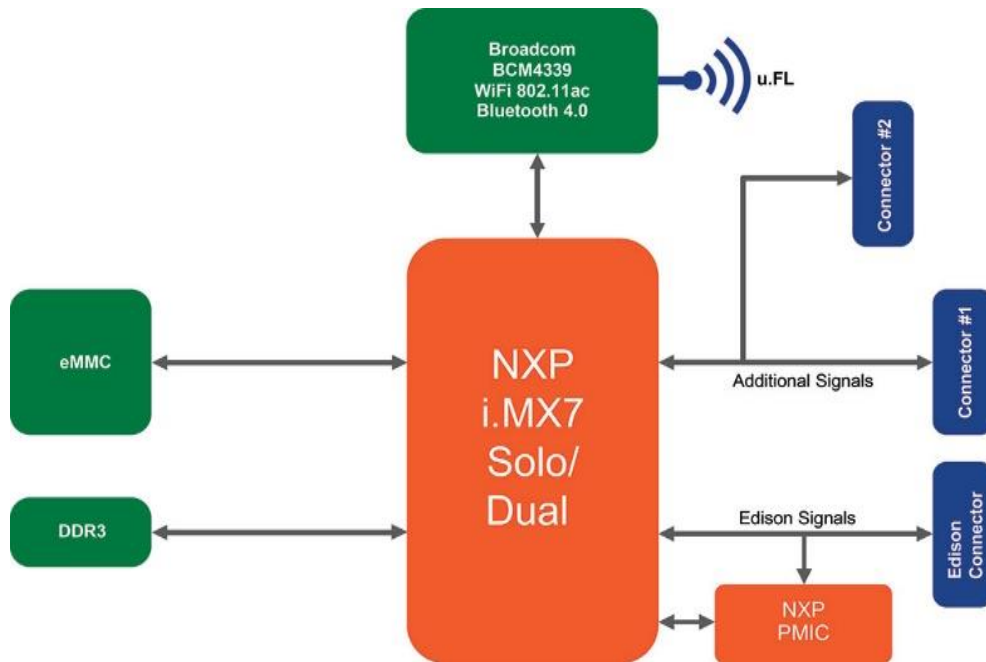
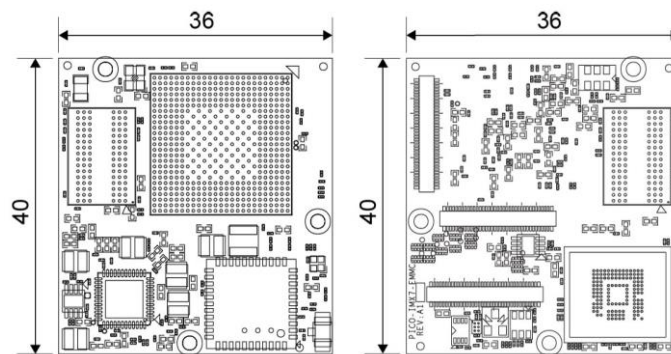


Figure 6 - PICO-IMX7 System-on-Module Dimensions



1.2. PICO-PI-IMX7 Carrier Baseboard Overview

The PICO-PI-IMX7 Carrier Baseboard (PICO-PI-GL) has 3 Hirose high-speed 70 pin board-to-board connectors that connect to the System-on-Module and provides the real-world interfaces such as audio, network, USB and a large number of signals on the various pin headers.

Figure 7 - PICO-PI-GL Carrier Board

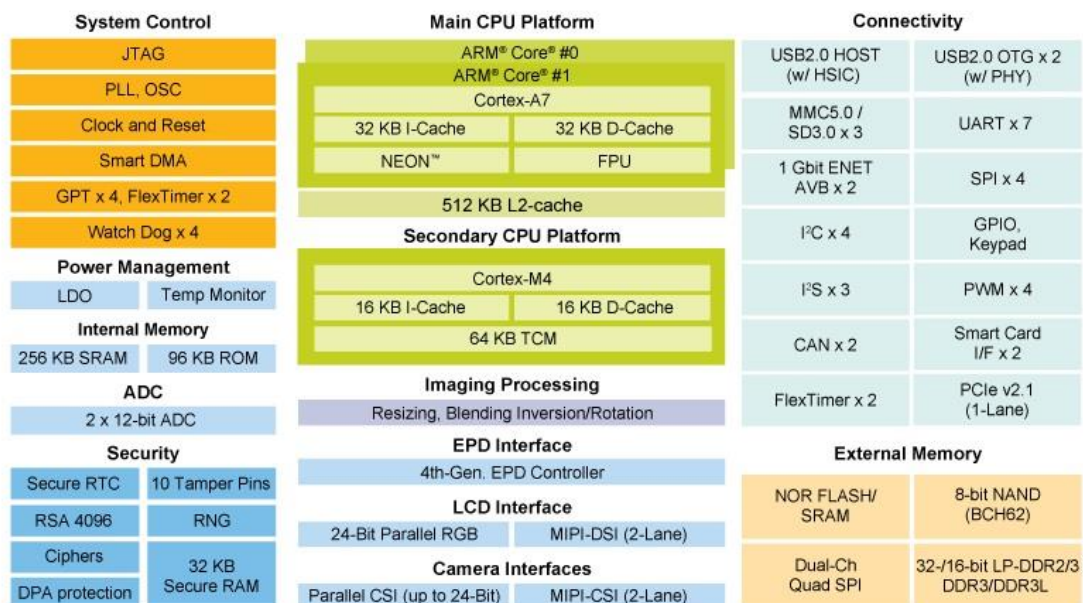


2.1. NXP i.MX7 ARM Cortex-A7 + Cortex-M4 Processor

- The device is composed of the following major subsystems:

- Up to Two ARM Cortex-A7 Cores (with TrustZone® technology)
- Up to 1GHz operation frequency
- 32 KByte L1 Instruction Cache, 32 KByte L1 Data Cache
- Private Timer and Watchdog
- NEON MPE coprocessor
- One ARM Cortex-M4 Core dedicated for real-time tasks, with the following features:
 - 200MHz operation frequency
 - MPU, FPU
 - 16 KByte instruction cache, 16 KByte data cache
 - 64 KByte TCM (tightly-coupled memory)
- Cryptographic acceleration and assurance module, containing cryptographic and hash engines supporting DPA (differential power analysis) protection, 32 KB secure RAM, and true and pseudo random number generator (NIST certified)
- PXP—PiXel processing pipeline for image resize, rotation, overlay and CSC. Offloading key pixel processing operations are required to support the display applications

System Control



2.2. Power Management IC (NXP PF3000)

The PICO-IMX7 has on onboard NXP PF3000 power management integrated circuit (PMIC) that features a configurable architecture supporting the numerous outputs with various current ratings as well as programmable voltage and sequencing required by the components on the PICO-IMX7 module.

Table 1 - PMIC Signal Description

CPU BALL	CPU PAD NAME	Pinmux (mode)	Signal	V	I/O	Description
D12	SAI1_RXC	I2C4_SDA	SDA	3V3	I/O	I ² C bus data line
C12	SAI1_RXFS	I2C4_SCL	SCL	3V3	I/O	I ² C bus clock line
AB8	PMIC_ON_REQ	PMIC_ON_REQ	PWRON	3V3	I	PMIC Power ON/OFF Input from processor
E10	SAI1_MCLK	GPIO6_IO18	INT	3V3	I	PMIC Interrupt Signal
R6	POR_B	POR_B	RESETBMCU	3V3	I	PMIC Reset Signal
AC7	PMIC_STBY_REQ	PMIC_STBY_REQ	STANDBY	3V3	I	PMIC Standby Input Signal

2.2.1. NXP PF3000 Reset Signal

To perform a hard-reset of the PICO-IMX7 a software reset signal can be implemented.

Table 2 - PMIC Reset Signal Description

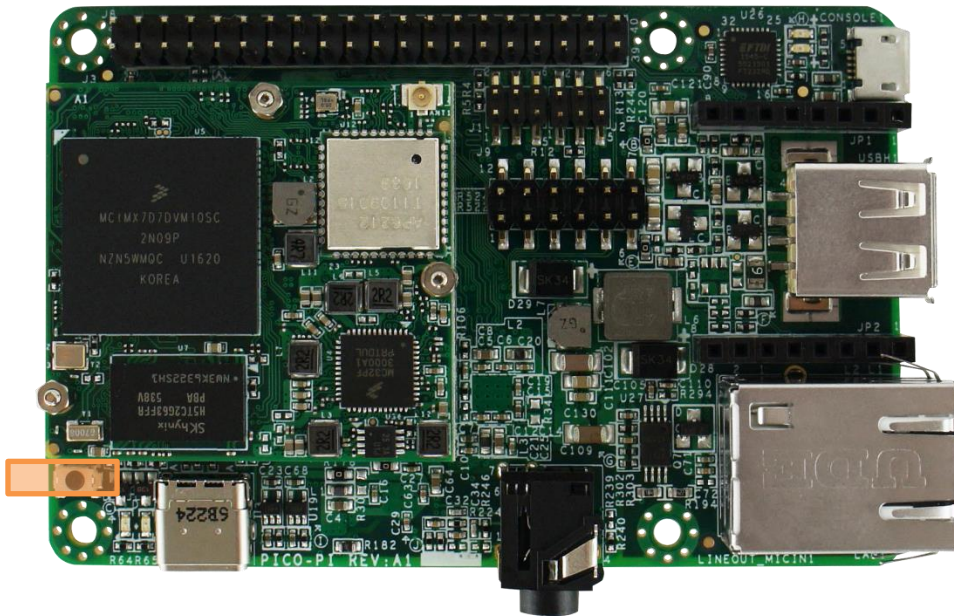
CPU BALL	CPU PAD NAME	Pinmux (mode)	Signal	V	I/O	Description
N1	GPIO1_IO00	WDOG1_WDOG	RESET	3V3	I	Connected to the PWRON signal of PMIC

To perform a hard-reset of the PICO-IMX7 an external circuit (for example a button or external watchdog IC) can be integrated on the carrier board.

Table 3 - PMIC Reset Signal Description

Connector	Signal	V	I/O	Description
E1_36	RESET	1V8	I	Connected to the PWRON signal

Figure 9 – RESET Button Location



2.3. Memory

The PICO-IMX7 integrates Double Data Rate III (DDR3) Synchronous DRAM in a single (16 bit) channel configuration.

The following memory chips have been validated and tested on the PICO-IMX7 Compute Module:

- SKHynix
- Samsung
- ISSI
- Micron

2.4. eMMC Storage

The PICO-IMX7 can be ordered with onboard eMMC storage in different configurations and capacity.

The onboard eMMC device is connected on the SD3 pins of the i.MX7 processor in an 8 bit width configuration.

The following eMMC chips have been validated and tested on the PICO-IMX7 System-on-Module:

- Sandisk iNAND
- Kingston eMMC
- Micron eMMC

Table 4 - eMMC Signal Description

CPU BALL	CPU PAD NAME	Signal	V	I/O	Description
B2	SD3_DATA0	eMMC_DATA0	3V3	I/O	MMC/SDIO Data bit 0
A2	SD3_DATA1	eMMC_DATA1	3V3	I/O	MMC/SDIO Data bit 1
G2	SD3_DATA2	eMMC_DATA2	3V3	I/O	MMC/SDIO Data bit 2
F1	SD3_DATA3	eMMC_DATA3	3V3	I/O	MMC/SDIO Data bit 3
F2	SD3_DATA4	eMMC_DATA4	3V3	I/O	MMC/SDIO Data bit 4
E2	SD3_DATA5	eMMC_DATA5	3V3	I/O	MMC/SDIO Data bit 5
C2	SD3_DATA6	eMMC_DATA6	3V3	I/O	MMC/SDIO Data bit 6
B1	SD3_DATA7	eMMC_DATA7	3V3	I/O	MMC/SDIO Data bit 7
E1	SD3_CMD	eMMC_CMD	3V3	I/O	MMC/SDIO Command
C1	SD3_CLK	eMMC_CLK	3V3	O	MMC/SDIO Clock

2.5. WiFi/Bluetooth SIP Module

The SIP module radio architecture & high integration MAC/BB chip provide excellent sensitivity with rich system performance.

In addition to WEP 64/128, WPA and TKIP, AES, CCX is supported to provide the latest security requirement on your network.

The SiP module is designed to operate with a single antenna for WiFi and Bluetooth to be connected to the u.FL connector available on the PICO-IMX7.

Matching antenna's are available with all distributors. "SKU : **ANT-P150-A1380-45D-2450-BK**

Figure 10 - PICO-IMX7 WiFi Module and Antenna Location

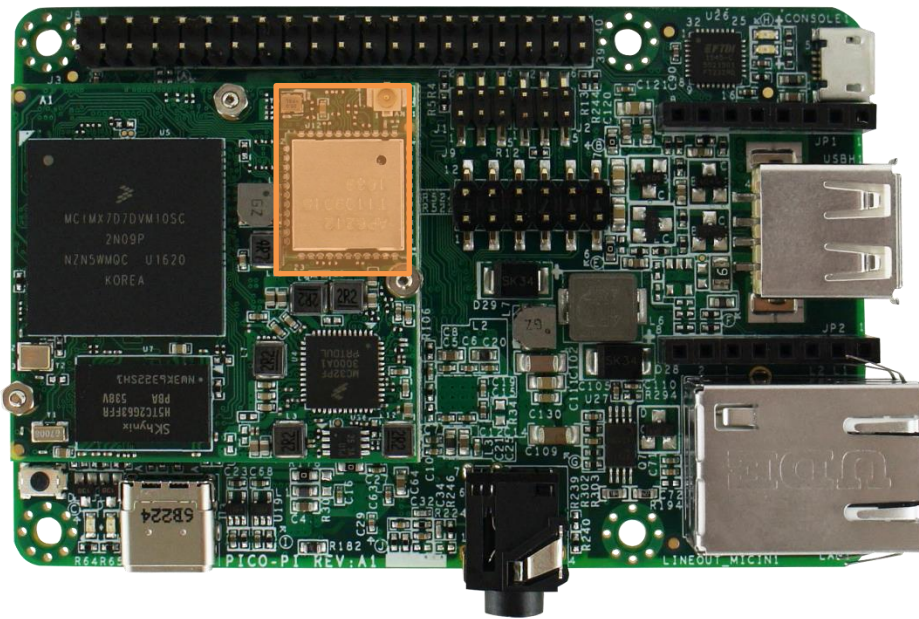


Table 5 - WiFi Signal Description

i.MX7 BALL	PAD NAME	Signal	I/O	Description
E4	SD2_DATA0	SD2_DATA_0	I/O	MMC/SDIO Data bit 0
E5	SD2_DATA1	SD2_DATA_1	I/O	MMC/SDIO Data bit 1
F5	SD2_DATA2	SD2_DATA_2	I/O	MMC/SDIO Data bit 2
E6	SD2_DATA3	SD2_DATA_3	I/O	MMC/SDIO Data bit 3
F6	SD2_CMD	SD2_CMD	I/O	MMC/SDIO Command
E3	SD2_CLK	SD2_CLK	I/O	MMC/SDIO Clock
H5	ECSP1_SS0	GPIO4_IO19	O	Host wake up. Signal from the module to the host indicating that the module requires Attention. • Asserted: Host device must wake-up or remain awake. • Deserter: Host device may sleep when sleep criteria are met. The polarity of this signal is software configurable and can be asserted high or low.
H3	ECSP1_SCLK	GPIO4_IO16	O	WiFi device wake-up: Signal from the host to the module indicating that the host requires attention. • Asserted: WiFi device must wake-up or remain awake. • Deserter: WiFi device may sleep when sleep criteria are met. The polarity of this signal is software configurable and can be asserted high or low.

Table 6 - Bluetooth Signal Description

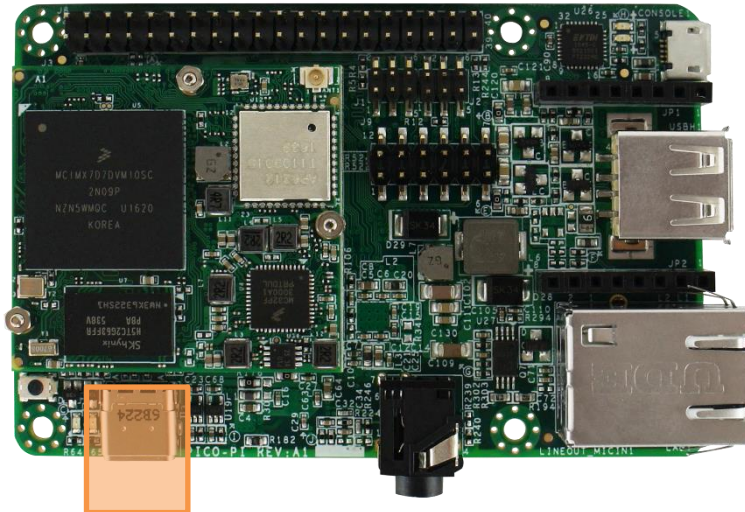
i.MX7 BALL	PAD NAME	Signal	I/O	Description
G6	ECSPI2_MOSI	UART7_TXD	O	Bluetooth UART Serial Input. Serial data input for the HCI UART Interface
J5	ECSPI2_SCLK	UART7_RXD	I	Bluetooth UART Serial Output. Serial data output for the HCI UART Interface.
J6	EIM_ECSPI2_SS0	UART7_CTS	I/O	Bluetooth UART Clear to Send. Active-low clear-to-send signal for the HCI UART interface.
H6	ECSPI2_MISO	UART7_RTS	I/O	Bluetooth UART Request to Send. Active-low request-to-send signal for the HCI UART interface.
E9	SAI2_RXD	AUD2_RXD	I	Integrated Interchip Sound (I ² S) channel receive data line
E8	SAI2_TXD	AUD2_TXD	O	Integrated Interchip Sound (I ² S) channel transmit data line
D8	SAI2_TXC	AUD2_TXC	O	Integrated Interchip Sound (I ² S) channel word clock signal
D9	SAI2_TXFS	AUD2_TXFS	O	Integrated Interchip Sound (I ² S) channel frame synchronization signal
H4	ECSPI1_MISO	GPIO4_IO18	O	Low asserting reset for BT core
G3	SD2_RESET_B	GPIO5_IO11	I	Host UART wake up. Signal from the module to the host indicating that the module requires Attention. • Asserted: Host device must wake-up or remain awake. • Deserter: Host device may sleep when sleep criteria are met. The polarity of this signal is software configurable and can be asserted high or low.
G5	ECSPI1_MOSI	GPIO4_IO17	O	Bluetooth device wake-up: Signal from the host to the module indicating that the host requires attention. • Asserted: Bluetooth device must wake-up or remain awake. • Deserter: Bluetooth device may sleep when sleep criteria are met. The polarity of this signal is software configurable and can be asserted high or low.

3. PICO-PI-IMX7 Interfaces and Connectors

3.1. Power Input Connector

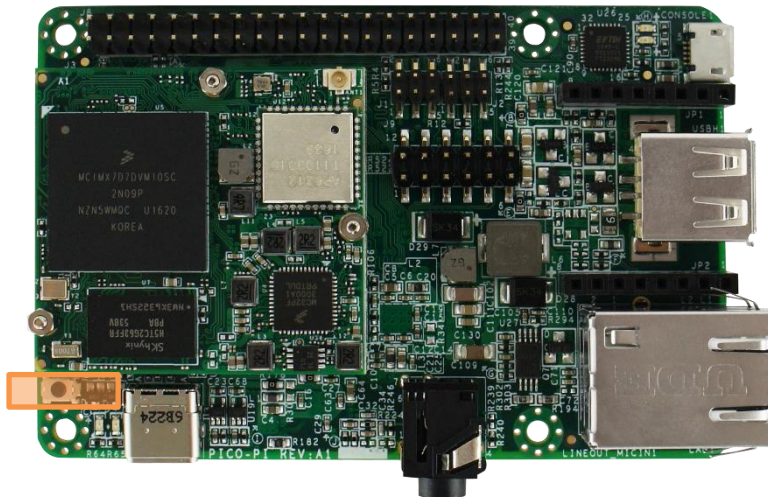
The PICO-PI-IMX7 can be easily powered over the USB Type-C cable.

Figure 11 – PICO-PI-IMX7 USB Type-C Location



3.2. System RESET Button

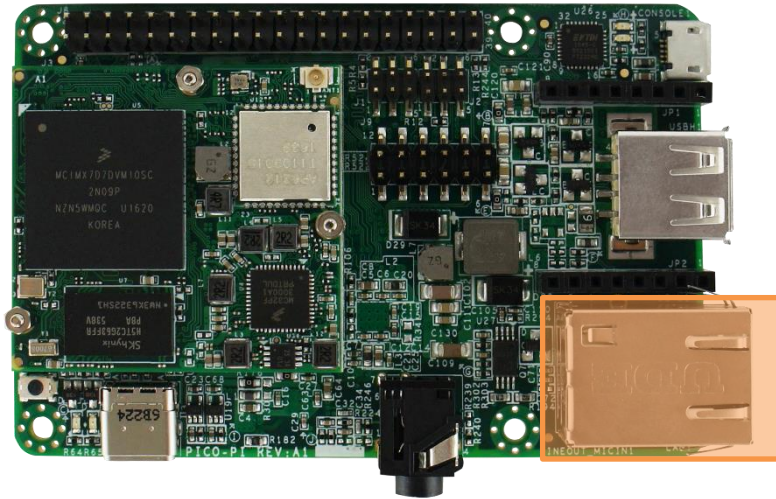
Figure 12 – PICO-PI-IMX7 Reset Button Location



3.3. Gigabit Ethernet

The PICO-PI-IMX7 features a Gigabit Ethernet MAC compliant with the IEEE802.3-2002 standard.

Figure 13 - PICO-PI-IMX7 RJ-45 Network Connector Location



3.4. Audio Interface

The PICO-PI-IMX7 comes with an Audio jack which is compliant with the CTIA standard. A standard mobile phone headset will work.

Figure 14 - PICO-PI-IMX7 Audio Jack Location

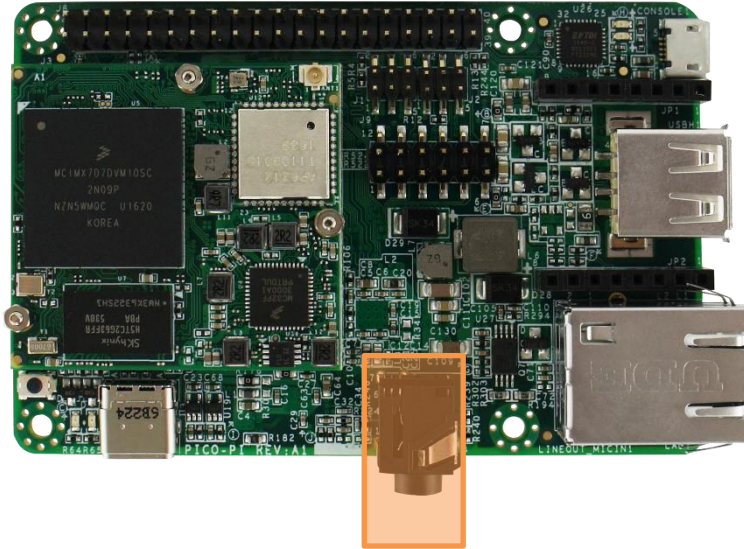
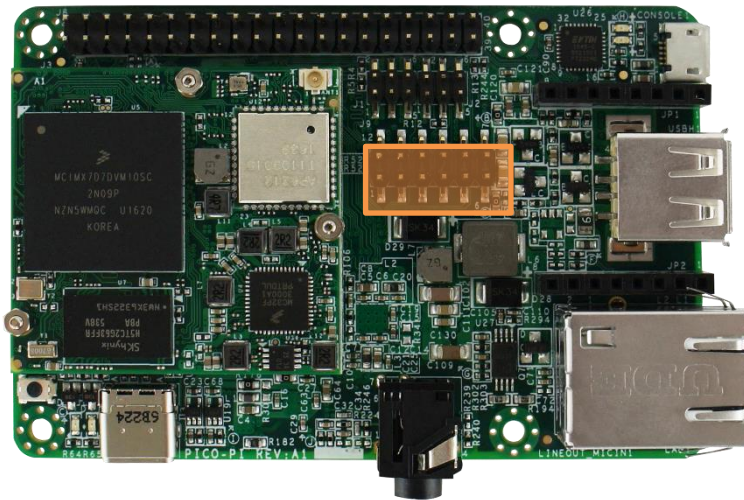


Figure 15 - PICO-PI-IMX7 Audio I²S Signal Location

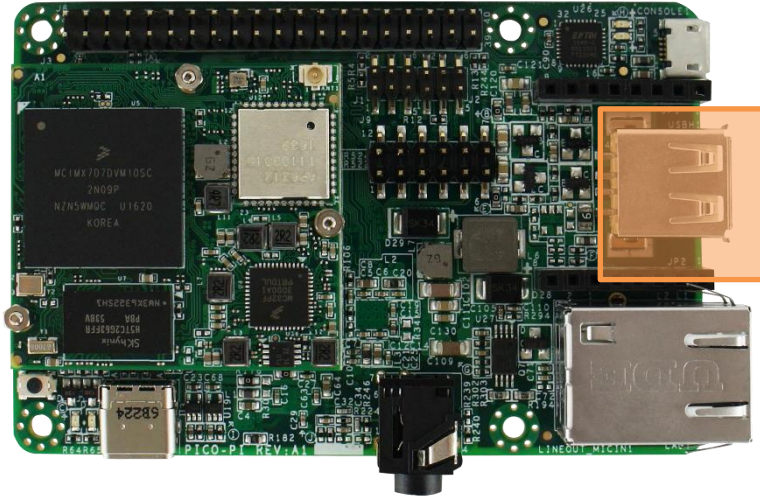


Detail	Description
	Default Audio Selection is as below picture and uses the primary I²S channel. Please select the jumpers as the picture.

3.5. Universal Serial Bus (USB) Host Interface

The PICO-PI-IMX7 features a standard USB 2.0 Host Connector.

Figure 16 - PICO-PI-IMX7 USB HOST Connector Location

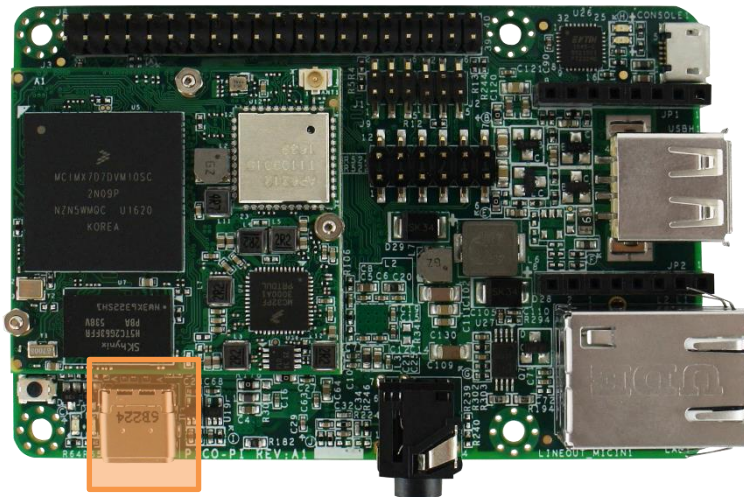


3.6. Universal Serial Bus (USB) OTG Interface

The PICO-PI-IMX7 incorporates a single USB Host/OTG controller which also function as the system power input.

The signals are routed to a USB Type-C connector.

Figure 17- PICO-PI-IMX7 USB OTG Type-C Connector Location

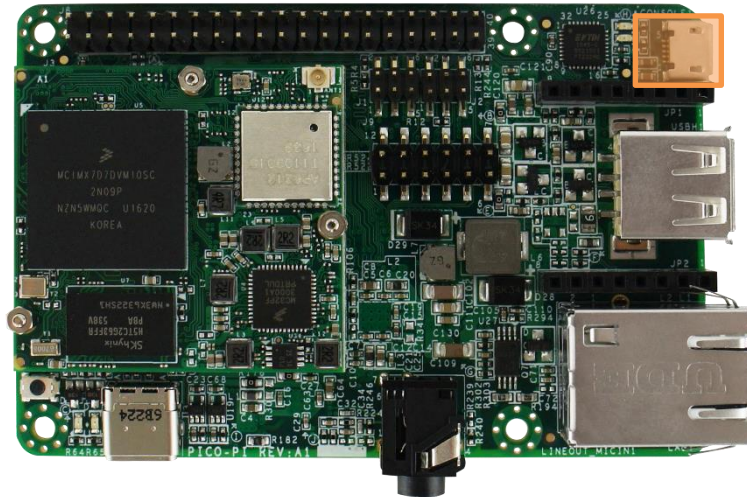


3.7. Debug Interface

The PICO-PI-IMX7 serial debug interface can be easily connected with a micro-USB cable.

The debug interface can be found on the PICO-PI-IMX7 at the following physical location and in software can be accessed over UART5.

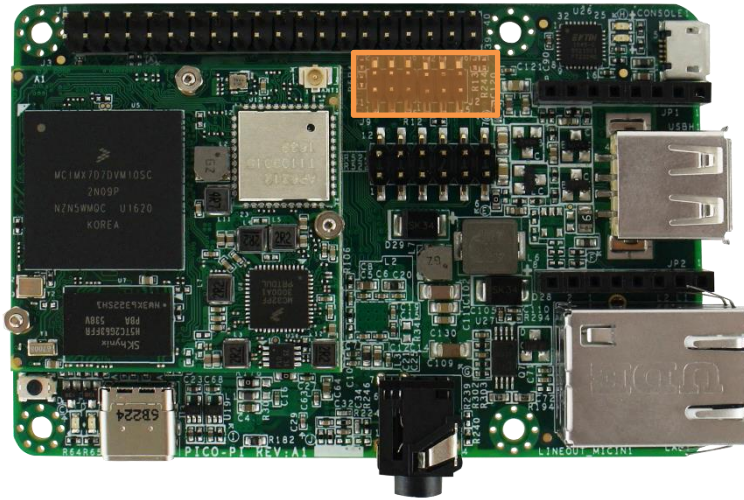
Figure 18 – PICO-PI-IMX7 Serial Debug Location

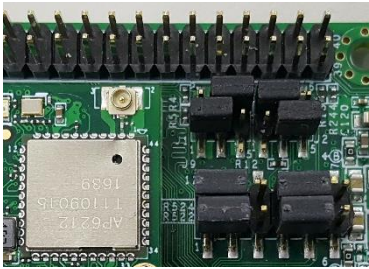


3.8. Serial Boot or eMMC Boot Control Pins

The PICO-PI-IMX7 has a number of pins to override the default boot media (eMMC) and enter in Serial Boot Loader mode.

Figure 19 - PICO-PI-IMX7 Boot Control Pins

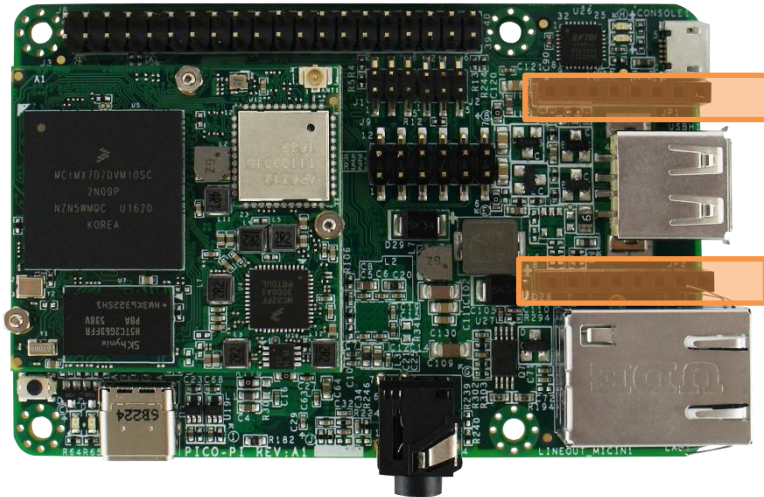


Boot from eMMC	Serial Boot Loader
	

3.9. Expansion Header Pins

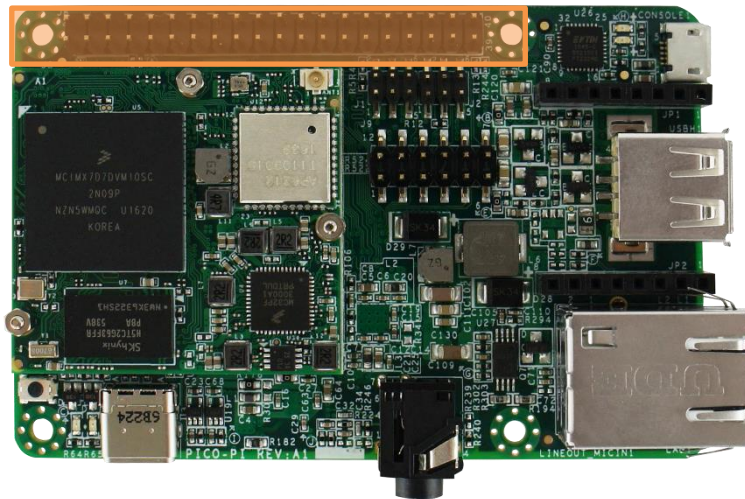
The PICO-PI-IMX7 has a number of expansion headers that can be used to connect sensors, motors, and external devices.

Figure 20 - PICO-PI-IMX7 Mikrobus Header Location



PIN	Signal	V	I/O	Description
JP1_1	NC			Not Connected
JP1_2	RESET	3V3	I	Reset power signal
JP1_3	NC			Not Connected
JP1_4	ECSPI_SCLK	3V3	O	Serial Peripheral Interface clock signal
JP1_5	ECSPI_MISO	3V3	I	Serial Peripheral Interface master input slave output signal
JP1_6	ECSPI_MOSI	3V3	O	Serial Peripheral Interface master output slave input signal
JP1_7	3V3 Power	3V3	P	3V3 Power
JP1_8	GND		P	Ground

PIN	Signal	V	I/O	Description
JP2_1	PWM7OUT	3V3	I/O	General Purpose Input Output with PWM control
JP2_2	GPIO	3V3	I/O	General Purpose Input Output
JP2_3	UART_RX	3V3	I	Universal Asynchronous Receive Transmit receive data signal
JP2_4	UART_TXD	3V3	O	Universal Asynchronous Receive Transmit transmit data signal
JP2_5	I2C_SCL	3V3	I/O	I ² C bus clock line
JP2_6	I2C_SDA	3V3	I/O	I ² C bus data line
JP2_7	5V Power	5V	P	5V Power
JP2_8	GND		P	Ground

Figure 21 - PICO-PI-IMX7 Expansion Header Location

PIN	Signal	V	I/O	Description
JP8_1	3V3 Power	3V3	P	3V3 Power
JP8_2	5V Power	5V	P	5V Power
JP8_3	I2C_SDA	3V3	I/O	I ² C bus data line
JP8_4	5V Power	5V	P	5V Power
JP8_5	I2C_SCL	3V3	I/O	I ² C bus clock line
JP8_6	GND		P	Ground
JP8_7	UART_RTS	3V3	O	Universal Asynchronous Receive Transmit request to send signal
JP8_8	UART_TXD	3V3	O	Universal Asynchronous Receive Transmit transmit data signal
JP8_9	GND		P	Ground
JP8_10	UART_RXD	3V3	I	Universal Asynchronous Receive Transmit receive data signal
JP8_11	UART_CTS	3V3	O	Universal Asynchronous Receive Transmit clear to send signal
JP8_12	PWM_OUT	3V3	I/O	General Purpose Input Output with PWM control
JP8_13	GPIO	3V3	I/O	General Purpose Input Output
JP8_14	GND		P	Ground
JP8_15	NC			Not Connected
JP8_16	CAN_TX	3V3	I/O	CAN (controller Area Network) transmit signal
JP8_17	3V3 Power	3V3	P	3V3 Power
JP8_18	CAN_RX	3V3	I/O	CAN (controller Area Network) receive signal
JP8_19	ECSPi_MOSI	3V3	O	Serial Peripheral Interface master output slave input signal
JP8_20	GND		P	Ground
JP8_21	ECSPi_MISO	3V3	I	Serial Peripheral Interface master input slave output signal
JP8_22	NC			Not Connected
JP8_23	ECSPi_SCLK	3V3	O	Serial Peripheral Interface clock signal
JP8_24	NC			Not Connected
JP8_25	GND		P	Ground
JP8_26	ECSPi_SS0	3V3	I/O	Serial Peripheral Interface Chip Select 1 signal
JP8_27	I2C_SDA	3V3	I/O	I ² C bus data line
JP8_28	I2C_SCL	3V3	I/O	I ² C bus clock line
JP8_29	GPIO	3V3	I/O	General Purpose Input Output
JP8_30	GND		P	Ground
JP8_31	GPIO	3V3	I/O	General Purpose Input Output

JP8_32	GPIO	3V3	I/O	General Purpose Input Output
JP8_33	PWM_OUT	3V3	I/O	General Purpose Input Output with PWM control
JP8_34	GND		P	Ground
JP8_35	GPIO	3V3	I/O	General Purpose Input Output
JP8_36	GPIO	3V3	I/O	General Purpose Input Output
JP8_37	GPIO	3V3	I/O	General Purpose Input Output
JP8_38	CAN_TX	3V3	I/O	CAN (controller Area Network) transmit signal
JP8_39	GND		P	Ground
JP8_40	CAN_RX	3V3	I/O	CAN (controller Area Network) receive signal

3.10. Display and Touch Connector

The PICO-PI-IMX7 features a Touch and RGB TTL Display interface that can be connected directly to a multi-touch 24-bit LCD panel.

The following LCD displays have been tested:

Manufacturer	Partnumber	Description
TechNexion	TDP0500T800480PCAP	5 INCH 800 x 480 PCAP MULTI TOUCH LCD PANEL INCLUDING TOUCH CABLE
TechNexion	TDP0700T800480PCAP	7 INCH 800 x 480 PCAP MULTI TOUCH LCD PANEL INCLUDING TOUCH CABLE

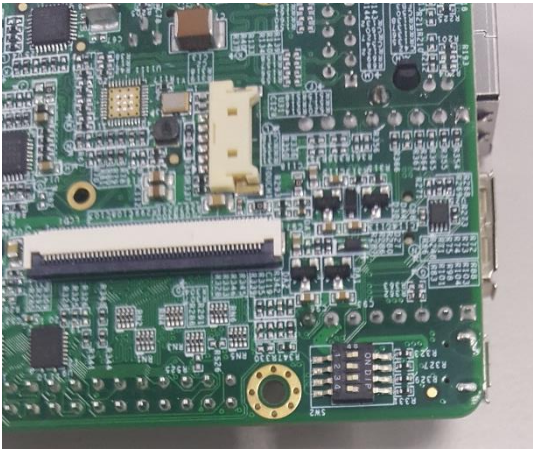
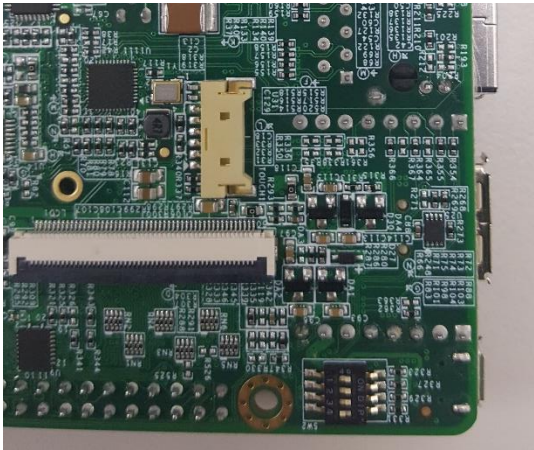
5 INCH	7 INCH
	
1 – 8 : ON 2 – 7 : OFF 3 – 6 : ON 4 – 5 : OFF	1 – 8 : ON 2 – 7 : ON 3 – 6 : ON 4 – 5 : OFF

Figure 22 - PICO-PI-IMX7 LCD Display FPC Connector Location



PIN	Signal	V	I/O	Description
LCD1_1	VLED+	21V7		LED Backlight Voltage
LCD1_2	VLED+	21V7		LED Backlight Voltage
LCD1_3	VLED-	GND	P	Ground
LCD1_4	VLED-	GND	P	Ground
LCD1_5	GND		P	Ground
LCD1_6	VCOM	4V09		Common Voltage
LCD1_7	DVDD	3V3		Power for Digital Circuit
LCD1_8	MODE	3V3		DE/SYNC mode select
LCD1_9	LCDIF_ENABLE	3V3	O	LCD dot enable pin signal
LCD1_10	LCDIF_VSYNC	3V3	O	LCD Vertical Synchronization
LCD1_11	LCDIF_HSYNC	3V3	O	LCD Horizontal Synchronization
LCD1_12	LCDIF_DATA7	3V3	O	LCD Pixel Data bit 7
LCD1_13	LCDIF_DATA6	3V3	O	LCD Pixel Data bit 6
LCD1_14	LCDIF_DATA5	3V3	O	LCD Pixel Data bit 5
LCD1_15	LCDIF_DATA4	3V3	O	LCD Pixel Data bit 4
LCD1_16	LCDIF_DATA3	3V3	O	LCD Pixel Data bit 3
LCD1_17	LCDIF_DATA2	3V3	O	LCD Pixel Data bit 2
LCD1_18	LCDIF_DATA1	3V3	O	LCD Pixel Data bit 1
LCD1_19	LCDIF_DATA0	3V3	O	LCD Pixel Data bit 0
LCD1_20	LCDIF_DATA15	3V3	O	LCD Pixel Data bit 15
LCD1_21	LCDIF_DATA14	3V3	O	LCD Pixel Data bit 14
LCD1_22	LCDIF_DATA13	3V3	O	LCD Pixel Data bit 13
LCD1_23	LCDIF_DATA12	3V3	O	LCD Pixel Data bit 12
LCD1_24	LCDIF_DATA11	3V3	O	LCD Pixel Data bit 11
LCD1_25	LCDIF_DATA10	3V3	O	LCD Pixel Data bit 10
LCD1_26	LCDIF_DATA9	3V3	O	LCD Pixel Data bit 9
LCD1_27	LCDIF_DATA8	3V3	O	LCD Pixel Data bit 8
LCD1_28	LCDIF_DATA23	3V3	O	LCD Pixel Data bit 23
LCD1_29	LCDIF_DATA22	3V3	O	LCD Pixel Data bit 22
LCD1_30	LCDIF_DATA21	3V3	O	LCD Pixel Data bit 21
LCD1_31	LCDIF_DATA20	3V3	O	LCD Pixel Data bit 20
LCD1_32	LCDIF_DATA19	3V3	O	LCD Pixel Data bit 19
LCD1_33	LCDIF_DATA18	3V3	O	LCD Pixel Data bit 18
LCD1_34	LCDIF_DATA17	3V3	O	LCD Pixel Data bit 17
LCD1_35	LCDIF_DATA16	3V3	O	LCD Pixel Data bit 16
LCD1_36	GND		P	Ground
LCD1_37	LCDIF_CLK	3V3	O	LCD Pixel Clock
LCD1_38	GND		P	Ground
LCD1_39	L/R	3V3	I	Left / Right Selection
LCD1_40	U/D	3V3	I	Up / Down Selection
LCD1_41	VGH	16V0	P	Gate ON Voltage
LCD1_42	VGL	-6V0	P	Gate OFF Voltage
LCD1_43	AVDD	10V4	P	Power for Analog Circuit
LCD1_44	RESET	3V3	I	Reset power signal
LCD1_45	NC			Not Connected
LCD1_46	VCOM	3V3	I	Common voltage
LCD1_47	DITHB	3V3	I	Dithering function
LCD1_48	GND		P	Ground
LCD1_49	NC			Not Connected
LCD1_50	NC			Not Connected

Figure 23 - PICO-PI-IMX7 Touch Panel Connector Location



PIN	Signal	V	I/O	Description
TOUCH_1	I2C1_SDA	3V3	I/O	I ² C bus data line
TOUCH_2	I2C1_SCL	3V3	I/O	I ² C bus clock line
TOUCH_3	3V3 Power	3V3	P	3V3 Power
TOUCH_4	GPIO4_IO29	3V3	I/O	General Purpose Input Output
TOUCH_5	GPIO4_IO24	3V3	I/O	General Purpose Input Output
TOUCH_6	GND		P	Ground

3.11. MIPI Connector

The PICO-PI-IMX7 features a MIPI CSI and MIPI DSI connector to connect to MIPI devices.

The following Camera modules have been tested:

Manufacturer	Partnumber	Description
TechNexion	CAM-OV5645	5MP OMNIVISION CAMERA MODULE WITH 20CM FPC CABLE

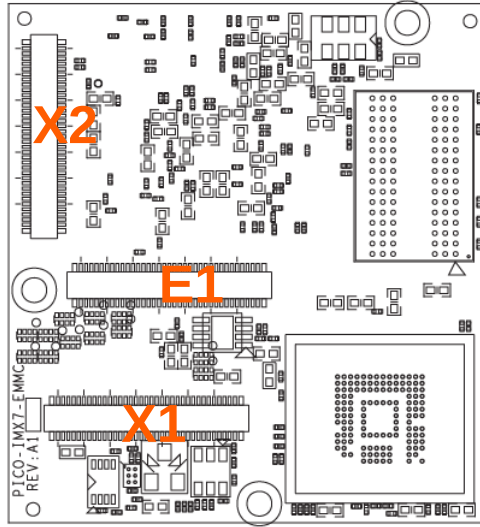
Figure 24 - PICO-PI-IMX7 Touch Panel Connector Location



PIN	Signal	V	I/O	Description
CAM_1	CSI_CLK0P	CMOS 2.5V	I	MIPI Camera Serial Interface clock pair positive signal
CAM_2	CSI_CLK0M	CMOS 2.5V	I	MIPI Camera Serial Interface clock pair negative signal
CAM_3	GND	GND	P	Ground
CAM_4	CSI_D0P	CMOS 2.5V	I	MIPI Camera Serial Interface data pair 0 positive signal
CAM_5	CSI_D0M	CMOS 2.5V	I	MIPI Camera Serial Interface data pair 0 negative signal
CAM_6	GND	GND	P	Ground
CAM_7	CSI_D1P	CMOS 2.5V	I	MIPI Camera Serial Interface data pair 1 positive signal
CAM_8	CSI_D1M	CMOS 2.5V	I	MIPI Camera Serial Interface data pair 1 negative signal
CAM_9	GND	GND	P	Ground
CAM_10	CSI_D2P	CMOS 2.5V	I	MIPI Camera Serial Interface data pair 2 positive signal
CAM_11	CSI_D2M	CMOS 2.5V	I	MIPI Camera Serial Interface data pair 2 negative signal
CAM_12	GND	GND	P	Ground
CAM_13	CSI_D3P	CMOS 2.5V	I	MIPI Camera Serial Interface data pair 3 positive signal
CAM_14	CSI_D3M	CMOS 2.5V	I	MIPI Camera Serial Interface data pair 3 negative signal
CAM_15	GND	GND	P	Ground
CAM_16	DSI_D1P		O	MIPI Display Serial Interface data pair 1 positive signal
CAM_17	DSI_D1M		O	MIPI Camera Serial Interface data pair 1 negative signal
CAM_18	GND	GND	P	Ground
CAM_19	DSI_D0P	CMOS 2.5V	O	MIPI Display Serial Interface data pair 0 positive signal
CAM_20	DSI_D0M	CMOS 2.5V	O	MIPI Camera Serial Interface data pair 0 negative signal
CAM_21	GND	GND	P	Ground
CAM_22	DSI_CLK0P	CMOS 2.5V	O	MIPI Display Serial Interface clock pair positive signal
CAM_23	DSI_CLK0M	CMOS 2.5V	O	MIPI Camera Serial Interface clock pair negative signal
CAM_24	GND	GND	P	Ground
CAM_25	I2C_SCL	CMOS 3.3V	I/O	I ² C bus clock line
CAM_26	I2C_SDA	CMOS 3.3V	I/O	I ² C bus data line
CAM_27		3.3V	P	Power Supply 3.3VDC
CAM_28		3.3V	P	Power Supply 3.3VDC
CAM_29	GPIO	CMOS 3.3V	I/O	General Purpose Input Output
CAM_30	GPIO	CMOS 3.3V	I/O	General Purpose Input Output
CAM_31	GPIO	CMOS 3.3V	I/O	General Purpose Input Output
CAM_32	VCC	5V	P	Power Supply 5VDC ± 5%
CAM_33	VCC	5V	P	Power Supply 5VDC ± 5%

4. PICO Compute Module Pin Assignment

The PICO-IMX7 has three 70-pin Hirose board to board connectors.



PIN	CPU BALL	CPU PAD NAME	Signal	V	I/O	Description
E1_1			GND		P	Ground
E1_2			VSYS		P	System input power (4.0 to 5.25V)
E1_3	B7	USB_OTG1_ID	USB_OTG1_ID	3V3	I	USB OTG ID Pin
E1_4			VSYS		P	System input power (4.0 to 5.25V)
E1_5			GND		P	Ground
E1_6			VSYS		P	System input power (4.0 to 5.25V)
E1_7	N5	CLK_32K_OUT	CLK_32K_OUT	3V3		
E1_8			3V3		P	System 3.3V Output
E1_9			GND		P	Ground
E1_10			3V3		P	System 3.3V Output
E1_11			GND		P	Ground
E1_12			1V8		P	System 1.8V Output (same as E1 connector I/O voltage levels)
E1_13			GND		P	Ground
E1_14			VSYS		P	System input power (4.0 to 5.25V)
E1_15			GND		P	Ground
E1_16	B8	USB_OTG1_DP	USB_OTG1_DP	3V3	I/O	Universal Serial Bus differential pair positive signal

PIN	CPU BALL	CPU PAD NAME	Signal	V	I/O	Description
E1_17	AC8	ONOFF	ONOFF	3V3	I	Power ON button input signal
E1_18	A8	USB_OTG1_DN	USB_OTG1_DN	3V3	I/O	Universal Serial Bus differential pair negative signal
E1_19	M1	UART3_RXD	USB_OTG1_OC	1V8	I	Over current detect input pin to monitor USB power over current
E1_20	C8	USB_OTG1_VBUS	USB_OTG1_VBUS	5V	I/O	Universal Serial Bus power
E1_21	M2	UART3_TXD	USB_OTG1_PWR	1V8	O	Universal Serial Bus power enable
E1_22	L1	I2C4_SCL	UART5_RXD	1V8	I	Universal Asynchronous Receive Transmit receive data signal
E1_23			VCC_RTC	3V3	P	RTC Power
E1_24	P20	EPDC1_DATA00	GPIO2_IO00	1V8	I/O	General Purpose Input Output
E1_25	M21	EPDC1_D06	GPIO2_IO06	1V8	I/O	General Purpose Input Output
E1_26	P21	EPDC1_D01	GPIO2_IO01	1V8	I/O	General Purpose Input Output
E1_27	L2	I2C4_SDA	UART5_TXD	1V8	O	Universal Asynchronous Receive Transmit transmit data signal
E1_28	N20	EPDC1_D02	GPIO2_IO02	1V8	I/O	General Purpose Input Output
E1_29			NC			Not Connected
E1_30	N21	EPDC1_D03	GPIO2_IO03	1V8	I/O	General Purpose Input Output
E1_31			NC			Not Connected
E1_32	N22	EPDC1_D04	GPIO2_IO04	1V8	I/O	General Purpose Input Output
E1_33	R1	GPIO1_IO08	PWM1_OUT	1V8	O	General Purpose Input Output with PWM control
E1_34	M20	EPDC1_D05	GPIO2_IO05	1V8	I/O	General Purpose Input Output
E1_35	R2	GPIO1_IO09	PWM2_OUT	1V8	O	General Purpose Input Output with PWM control
E1_36	PMIC	RESET	RESET	1V8	I	Reset power signal
E1_37	R5	GPIO1_IO10	PWM3_OUT	1V8	O	General Purpose Input Output with PWM control
E1_38			NC			Not Connected
E1_39	T1	GPIO1_IO11	PWM4_OUT	1V8	O	General Purpose Input Output with PWM control
E1_40			NC			Not Connected
E1_41	L3	UART1_RXD	I2C1_SCL	1V8	I/O	I ² C bus clock line
E1_42	L22	EPDC1_D12	GPIO2_IO12	1V8	I/O	General Purpose Input Output
E1_43	L4	UART1_TXD	I2C1_SDA	1V8	I/O	I ² C bus data line
E1_44	L21	EPDC1_D13	GPIO2_IO13	1V8	I/O	General Purpose Input Output
E1_45	L5	UART2_RXD	I2C2_SCL	1V8	I/O	I ² C bus clock line

PIN	CPU BALL	CPU PAD NAME	Signal	V	I/O	Description
E1_46	L25	EPDC1_DATA09	UART6_TX_DATA	1V8	O	Universal Asynchronous Receive Transmit transmit data signal
E1_47	L6	UART2_TXD	I2C2_SDA	1V8	I/O	I ² C bus data line
E1_48	M22	EPDC1_D07	GPIO2_IO07	1V8	I/O	General Purpose Input Output
E1_49			NC			Not Connected
E1_50	D16	ENET1_TX_CLK	SAI1_RX_DATA	1V8	I	Integrated Interchip Sound (I ² S) channel receive data line
E1_51	M6	UART3_CTS	ECSPI1_SS0	1V8	O	Serial Peripheral Interface Chip Select Signal
E1_52	D15	ENET1_RX_CLK	SAI1_TX_BCLK	1V8	O	Integrated Interchip Sound (I ² S) channel word clock signal
E1_53	K3	I2C2_SDA	ECSPI3_SS0	1V8	O	Serial Peripheral Interface Chip Select signal
E1_54	E19	ENET1_CRS	SAI1_TX_SYNC	1V8	I/O	Integrated Interchip Sound (I ² S) channel frame synchronization signal
E1_55	K2	I2C2_SCL	ECSPI3_SCLK	1V8	I/O	Serial Peripheral Interface clock signal
E1_56	D19	ENET1_COL	SAI1_TX_DATA	1V8	O	Integrated Interchip Sound (I ² S) channel transmit data line
E1_57	K1	I2C1_SDA	ECSPI3_MOSI	1V8	I/O	Serial Peripheral Interface master output slave input signal
E1_58	B5	SD1_CLK	SD1_CLK	1V8	I/O	MMC/SDIO Clock
E1_59	J2	I2C1_SCL	ECSPI3_MISO	1V8	I/O	Serial Peripheral Interface master input slave output signal
E1_60	C6	SD1_CD_B	SD1_CD_B	1V8	I	SD Card detect input (Active low)
E1_61	M23	EPDC1_DATA08	UART6_RX_DATA	1V8	I	Universal Asynchronous Receive Transmit receive data signal
E1_62	C5	SD1_CMD	SD1_CMD	1V8	I/O	MMC/SDIO Command
E1_63	L24	EPDC1_DATA10	UART6_RTS_B	1V8	I	Universal Asynchronous Receive Transmit request to send signal
E1_64	A4	SD1_DATA2	SD1_DATA2	1V8	I/O	MMC/SDIO Data bit 2
E1_65	L23	EPDC1_DATA11	UART6_CTS_B	1V8	O	Universal Asynchronous Receive Transmit clear to send signal
E1_66	A5	SD1_DATA0	SD1_DATA0	1V8	I/O	MMC/SDIO Data bit 0
E1_67			NC			Not Connected
E1_68	D5	SD1_DATA3	SD1_DATA3	1V8	I/O	MMC/SDIO Data bit 3
E1_69			NC			Not Connected
E1_70	D6	SD1_DATA1	SD1_DATA1	1V8	I/O	MMC/SDIO Data bit 1

PIN	CPU BALL	CPU PAD NAME	Signal	V	I/O	Description
X1_1			GND		P	Ground
X1_2			GND		P	Ground
X1_3			NC			Not Connected
X1_4			NC			Not Connected
X1_5			NC			Not Connected
X1_6			NC			Not Connected
X1_7			GND		P	Ground
X1_8	G23	LCD1_DATA23	LCD_DATA23	3V3	O	LCD Pixel Data bit 23
X1_9			NC			Not Connected
X1_10	D25	LCD1_DATA22	LCD_DATA22	3V3	O	LCD Pixel Data bit 22
X1_11			NC			Not Connected
X1_12	E24	LCD1_DATA21	LCD_DATA21	3V3	O	LCD Pixel Data bit 21
X1_13			GND		P	Ground
X1_14	C25	LCD1_DATA20	LCD_DATA20	3V3	O	LCD Pixel Data bit 20
X1_15			NC			Not Connected
X1_16	D24	LCD1_DATA19	LCD_DATA19	3V3	O	LCD Pixel Data bit 19
X1_17			NC			Not Connected
X1_18	E23	LCD1_DATA18	LCD_DATA18	3V3	O	LCD Pixel Data bit 18
X1_19			GND		P	Ground
X1_20	G21	LCD1_DATA17	LCD_DATA17	3V3	O	LCD Pixel Data bit 17
X1_21			NC			Not Connected
X1_22	B25	LCD1_DATA16	LCD_DATA16	3V3	O	LCD Pixel Data bit 16
X1_23			NC			Not Connected
X1_24	C24	LCD1_DATA15	LCD_DATA15	3V3	O	LCD Pixel Data bit 15
X1_25			GND		P	Ground
X1_26	D23	LCD1_DATA14	LCD_DATA14	3V3	O	LCD Pixel Data bit 14
X1_27			NC			Not Connected
X1_28	E22	LCD1_DATA13	LCD_DATA13	3V3	O	LCD Pixel Data bit 13
X1_29			NC			Not Connected
X1_30	F21	LCD1_DATA12	LCD_DATA12	3V3	O	LCD Pixel Data bit 12
X1_31			GND		P	Ground
X1_32	G20	LCD1_DATA11	LCD_DATA11	3V3	O	LCD Pixel Data bit 11
X1_33	C3	SD2_WP	ENET1_MDC	3V3		Management data clock reference
X1_34	B24	LCD1_DATA10	LCD_DATA10	3V3	O	LCD Pixel Data bit 10
X1_35	D3	SD2_CD_B	ENET1_MDIO	3V3		Management data
X1_36	C23	LCD1_DATA09	LCD_DATA09	3V3	O	LCD Pixel Data bit 9
X1_37	G1	SD3_RESET_B	GPIO6_IO11	3V3		Ethernet reset
X1_38	E21	LCD1_DATA08	LCD_DATA08	3V3	O	LCD Pixel Data bit 8
X1_39	J1	SD3_STROBE	GPIO6_IO10	3V3		Ethernet interrupt output
X1_40	F20	LCD1_DATA07	LCD_DATA07	3V3	O	LCD Pixel Data bit 7
X1_41	N2	GPIO1_IO01	CCM_ENET_REF_CLK3	3V3		Synchronous Ethernet recovered clock
X1_42	A24	LCD1_DATA06	LCD_DATA06	3V3	O	LCD Pixel Data bit 6
X1_43	E16	ENET1_TX_CTL	RGMII1_TX_CTL	1V8	O	RGMII transmit enable
X1_44	B23	LCD1_DATA05	LCD_DATA05	3V3	O	LCD Pixel Data bit 5
X1_45	E15	ENET1_RX_CTL	RGMII1_RX_CTL	1V8	I	RGMII receive data valid
X1_46	C22	LCD1_DATA04	LCD_DATA04	3V3	O	LCD Pixel Data bit 4

PIN	CPU BALL	CPU PAD NAME	Signal	V	I/O	Description
X1_47			GND		P	Ground
X1_48	A23	LCD1_DATA03	LCD_DATA03	3V3	O	LCD Pixel Data bit 3
X1_49	F16	ENET1_TXC	RGMII1_TXC	1V8	O	RGMII transmit clock
X1_50	B22	LCD1_DATA02	LCD_DATA02	3V3	O	LCD Pixel Data bit 2
X1_51	F17	ENET1_TDATA0	RGMII1_TD0	1V8	O	RGMII transmit data 0
X1_52	A22	LCD1_DATA01	LCD_DATA01	3V3	O	LCD Pixel Data bit 1
X1_53	E17	ENET1_TDATA1	RGMII1_TD1	1V8	O	RGMII transmit data 1
X1_54	D21	LCD1_DATA00	LCD_DATA00	3V3	O	LCD Pixel Data bit 0
X1_55	E18	ENET1_TDATA2	RGMII1_TD2	1V8	O	RGMII transmit data 2
X1_56	C21	LCD1_RESET	LCD_RS	3V3	O	LCD backlight enable/disable
X1_57	D18	ENET1_TDATA3	RGMII1_TD3	1V8	O	RGMII transmit data 3
X1_58	E25	LCD1_HSYNC	LCD_HSYNC	3V3	O	LCD Horizontal Synchronization
X1_59			GND		P	Ground
X1_60	F25	LCD1_ENABLE	LCD_ENABLE	3V3	O	LCD dot enable pin signal
X1_61	F15	ENET1_RXC	RGMII1_RXC	1V8	I	RGMII receive clock
X1_62	F24	LCD1_VSYNC	LCD_VSYNC	3V3	O	LCD Vertical Synchronization
X1_63	E14	ENET1_RDATA0	RGMII1_RD0	1V8	I	RGMII transmit data 0
X1_64	E20	LCD1_CLK	LCD_CLK	3V3	O	LCD Pixel Clock
X1_65	F14	ENET1_RDATA1	RGMII1_RD1	1V8	I	RGMII receive data 1
X1_66	T1	GPIO1_IO11	PWM4_OUT	3V3	O	LCD Backlight brightness Control
X1_67	D13	ENET1_RDATA2	RGMII1_RD2	1V8	I	RGMII receive data 2
X1_68	P2	GPIO1_IO06	GPIO1_IO06	3V3	O	LCD Voltage On
X1_69	E13	ENET1_RDATA3	RGMII1_RD3	1V8	I	RGMII receive data 3
X1_70			GND		P	Ground

PIN	CPU BALL	CPU PAD NAME	Signal	V	I/O	Description
X2_1			GND		P	Ground
X2_2			GND		P	Ground
X2_3	G20	BT_CFG11	BT_CFG11	1V8	I	Boot Select pin
X2_4			NC			Not Connected
X2_5	C22	BT_CFG4	BT_CFG4	1V8	I	Boot Select pin
X2_6			NC			Not Connected
X2_7	F21	BT_CFG12	BT_CFG12	1V8	I	Boot Select pin
X2_8			GND		P	Ground
X2_9	E22	BT_CFG13	BT_CFG13	1V8	I	Boot Select pin
X2_10			NC			Not Connected
X2_11			GND		P	Ground
X2_12			NC			Not Connected
X2_13	C12	SAI1_RXFS	I2C4_SCL	3V3	I/O	I ² C bus clock line
X2_14			GND		P	Ground
X2_15	D12	SAI1_RXC	I2C4_SDA	3V3	I/O	I ² C bus data line
X2_16			NC			Not Connected
X2_17			GND		P	Ground
X2_18			NC			Not Connected
X2_19	C11	SAI1_TXC	FLEXCAN1_TX	3V3	O	CAN (controller Area Network) transmit signal
X2_20			GND		P	Ground
X2_21	E12	SAI1_RXD	FLEXCAN1_RX	3V3	I	CAN (controller Area Network) receive signal
X2_22			NC			Not Connected
X2_23			GND		P	Ground
X2_24			NC			Not Connected
X2_25	E11	SAI1_TXD	FLEXCAN2_TX	3V3	O	CAN (controller Area Network) transmit signal
X2_26			GND		P	Ground
X2_27	D11	SAI1_TXFS	FLEXCAN2_RX	3V3	I	CAN (controller Area Network) receive signal
X2_28			NC			Not Connected
X2_29			GND		P	Ground
X2_30			NC			Not Connected
X2_31	A15	MIPI_CSI_CLK_N		2V5	I	MIPI Camera Serial Interface clock pair negative signal
X2_32			GND		P	Ground
X2_33	B15	MIPI_CSI_CLK_P		2V5	I	MIPI Camera Serial Interface clock pair positive signal
X2_34			NC			Not Connected
X2_35	A16	MIPI_CSI_D0_N		2V5	I	MIPI Camera Serial Interface data pair 0 negative signal
X2_36			NC			Not Connected
X2_37	B16	MIPI_CSI_D0_P		2V5	I	MIPI Camera Serial Interface data pair 0 positive signal
X2_38			GND		P	Ground
X2_39	B14	MIPI_CSI_D1_P		2V5	I	MIPI Camera Serial Interface data pair 1 positive signal
X2_40			NC			Not Connected

PIN	CPU BALL	CPU PAD NAME	Signal	V	I/O	Description
X2_41	A14	MIPI_CSI_D1_N		2V5	I	MIPI Camera Serial Interface data pair 1 negative signal
X2_42			NC			Not Connected
X2_43			NC			Not Connected
X2_44			GND		P	Ground
X2_45			NC			Not Connected
X2_46	A10	USB_OTG2_DN		3V3	I/O	Universal Serial Bus differential pair negative signal
X2_47			NC			Not Connected
X2_48	B10	USB_OTG2_DP		3V3	I/O	Universal Serial Bus differential pair positive signal
X2_49			NC			Not Connected
X2_50	C10	USB_OTG2_VBUS		5V	I/O	Universal Serial Bus power
X2_51			GND		P	Ground
X2_52	M5	UART3_RTS	USB_OTG2_OC	3V3	I	Active low input, to inform USB overcurrent condition (low = overcurrent detected)
X2_53	B20	MIPI_DSI_D0_P		2V5	O	MIPI Display Serial Interface data pair 0 positive signal
X2_54			GND		P	Ground
X2_55	A20	MIPI_DSI_D0_N		2V5	O	MIPI Display Serial Interface data pair 0 negative signal
X2_56	AB10	PCIE_REFCLKOUT_P		2V5	O	PCI Express clock differential pair positive signal
X2_57	B18	MIPI_DSI_D1_P		2V5	O	MIPI Display Serial Interface data pair 1 positive signal
X2_58	AC10	PCIE_REFCLKOUT_N		2V5	O	PCI Express clock differential pair negative signal
X2_59	A18	MIPI_DSI_D1_N		2V5	O	MIPI Display Serial Interface data pair 1 negative signal
X2_60			GND		P	Ground
X2_61	A19	MIPI_DSI_CLK_N		2V5	O	MIPI Display Serial Interface clock pair negative signal
X2_62	AB11	PCIE_TX_P		2V5	O	PCI Express Transmit output differential pair positive signal
X2_63	B19	MIPI_DSI_CLK_P		2V5	O	MIPI Display Serial Interface clock pair positive signal
X2_64	AC11	PCIE_TX_N		2V5	O	PCI Express Transmit output differential pair negative signal
X2_65	P1	GPIO1_IO05	GPIO1_IO05	3V3	I/O	General Purpose Input Output

PIN	CPU BALL	CPU PAD NAME	Signal	V	I/O	Description
X2_66			GND		P	Ground
X2_67	N6	GPIO1_IO04	GPIO1_IO04	3V3	I/O	General Purpose Input Output
X2_68	AD11	PCIE_RX_P		2V5	I	PCI Express Receive input differential pair positive signal
X2_69	N3	GPIO1_IO02	GPIO1_IO02	3V3	I/O	General Purpose Input Output
X2_70	AE11	PCIE_RX_N		2V5	I	PCI Express Receive input differential pair negative signal

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6. Schematics

WANDBOARD DESIGN AND DISCLAIMER

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On the following pages, you will find the schematics of the PICO-IMX7 Compute Module and the PICO-PI Carrier Baseboard.

Components marked with -x are not populated.

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