

# iMX6 TinyRex Base Board Lite

Designed by FEDEVEL Academy

## Datasheet

Date	Revision	Changes
February 12, 2016	1.0	Initial Release
February 8, 2017	1.1	Updated table 1.5 Reference Documents
April 3, 2017	1.2	Updated chapter 5.2 Mechanical

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# 1. Introduction

## 1.1 General

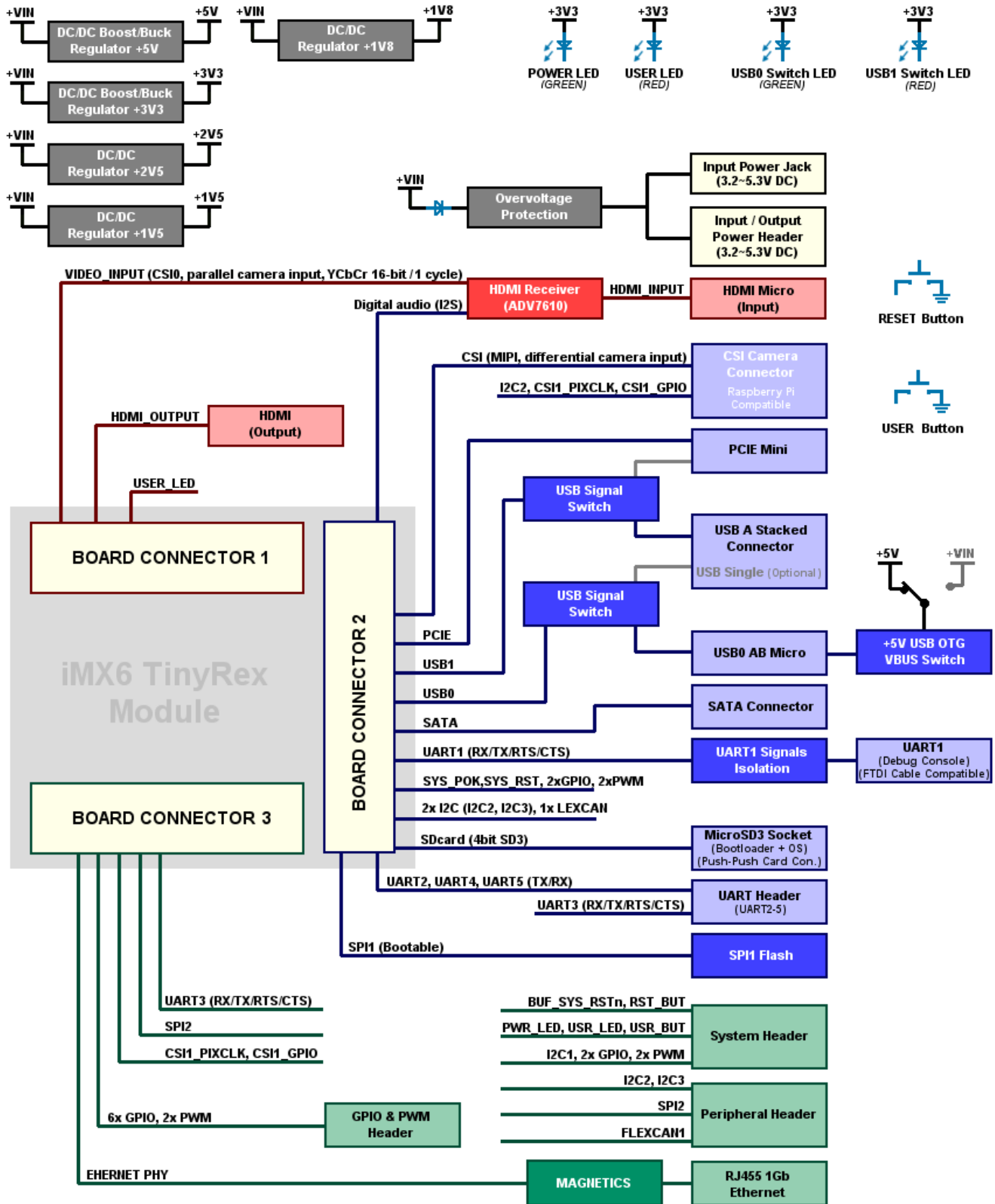
iMX6 TinyRex Base Board Lite was designed to be used as development platform for the iMX6 TinyRex Module by [FEDEVEL Academy](#), which focuses at ARM boards Schematic and PCB design courses. The two boards together create very compact and low power system with excellent MIPS/mW performance allowing deployment in situation where power source is limited. Besides the standard PC peripheral interfaces, the system provides unique HDMI input interface and numerous communication channels as well as universal expansion slots and connectors.

## 1.2 Software

Voipac fully supports Linux operating system with drivers for all basic interfaces. Custom additional drivers for specific applications can be developed upon request.

Operating system	Description
Linux	Yocto Project Linux distribution (Filesystem installed to microSD card which is set as default boot). Recovery mode from the baseboard SPI Flash (if microSD card is missing) is enabled.
Android	TBA

### 1.3 Hardware – Block Diagram



## 1.4 Features

Interface	Type	Description
POWER SUPPLY		3.2 - 5.5V DC
Flash Memory	SPI Flash	On board SPI Flash (up to 128Mbit)
VIDEO	HDMI / HDMI Micro	HDMI Output / Input, On board HDMI video receiver
CAMERA		MIPI-CSI Camera input (compatible with Raspberry Pi)
ETHERNET	RJ-45	1Gb
Secure Digital	microSD™ /MMCSD	
USB	USB A / mini USB	2x High-Speed USB 2.0, 1x High-Speed USB 2.0 OTG micro
PCIE	MicroSD	
SERIAL	USB to Serial	TTL-232 3.3V (compatible with FTDI cable)
SATA	HEADER	

## 1.5 Reference Documents

For more detailed technical information about the iMX6 TinyRex Module components, please refer to the web resources and documents listed below.

Component	Manufacturer	Description
i.MX6 Processor	NXP / Freescale	<a href="#">i.MX6 QuadPlus / i.MX6 Quad / i.MX6 Dual / i.MX6 Solo</a>
DD3 SDRAM Memory	Micron Technology	<a href="#">MT41K256M16HA-125:E</a> , <a href="#">MT41K128M16JT-125</a> , <a href="#">MT41J64M16JT-15E</a>
I2C EEPROM	ATMEL	<a href="#">AT24C512C-MAHM-T</a> , <a href="#">AT24C256C-MAHL-T</a> , <a href="#">AT24C128C-MAHM-T</a>
Ethernet Controller	Microchip Technology	<a href="#">KSZ9021RNX</a>
PMIC – Volatge Regulator	Texas Instrumets	<a href="#">TPS74801DRCR</a>
PMIC – Volatge Regulator	Intersil	<a href="#">ISL8024AIRTAJZ-T7A</a>
PMIC – Volatge Regulator	Microchip Technology	<a href="#">MIC33050-4YHL TR</a>
PMIC - Supervisor	Texas Instrumets	<a href="#">TPS3808G09DBVR</a>
Logic-Gates and Inverters	Texas Instrumets	<a href="#">SN74AHC1G09DCKR</a>

For more detailed technical information about the iMX6 TinyRex Base Board Lite components, please refer to the web resources and documents listed below.

Component	Type	Description
ADV7610BBCZ-P	Low Power 165MHz HDMI Receiver	<a href="http://www.analog.com/media/en/technical-documentation/data-sheets/ADV7610.pdf">http://www.analog.com/media/en/technical-documentation/data-sheets/ADV7610.pdf</a>
CM2020-00TR	HDMI driver	<a href="http://www.onsemi.com/pub_link/Collateral/CM2020-00TR-D.PDF">http://www.onsemi.com/pub_link/Collateral/CM2020-00TR-D.PDF</a>
TPD12S520DBTR	Single-Chip HDMI Receiver	<a href="http://www.ti.com/lit/ds/symlink/tpd12s520.pdf">http://www.ti.com/lit/ds/symlink/tpd12s520.pdf</a>
TPS74801DRCR	Low-Dropout Linear Regulator	<a href="http://www.ti.com.cn/cn/lit/ds/symlink/tps74801.pdf">http://www.ti.com.cn/cn/lit/ds/symlink/tps74801.pdf</a>
H5007NL	1000Base-T Magnetics Module	<a href="http://productfinder.pulseeng.com/products/datasheets/HC500.pdf">http://productfinder.pulseeng.com/products/datasheets/HC500.pdf</a>
TS3USB221ERSER	USB Multiplexer-Demultiplexer Switch	<a href="http://www.ti.com/lit/ds/symlink/ts3usb221e.pdf">http://www.ti.com/lit/ds/symlink/ts3usb221e.pdf</a>

Component	Type	Description
MIC2026-1YM TR	Dual Channel Power distribution Switch	<a href="http://www.micrel.com/_PDF/mic2026.pdf">http://www.micrel.com/_PDF/mic2026.pdf</a>
SST25VF016B	16 Mbit SPI Serial Flash	<a href="http://ww1.microchip.com/downloads/en/DeviceDoc/20005044C.pdf">http://ww1.microchip.com/downloads/en/DeviceDoc/20005044C.pdf</a>
TPS63020DSJR	Single Inductor Buck-Boost Converter	<a href="http://www.ti.com/lit/ds/symlink/tps63020.pdf">http://www.ti.com/lit/ds/symlink/tps63020.pdf</a>
TPS74801DRCR	Low-Dropout Linear Regulator	<a href="http://www.ti.com/lit/ds/symlink/tps74801.pdf">http://www.ti.com/lit/ds/symlink/tps74801.pdf</a>
SI4425BDY-T1-E3	P-Channel 30-V (D-S) MOFSET	<a href="http://www.vishay.com/docs/72000/72000.pdf">http://www.vishay.com/docs/72000/72000.pdf</a>

## 2. Features Description

### 2.1 User Interfaces

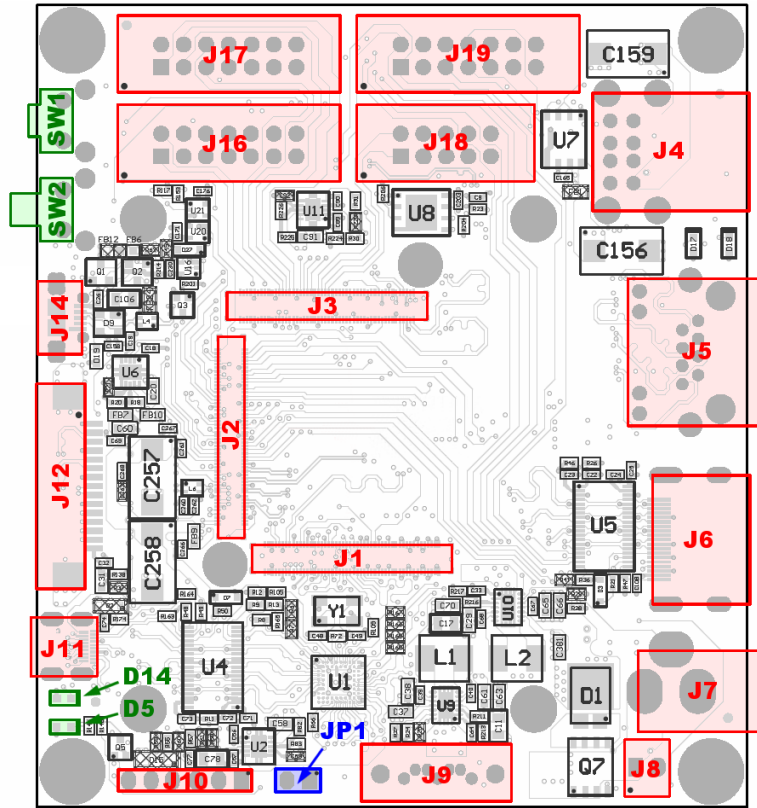
The following user interfaces are available on the Voipac iMX6 TinyRex Base Board Lite.

Interface	Description
HDMI	HDMI Output with Audio and HDMI Micro Input with Audio (e.g. from GoPro camera)
USB	1x USB (Optional: 2x USB ) and 1x OTG
PCIE	mini card socket (PCIE & USB)
Power	Power input / output header
Headers	4x UART, 1x SPI, 1x CAN (CMOS), 3x I2C, 2x PWM, 8x GPIO (can be used for Buttons, LEDs, ...)

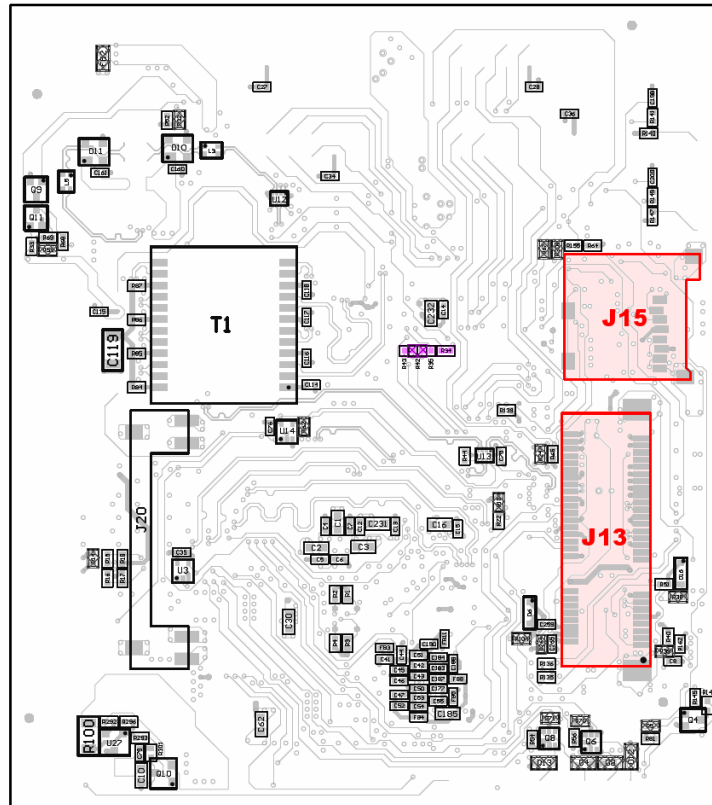
### 2.2 Board Layout – Connectors, Jumpers, LEDs, Buttons and Peripheral selection resistors

The top and bottom component placement on the next page shows interfaces layout of the baseboard. All useful interfaces are shown in assembly top and bottom drawings and summarized in subsection 2.3.

TOP SIDE



BOTTOM SIDE



## 2.3 Connectors, Jumpers, LEDs, Buttons and Resistors list

CONNECTORS		
Ref.Num.	Description	Page
J1	Module Board to Board Connector	9
J2	Module Board to Board Connector	11
J3	Module Board to Board Connector	13
J4	USB 2x Host Stacked	15
J5	Ethernet Connector RJ-45	15
J6	HDMI Output Connector	16
J7	Power Input	16
J8	Power Input/Output Header	17
J9	SATA	17
J10	Serial Console Header (TTL-232R-3V3)	18
J11	HDMI Input Connector	18
J12	MIPI CSI Connector	19
J13	PCIe Mini Slot	20
J14	USB Micro Connector	21
J15	Micro SD Slot	21
J16	UART Header	22
J17	Peripheral Header	22
J18	GPIO & PWM Header	23
J19	System Header	23
J20	PCIe Mini Card Latch	

JUMPERS		
Ref.Num.	Description	Page
JP1	Boot Mode selection eFuses / USB OTG	24

BUTTONS AND LEDs		
Ref.Num.	Description	Page
SW1	Reset Button	24
SW2	User Button	24
D5	User LED indicator (Red)	25
D14	Power LED indicator (Green)	25
D17	USB TOP indicator (Red)	25
D18	USB BOTTOM indicator (Red)	25

PERIPHERAL SELECTIONS RESISTORS		
Ref.Num.	Description	Page
	CPU_GPIO0 & CSI1_PIXCLK Routing	26

## 3. Connector Description

This chapter describes the connectors of the iMX6 TinyRex Base Board Lite. Some connectors have dedicated functionality, but some like TFT can be used also for other purposes, like general purpose IO (GPIO) or general expansion bus.

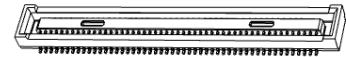


### 3.1 Pinout Description

#### 3.1.1 J1 Board to Module Receptacle Connector (CONN RCPT 100POS 0.4MM SMD GOLD)

Description: J1 receptacle connector connects the baseboard with the module.  
It has space saving design with minimum width and height of the connector.  
(Maximum current for the board to board connector is 0.3A per contact.)

Manufacturer: Hirose Electric Co. Ltd.  
Connector: [DF40C-100DS-0.4V\(51\)](#)



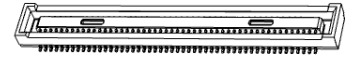
Description	Type	PIN Name	PIN	PIN	PIN Name	Type	Description
VIN DC (2.7-5.5V)	PO	+VIN	1	2	+VIN	PO	VIN DC (2.7-5.5V)
VIN DC (2.7-5.5V)	PO	+VIN	3	4	+VIN	PO	VIN DC (2.7-5.5V)
Ground	G	GND	5	6	+VIN	PO	VIN DC (2.7-5.5V)
Ground	G	GND	7	8	+VIN	PO	VIN DC (2.7-5.5V)
Ground	G	GND	9	10	+VIN	PO	VIN DC (2.7-5.5V)
Ground	G	GND	11	12	+VIN	PO	VIN DC (2.7-5.5V)
Ground	G	GND	13	14	+VIN	PO	VIN DC (2.7-5.5V)
Ground	G	GND	15	16	+VIN	PO	VIN DC (2.7-5.5V)
Ground	G	GND	17	18	+VIN	PO	VIN DC (2.7-5.5V)
Ground	G	GND	19	20	+VIN	PO	VIN DC (2.7-5.5V)
Ground	G	GND	21	22	+3V3	PO	VIN DC (3.3V)
Ground	G	GND	23	24	+3V3	PO	VIN DC (3.3V)
			25	26			
			27	28			
Ground	G	GND	29	30	GND	G	Ground
			31	32			
			33	34			
Ground	G	GND	35	36	GND	G	Ground
			37	38	USB0_ID_BUFF_EN		
			39	40	MPCIE_WDISn		
Ground	G	GND	41	42	+3V3	PO	VIN DC (3.3V)
Sensor data latch clock (Pixel Clock)	I	VID_IN_CSI0_PIXCLK	43	44	+3V3	PO	VIN DC (3.3V)
Sensor data Vertical Sync (Blank Signal)	I	VID_IN_CSI0_VS	45	46	+3V3	PO	VIN DC (3.3V)
Sensor data Horizontal Sync (Start Of Frame)	I	VID_IN_CSI0_HS	47	48	VID_IN_CSI0_D0	I	Sensor port data

Description	Type	PIN Name	PIN	PIN	PIN Name	Type	Description
Ground	G	GND	49	50	VID_IN_CSI0_D1	I	Sensor port data
Sensor port data	I	VID_IN_CSI0_D4	51	52	VID_IN_CSI0_D2	I	Sensor port data
Sensor port data	I	VID_IN_CSI0_D5	53	54	VID_IN_CSI0_D3	I	Sensor port data
Sensor port data	I	VID_IN_CSI0_D6	55	56	GND	G	Ground
Sensor port data	I	VID_IN_CSI0_D7	57	58	VID_IN_CSI0_D8	I	Sensor port data
Ground	G	GND	59	60	VID_IN_CSI0_D9	I	Sensor port data
Sensor port data	I	VID_IN_CSI0_D12	61	62	VID_IN_CSI0_D10	I	Sensor port data
Sensor port data	I	VID_IN_CSI0_D13	63	64	VID_IN_CSI0_D11	I	Sensor port data
Sensor port data	I	VID_IN_CSI0_D14	65	66	GND	G	Ground
Sensor port data	I	VID_IN_CSI0_D15	67	68	VID_IN_CSI0_D16	I	Sensor port data
VDC 3V output	PO	+3V0_ALWAYS_TP	69	70	VID_IN_CSI0_D17	I	Sensor port data
GPIO	O	VID_IN_CSI0_RSTn	71	72	VID_IN_CSI0_D18	I	Sensor port data
GPIO	I	VID_IN_CSI0_INT	73	74	VID_IN_CSI0_D19	I	Sensor port data
Sensor data Data Enable	I	VID_IN_CSI0_DE	75	76	+5V	PO	
VOUT DC (3V)	PO	+3V0_ALWAYS_TP	77	78	HDMI_OUT_HPD	IO	HDMI HPD Signal
HDMI Negative Data Signal 1	IO	HDMI_OUT_D1_N	79	80	HDMI_OUT_CEC_IN	IO	HDMI CEC line
HDMI Positive Data Signal 1	IO	HDMI_OUT_D1_P	81	82	HDMI_CEC_STBY	IO	GPIO
Ground	G	GND	83	84	+5V	PO	
HDMI Negative Data Signal 2	IO	HDMI_OUT_D2_N	85	86	HDMI_OUT_D0_N	IO	HDMI Negative Data Signal 0
HDMI Positive Data Signal 2	IO	HDMI_OUT_D2_P	87	88	HDMI_OUT_D0_P	IO	HDMI Positive Data Signal 0
Ground	G	GND	89	90	GND	G	Ground
			91	92	HDMI_OUT_CLK_N	I	HDMI Negative Clock Signal
			93	94	HDMI_OUT_CLK_P	I	HDMI Positive Clock Signal
Ground	G	GND	95	96	GND	G	Ground
			97	98			
			99	100			

### 3.1.2 J2 Board to Module Receptacle Connector (CONN RCPT 100POS 0.4MM SMD GOLD)

Description: J2 receptacle connector connects the baseboard with the module.  
It has space saving design with minimum width and height of the connector.  
(Maximum current for the board to board connector is 0.3A per contact.)

Manufacturer: Hirose Electric Co. Ltd.  
Connector: [DF40C-100DS-0.4V\(51\)](#)



Description	Type	PIN Name	PIN	PIN	PIN Name	Type	Description
			1	2	SYS_POKn		
Boot mode signal	I	BOOT_MODE0_CON	3	4	SYS_RSTn		
Power good signal	O	POK_1V5_MODULE	5	6	PMIC_ON_REQ	O	Power On request signal
Power good signal	I	POK_5V	7	8	ON_OFF	I	ON/OFF signal
Power good signal	I	POK_3V3	9	10	USER_BUTTON	IO	GPIO
Ground	G	GND	11	12	GND	G	Ground
GPIO	IO	CPU_GPIO0_R	13	14	AUD4_CLK	IO	GPIO
GPIO	IO	CPU_GPIO1	15	16	AUD4_TXC	IO	Transmit clock signal
PWM1 functional output of the PWM.	O	GPIO-OR-PWM_1	17	18	AUD4_TXFS	IO	Transmit Frame sync signal
PWM2 functional output of the PWM.	O	GPIO_OR_PWM_2	19	20			
Ground	G	GND	21	22	AUD4_RXD	IO	Data receive signal
SPI clock signal	IO	CSPI1_CLK	23	24	GND	G	Ground
SPI Master data out; slave data in	IO	CSPI1_MOSI	25	26	I2C1_SCL	IO	I2C Serial Clock
SPI Master data in; slave data out	IO	CSPI1_MISO	27	28	I2C1_SDA	IO	I2CSerial Data
SPI Chip select signal	IO	CSPI1_CS0	29	30	FLEXCAN1_TX	O	FLEXCAN transmit pin. This pin is the transmit pin to the CAN bus transceiver. Dominant state is represented by logic level '0'. Recessive state is represented by logic level '1'
Ground	G	GND	31	32	FLEXCAN1_RX	I	FLEXCAN receive pin. This pin is the receive pin from the CAN bus transceiver. Dominant state is represented by logic level '0'. Recessive state is represented by logic level '1'
SD Card detection pin If not used(for the embedded memory),tie low to indicate there is a card attached.	I	SD3_CD	33	34	GND	G	Ground
GPIO	IO	SD3_WP	35	36	SATA_RX_N	I	SATA Negative receive signal
SD Clock for MMC/SD/SDIO card	O	SD3_CLK	37	38	SATA_RX_P	I	SATA Positive receive signal
SD CMD line connect to card	IO	SD3_CMD	39	40	GND	G	Ground

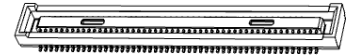
Description	Type	PIN Name	PIN	PIN	PIN Name	Type	Description
Ground	G	GND	41	42	SATA_TX_N	O	SATA Negative transmit signal
SD DATA0 line in all modes. Also used to detect busy state	IO	SD3_DATA0	43	44	SATA_TX_P	O	SATA Positive transmit signal
SD DATA1 line in 4/8-bit modes. Also used to detect interrupt in 1/4-bit mode	IO	SD3_DATA1	45	46	GND	G	Ground
SD DATA2 line or Read Wait in 4-bit mode Read Wait in 1-bit mode	IO	SD3_DATA2	47	48	I2C2_SCL	IO	I2C Serial Clock
DATA3 line in 4/8-bit mode May be configured as card detection pin in 1-bit mode	IO	SD3_DATA3	49	50	I2C2_SDA	IO	I2C Serial Data
Ground	G	GND	51	52	I2C3_SDA	IO	I2C Serial Clock
UART Serial/infrared data transmit	O	UART1_TXD	53	54	I2C3_SCL	IO	I2C Serial Data
UART Serial / infrared data receive	I	UART1_RXD	55	56	GND	G	Ground
UART Request to send	I	UART1_RTS	57	58	UART4_TXD	O	UART Serial/infrared data transmit
UART Clear to send	O	UART1_CTS	59	60	UART4_RXD	I	UART Serial / infrared data receive
UART Serial/infrared data transmit	O	UART2_TXD	61	62	UART5_TXD	O	UART Serial/infrared data transmit
UART Serial / infrared data receive	I	UART2_RXD	63	64	UART5_RXD	I	UART Serial / infrared data receive
Ground	G	GND	65	66	GND	G	Ground
USB DN Host 1 Signal	IO	USB1_N	67	68	USB0_ID	I	USB ID signal
USB DP Host 1 Signal	IO	USB1_P	69	70	USB_OC	I	USB OTG External input for VBUS overcurrent detection
Ground	G	GND	71	72	USB1_PWR_EN	IO	GPIO
USB DN OTG Signal	IO	USB0_N	73	74	USB0_PWR_EN	O	To control PMIC to supply VBUS voltage
USB DP OTG Signal	IO	USB0_P	75	76	PCIE_WAKE	IO	GPIO
Ground	G	GND	77	78	GND	G	Ground
PCIE Transmitter Lane 0, Differential pair	IO	PCIE_TX_N	79	80	PCIE_CLK_N	IO	PCIE Reference Clock Differential pair
PCIE Transmitter Lane 0, Differential pair	IO	PCIE_TX_P	81	82	PCIE_CLK_P	IO	PCIE Reference Clock Differential pair
Ground	G	GND	83	84	GND	G	Ground
PCIE Receiver Lane 0, Differential pair	IO	PCIE_RX_N	85	86	CSI_CLK0_N	IO	MIPI Clock
PCIE Receiver Lane 0, Differential pair	IO	PCIE_RX_P	87	88	CSI_CLK_P	IO	MIPI Clock
Ground	PO	GND	89	90	GND	PO	Ground
			91	92	CSI_D0_N	IO	MIPI Data Lane 0

Description	Type	PIN Name	PIN	PIN	PIN Name	Type	Description
			93	94	CSI_D0_P	IO	MIPI Data Lane 0
Ground	G	GND	95	96	GND	G	Ground
			97	98	CSI_D1_N	IO	MIPI Data Lane 1
			99	100	CSI_D1_P	IO	MIPI Data Lane 1

### 3.1.3 J3 Board to Module Receptacle Connector (CONN RCPT 100POS 0.4MM SMD GOLD)

Description: J3 receptacle connector connects the baseboard with the module.  
It has space saving design with minimum width and height of the connector.  
(Maximum current for the board to board connector is 0.3A per contact.)

Manufacturer: Hirose Electric Co. Ltd.  
Connector: [DF40C-100DS-0.4V\(51\)](#)



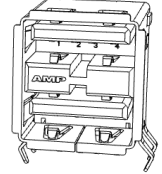
Description	Type	PIN Name	PIN	PIN	PIN Name	Type	Description
ETH Media Dependent Interface[0], negative signal of differential pair	IO	TRD0_N	1	2	TRD2_N	IO	ETH Media Dependent Interface[2], negative signal of differential pair
ETH Media Dependent Interface[0], positive signal of differential pair	IO	TRD0_P	3	4	TRD2_P	IO	ETH Media Dependent Interface[2], positive signal of differential pair
Ground	G	GND	5	6	+1V2	PO	
ETH Media Dependent Interface[1], negative signal of differential pair	IO	TRD1_N	7	8	TRD3_N	IO	ETH Media Dependent Interface[3], negative signal of differential pair
ETH Media Dependent Interface[1], positive signal of differential pair	IO	TRD1_P	9	10	TRD3_P	IO	ETH Media Dependent Interface[3], positive signal of differential pair
Ground	G	GND	11	12	+1V2	PO	
			13	14	ENET_LED_LINK	IO	ETH Link On/Off signal
			15	16	ENET_LED_RX	IO	ETH Activity/No activity signal
			17	18			
		CSI1_GPIO	19	20	+1V2	PO	
			21	22	CSI1_PIXCLK	O	Pixel clock
			23	24			
Ground	G	GND	25	26			
			27	28	GND	G	Ground
			29	30			
			31	32			
			33	34			
Ground	G	GND	35	36			

Description	Type	PIN Name	PIN	PIN	PIN Name	Type	Description
			37	38	GND	G	Ground
			39	40			
			41	42			
			43	44			
Ground	G	GND	45	46			
			47	48	+2V5	PO	
			49	50	CPU_GPIO2	IO	SD DATA0 line in all modes Also used to detect busy state
			51	52	GPIO_OR_PWM_3		
			53	54	GPIO_OR_PWM_4		
Ground	G	GND	55	56	CPU_GPIO3		
			57	58	+2V5	PO	
			59	60	CPU_GPIO4		
			61	62	CPU_GPIO5		
			63	64	CPU_GPIO6		
			65	66	CPU_GPIO7		
			67	68	GND	G	Ground
Ground	G	GND	69	70	CSPI2_CLK	IO	SPI clock signal
UART Serial/infrared data transmit	O	UART3_TXD	71	72	CSPI2_MOSI	IO	SPI Master data out; slave data in
UART Serial / infrared data receive	I	UART3_RXD	73	74	CSPI2_MISO	IO	SPI Master data in; slave data out
UART Request to send	I	UART3_RTS	75	76	CSPI2_CS0	IO	SPI Chip select signal
UART Clear to send	O	UART3_CTS	77	78	CSPI2_CS1	IO	SPI Chip select signal
Ground	G	GND	79	80	GND	G	Ground
			81	82			
			83	84			
			85	86			
			87	88			
			89	90			
Ground	G	GND	91	92	GND	G	Ground
			93	94			
			95	96			
			97	98			
			99	100			

### 3.1.4 J4 – USB Stacked A Connector (USB - A, Stacked)

Description: Connector J4 is connected to the USB HUB located on the baseboard. This on board USB HUB connects to the CPU-USB0.

Manufacturer: TE Connectivity AMP Connectors  
Connector: 5787617-1  
[www.te.com](http://www.te.com)

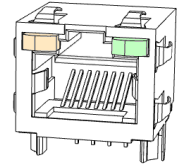


Description	Type	Signal Name	PIN	PIN	Signal Name	Type	Description
+5V supply for the device	PO	+5V_USB1_VBUS	1	5	+5V_USB0_VBUS	PO	+5V supply for the device
USB0 Downstream 1 Negative signal	I/O	USB1_CON_N	2	6	USB0_CON_N	I/O	USB0 Downstream 2 Negative signal
USB0 Downstream 1 Positive signal	I/O	USB1_CON_P	3	7	USB0_CON_P	I/O	USB0 Downstream 2 Positive signal
Ground	G	GND	4	8	GND	G	Ground

### 3.1.5 J5 – Ethernet Connector (CONN MOD JACK 8P8C R/A SHIELDED )

Description: Connector J5 is 1Gb Ethernet interface.

Manufacturer: TE Connectivity AMP Connectors  
Connector: 2-406549-1  
[www.te.com](http://www.te.com)



PIN	PIN Name	Type	Description
1	BI_DA+	I/O	TRD0 Positive signal
2	BI_DA-	I/O	TRD0 Negative signal
3	BI_DB+	I/O	TRD1 Positive signal
4	BI_DC+	I/O	TRD2 Positive signal
5	BI_DC-	I/O	TRD2 Negative signal
6	BI_DB-	I/O	TRD1 Negative signal
7	BI_DD+	I/O	TRD3 Positive signal
8	BI_DD-	I/O	TRD3 Negative signal
9	K_GREEN	O	ENET_LED_RX
10	A_GREEN	PO	
11	K_YELLOW	O	ENET_LED_LINK
12	A_YELLOW	PO	
13	SHIELD1	G	
14	SHIELD2	G	

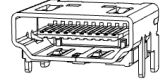
Link / Activity	State of yellow LED	State of green LED
Link off	OFF	OFF
1000 Link / No activity	ON	OFF
1000 Link / Activity	Blinking	OFF
100 Link / No Activity	OFF	ON
100 Link / Activity	OFF	Blinking
10 Link / No Activity	ON	ON
10 Link / Activity	Blinking	Blinking

### 3.1.6 J6 – HDMI Output Connector (HDMI 19 Position Surface Mount Connector)

Description: Connector J6 is connected to the HDMI interface.

Manufacturer: Molex, LLC

Connector: Molex 47151-0001  
[www.molex.com](http://www.molex.com)



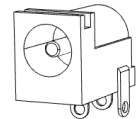
PIN	Signal Name	Type	Description
1	D2+	O	TMDS Data2+
2	D2 SHIELD	G	TMDS Data2 Shield
3	D2-	O	TMDS Data2-
4	D1+	O	TMDS Data1+
5	D1 SHIELD	G	TMDS Data1 Shield
6	D1-	O	TMDS Data1-
7	D0+	O	TMDS Data0+
8	D0 SHIELD	G	TMDS Data0 shield
9	D0-	O	TMDS Data0-
10	CK+	O	TMDS Clock+
11	CK SHIELD	G	TMDS Clock Shield
12	CK-	O	TMDS Clock-
13	CE REMOTE	I/O	Consumer Electronics Control
14	NC.14		Not connected
15	DDC CLK	O	Connected to I2C2
16	DDC DATA	I/O	Connected to I2C2
17	GND	G	
18	+5V	PO	+3.3V Supply for the device
19	HP DET	I	Hot Plug detect

### 3.1.7 J7 – Power Input Connector (CONN PWR JACK 2.1X5.5MM HIGH CUR)

Description: Connector J7 is a main input power jack (input voltage range: +3.2V to +5.3V DC, max. current 10A).

Manufacturer: CUI Inc.

Connector: PJ-002AH  
[www.cui.com](http://www.cui.com)



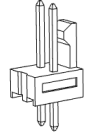
PIN	Signal Name	Type	Description
Center	+V_INPUT	PI	Input power for the board
Outer Barrel	GND	G	Power ground



### 3.1.8 J8 – Power Input/Output Header (HDR\_1X2\_2.54MM\_MOLEX\_KK)

Description: Power header J8 can be used as an output connector for supplying external devices (e.g. 2.5" hard drive or fan). Be sure that +V\_INPUT is within the device voltage specification. (Maximum current per contact: 4A)  
Power header J8 can also supply the whole board when input jack is not fitted.

Manufacturer: Molex, LLC  
Connector: 0022112022  
[www.molex.com](http://www.molex.com)

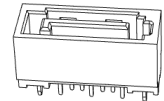


PIN	Signal Name	Type	Description
Center	+V_INPUT	PI	Input power for the board
Outer Barrel	GND	G	Power ground

### 3.1.9 J9 – SATA Connector (CONN SATA HDR 7POS PCB VERT)

Description: High Speed Connector to the SATA Interface (SATA Interface is supported only by QuadPlus / Quad / Dual i.MX6 Processors).

Manufacturer: Molex, LLC  
Connector: Molex 0471554001  
[www.molex.com](http://www.molex.com)

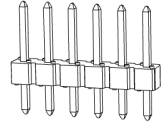


PIN	Signal Name	Type	Description
1	GND1	G	
2	TX+	O	SATA Transmit Positive Signal
3	TX-	O	SATA Transmit Negative Signal
4	GND2	G	
5	RX-	I	SATA Receive Negative Signal
6	RX+	I	SATA Receive Positive Signal
7	GND3	G	

### 3.1.10 J10 – Serial Console Header (1x6 PIN, CONN HEADER 6POS .100 STR 15AU)

Description: Serial console header J10 is designed to be used with FTDI TTL-232R-3V3 TTL to USB Serial Converter.  
FTDI TTL-232R-3V3 Cable Pinout (Left side - Converter; Right Side - iMX6 TinyRex).

Cable by default Manufacturer: Future Technology Devices International Limited  
[www.ftdichip.com](http://www.ftdichip.com)



PIN	Signal Name	Type	Description
1	GND	G	
2	UART1_RTS_FTDI	O	
3	+5V_FTDI	PO	
4	UART1_RXD_FTDI	I	
5	UART1_TXD_FTDI	O	
6	UART1_CTS_FTDI	I	

### 3.1.11 J11 – HDMI Input Connector (CONN RCPT HDMI MICRO TYPE-D R/A)

Description: Connector J11 is connected to the HDMI interface.

Manufacturer: Molex, LLC  
Connector: Molex 0467651001  
[www.molex.com](http://www.molex.com)



PIN	Signal Name	Type	Description
1	HP DET	I	Hot Plug detect
2	UTILITY	PI	+5V_HDMI_IN_CON
3	D2+	I	TMDS Data2+
4	D2 SHIELD	G	TMDS Data2 Shield
5	D2-	I	TMDS Data2-
6	D1+	I	TMDS Data1+
7	D1 SHIELD	G	TMDS Data1 Shield
8	D1-	I	TMDS Data1-
9	D0+	I	TMDS Data0+
10	D0 SHIELD	G	TMDS Data0 shield
11	D0-	I	TMDS Data0-
12	CK+	I	TMDS Clock+

PIN	Signal Name	Type	Description
13	CK SHIELD	G	TMDS Clock Shield
14	CK-	O	TMDS Clock-
15	CEC		
16	DDC/CEC GND	G	
17	SCL		
18	SDA		
19	+5V POWER	PI	

### 3.1.12 J12 – MIPI CSI Connector (CONN FPC BOTTOM 15POS 1.00MM R/A)

Description: MIPI CSI connector J12 is pin compatible with Raspberry Pi camera connector to attach camera subsystems to a host device.

Manufacturer: TE Connectivity AMP Connectors  
 Connector: 1-84952-5  
[www.te.com](http://www.te.com)



PIN	Signal Name	Type	Description
1	GND	G	
2	CSI_D0_N	I	
3	CSI_D0_P	I	
4	GND	G	
5	CSI_D1_N	I	
6	CSI_D1_P	I	
7	GND	G	
8	CSI_CLK0_N	I	
9	CSI_CLK0_P	I	
10	GND	G	
11	CSI1_GPIO_R	I	
12	CSI1_PIXCLK_R	I	
13	I2C2_CSI_SCL	O	
14	I2C2_CSI_SDA	I/O	
15	+VCC_MIPI_CSI	PO	+3V3

### 3.1.13 J13 – PCI Express Mini Card 1 Socket (CONN MINI EXPRESS CARD 52POS SMD)

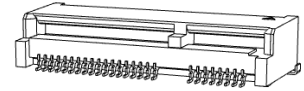
Description: Card Socket J13 is connected to the PCI Express interface.

Manufacturer: Japan Aviation Electronics Industry, Limited

Connector: JAE MM60-52B1-E1-R650

Card Latch: JAE MM60-EZH059-B5-R650

[jae-connectors.com](http://jae-connectors.com)



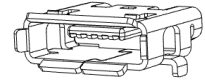
Description	Type	PIN Name	PIN	PIN	PIN Name	Type	Description
PCIe Wake up	OD	WAKE#	1	2	3.3V_1	PO	
		Reserved_1	3	4	GND_7	G	
		Reserved_2	5	6	1.5V_1	PO	
Not connected		CLKREQ#	7	8	UIM_PWR	PI	SIM Card Power
	G	GND_1	9	10	UIM_DATA	I/O	SIM Card Data
	O	REFCLK-	11	12	UIM_CLK	I	SIM Card Clock
	O	REFCLK+	13	14	UIM_RESET	I	SIM Card Reset
	G	GND_2	15	16	UIM_VPP	PI	SIM Card VPP
Not connected		Reserved / UIM_C8	17	18	GND_8	G	
Not connected		Reserved / UIM_C4	19	20	W_DISABLE#	O	Wireless disable
	G	GND_3	21	22	PERST#	O	Reset
PCIe Receive Negative	I	PERn0	23	24	+3.3Vaux	PO	Connected to +3V3
PCIe Receive Positive	I	PERp0	25	26	GND_9	G	
	G	GND_4	27	28	1.5V_2	PO	
	G	GND_5	29	30	SMB_CLK	O	Connected to I2C2
PCIe Transmit Negative	O	PETn0	31	32	SMB_DATA	I/O	Connected to I2C2
PCIe Transmit Positive	O	PETp0	33	34	GND_10	G	
	G	GND_6	35	36	USB_D-	I/O	Connected to USB1
Connected to Ground	G	Reserved_3	37	38	USB_D+	I/O	Connected to USB1
Connected to +3.3V	PO	Reserved_4	39	40	GND_11	G	
Connected to +3.3V	PO	Reserved_5	41	42	LED_WWAN#	I	Not connected
Connected to Ground	G	Reserved_6	43	44	LED_WLAN#	I	Not connected
Not connected		Reserved_7	45	46	LED_WPAN#	I	Not connected
Not connected		Reserved_8	47	48	1.5V_3	PO	
+5V_MPCIE	PO	Reserved_9	49	50	GND_12	G	
+5V_MPCIE	PO	Reserved_10	51	52	3.3V_2	PO	

### 3.1.14 J14 – USB Micro Connector (CONN RCPT MICRO USB AB R/A SMD)

Description: Connector J14 is connected to the CPU-USB0 interface. Connector is intended to be used as a slave for the debugging purposes. See the schematic.

Manufacturer: Molex, LLC  
Connector: 0475890001

[www.molex.com](http://www.molex.com)



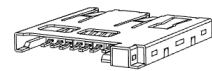
PIN	Signal Name	Type	Description
1	+5V_USB_VBUS	PO	+5V supply for the device
2	USB_OTG_CON_N	I/O	CPU-USB0 Negative signal
3	USB_OTG_CON_P	I/O	CPU-USB0 Positive signal
4	USB0_ID	I/O	USB0 Host Selection
5	GND	G	

### 3.1.15 J15 – microSD™ Slot (CONN MICRO SD 8 POS SMD)

Description: Slot J15 is connected to the CPU-SD3 interface. Card detection is supported. The module defaultly boots up from the card inserted into the slot J15. Recovery mode from the baseboard SPI Flash (if microSD card is missing) is enabled.

Manufacturer: Wurth Electronics Inc.  
Connector: 693071010811

<http://www.wuerth.de>

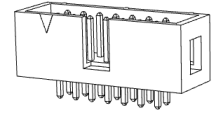


PIN	PIN Name	Type	Description
1	DAT2	I/O	
2	CD/DAT3	I/O	
3	CMD	I/O	
4	VDD	PO	
5	CLK	O	
6	VSS	G	
7	DAT0	I/O	
8	DAT1	I/O	
9	SW_1	I	Card detection signal
10	SW_2	I	Card detection signal
11	CASE2	G	
12	CASE3	G	

### 3.1.16 J16 – UART Header (2x7 PIN, CONN HEADER 14POS VERT 10GOLD)

Description: J16 connector brings out UART interface signals.

Manufacturer: 3M Electronics Solutions Division  
 Connector: D2514-6002-AR  
 Mating housing: TE 1658622-1 or equivalent  
[multimedia.3m.com](http://multimedia.3m.com)

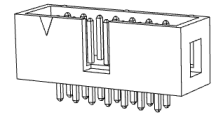


Description	Type	Signal Name	PIN	PIN	Signal Name	Type	Description
	O	UART2_TXD	1	2	UART2_RXD	I	
	G	GND	3	4	+3V3	PO	
	I	UART4_RXD	5	6	UART4_TXD	O	
	G	GND	7	8	UART5_RXD	I	
	O	UART5_TXD	9	10	GND	G	
	O	UART3_RTS	11	12	UART3_CTS	I	
	I	UART3_RXD	13	14	UART3_TXD	O	

### 3.1.17 J17 – Peripheral Header (2x7 PIN, CONN HEADER 14POS VERT 10GOLD)

Description: J17 connector brings out various system signals.

Manufacturer: 3M Electronics Solutions Division  
 Connector: D2514-6002-AR  
 Mating housing: TE 1658622-1 or equivalent  
[multimedia.3m.com](http://multimedia.3m.com)



Description	Type	Signal Name	PIN	PIN	Signal Name	Type	Description
	O	CSPI2_CLK	1	2	GND	G	
	I	CSPI2_MISO	3	4	CSPI2_MOSI	O	
	O	CSPI2_CS0	5	6	CSPI2_CS1	O	
	PO	+3V3	7	8	FLEXCAN1_RX	I	
	O	FLEXCAN1_TX	9	10	I2C2_SDA	I/O	
	O	I2C2_SCL	11	12	GND	G	
	O	I2C3_SDA	13	14	I2C3_SCL	O	

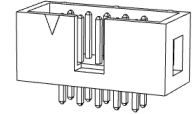
### 3.1.18 J18 – GPIO & PWM Header (2x5 PIN, CONN HEADER 10POS VERT 10GOLD)

Description: Header J18 is connected to CPU\_GPIO & CPU\_PWM interface.

Manufacturer: 3M Electronics Solutions Division

Connector: D2510-6002-AR

Mating housing: TE 1658622-1 or equivalent  
[multimedia.3m.com](http://multimedia.3m.com)



Description	Type	Signal Name	PIN	PIN	Signal Name	Type	Description
	I/O	GPIO_OR_PWM_3	1	2	GPIO_OR_PWM_4	I/O	
	PO	+3V3	3	4	GND	G	
	I/O	CPU_GPIO2	5	6	CPU_GPIO3	I/O	
	I/O	CPU_GPIO4	7	8	CPU_GPIO5	I/O	
	I/O	CPU_GPIO6	9	10	CPU_GPIO7	I/O	

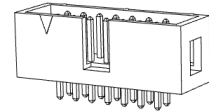
### 3.1.19 J19 – System Header (2x7 PIN, CONN HEADER 14POS VERT 10GOLD)

Description: J19 connector brings out CPU-SPI2 interface and other various system signals.

Manufacturer: 3M Electronics Solutions Division

Connector: D2514-6002-AR

Mating housing: TE 1658622-1 or equivalent  
[multimedia.3m.com](http://multimedia.3m.com)



Description	Type	Signal Name	PIN	PIN	Signal Name	Type	Description
	O	I2C1_SCL	1	2	I2C1_SDA	I/O	
	G	GND	3	4	USER_BTN_HDR	I	
	O	USER_LED_HDR	5	6	RST_BTN_HDR	I	
	O	PWR_LED_HDR	7	8	BUF_SYS_RSTn	I/O	
	PO	+3V3	9	10	CPU_GPIO0	I/O	
	I/O	CPU_GPIO1	11	12	GND	G	
	I/O	GPIO_OR_PWM_1	13	14	GPIO_OR_PWM_2	I/O	

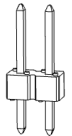
## 4. Jumper, Buttons, LEDs and Resistors Description

### 4.1 Jumper Pinout Description

#### 4.1.1 JP1 – Boot Mode Selection (1x2pin, BERGSTIK II .100" SR STRAIGHT)

Description: The JP1 header controls the level of the Boot mode signal. This signal selects between booting from eFuses or booting from USB OTG (used by MFGTools during manufacturing or debugging).

Manufacturer: FCI Electronics  
 Connector: 68001-202HLF  
 Mating housing: TE 1658622-1 or equivalent  
[portal.fciconnect.com](http://portal.fciconnect.com)



PIN	Level of BOOT_MODE	Description
<b>CLOSED</b>	GND	USB OTG bootloader mode
<b>OPEN</b>	BOOT_MODE0_CON	Boots from eFuses (default)

Usage: As a default the board boots up from the e-fuses. For special purpose the link on JP1 can be fitted. The board then boots from the USB OTG host device.



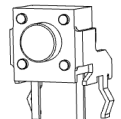
**(Note)** When running an iMX6 TinyRex Module for the very first time (before eFUSES are programmed), this pin has to be shorted to run the module in USB bootloader mode.

### 4.2 Buttons and LEDs Description

#### 4.2.1 SW1 – Reset button (SWITCH TACTILE SPST-NO 0.05A 12V)

Description: The SW1 button is used to reset the board. It is a hardware reset.

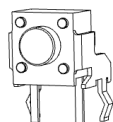
Manufacturer: TE Connectivity AMP Connectors  
 Connector: FSMRA2JH  
[www.te.com](http://www.te.com)



#### 4.2.2 SW2 – User button (SWITCH TACTILE SPST-NO 0.05A 12V)

Description: The SW2 button is a general purpose button and can be used by your application.

Manufacturer: TE Connectivity AMP Connectors  
 Connector: 1825027-8  
[www.te.com](http://www.te.com)





#### 4.2.3 D5 – User LED indicator (RED) (LED RED DIFFUSED 0603 SMD)

Description: D5 is a LED indicator. The red diode is a general purpose indicator and can be used by your application.

Manufacturer: TE Connectivity AMP Connectors  
Connector: LS L29K-H1J2-1-Z  
[www.osram-os.com](http://www.osram-os.com)



#### 4.2.4 D14 – Power LED indicator (GREEN) (LED GREEN DIFFUSED 0603 SMD)

Description: D14 is a LED indicator. The green diode is used for power good indication – the green diode is ON if all the powers are working correctly.

Manufacturer: TE Connectivity AMP Connectors  
Connector: LG L29K-G2J1-24-Z  
[www.osram-os.com](http://www.osram-os.com)



#### 4.2.5 D17 – USB TOP indicator (RED) (LED RED DIFFUSED 0603 SMD)

Description: D17 is a LED indicator. The red diode is used to indicate the USB Interface is connected to USB-A Stacked connector.  
LED State: The LED diode is ON – USB-A can be used.  
The LED diode is OFF – USB-A cannot be used.

Manufacturer: TE Connectivity AMP Connectors  
Connector: LS L29K-H1J2-1-Z  
[www.osram-os.com](http://www.osram-os.com)



#### 4.2.6 D18 – USB BOTTOM indicator (RED) (LED RED DIFFUSED 0603 SMD)

Description: D18 is a LED indicator. The red diode is used to indicate the USB Interface is connected to USB-A Stacked connector.  
LED State: The LED diode is ON – USB-A can be used.  
The LED diode is OFF – USB-A cannot be used.

Manufacturer: TE Connectivity AMP Connectors  
Connector: LS L29K-H1J2-1-Z  
[www.osram-os.com](http://www.osram-os.com)





## 4.3 Resistors Selection Description

### 4.3.1 CPU\_GPIO0 & CSI1\_PIXCLK Routing (RES 0.0 OHM 1/16W 0402 SMD)

**Description:** The USB0 interface can be routed either to the USB HUB or to the USB AB Micro connector (J21). When the USB HUB is selected, the USB stacked connector (J22), the USB Header (J23) and the PCIe Mini Card 2 (J9) can be used.

**Manufacturer:** Yageo Corporation  
**Connector:** RC0402JR-070RL  
[www.yageo.com.tw](http://www.yageo.com.tw)

Resistoers Fitted	R35, R43 (DEFAULT)		R42
OPTION	R35	CPU PIXCLK to CSI CON	CPU GPIO0_R to CSI CON
	R43	CPU GPIO0_R to SYS HDR	
			

## 5. Technical Specifications

### 5.1 Input Voltage

Voipac iMX6 TinyRex Base Board Lite has default input voltage ranging from +3.2V to +5.5V DC. Maximum current is 10A.



#### (Notes)

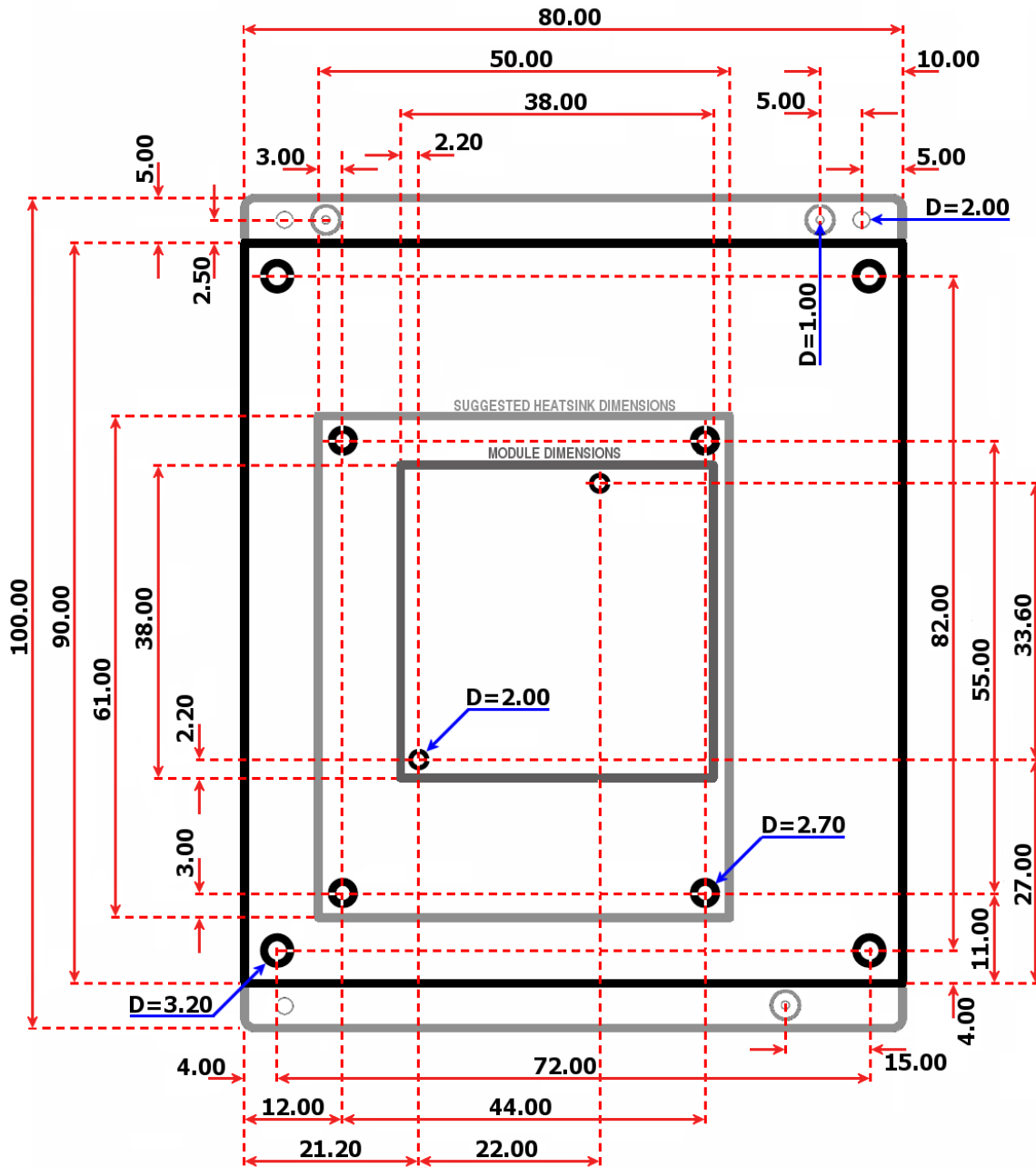
J7 maximum current is 5A. May not be enough for i.MX6 Quad / QuadPlus CPU (when minimum input voltage is applied). In this case power up the board through wires soldered directly to J7 pads.

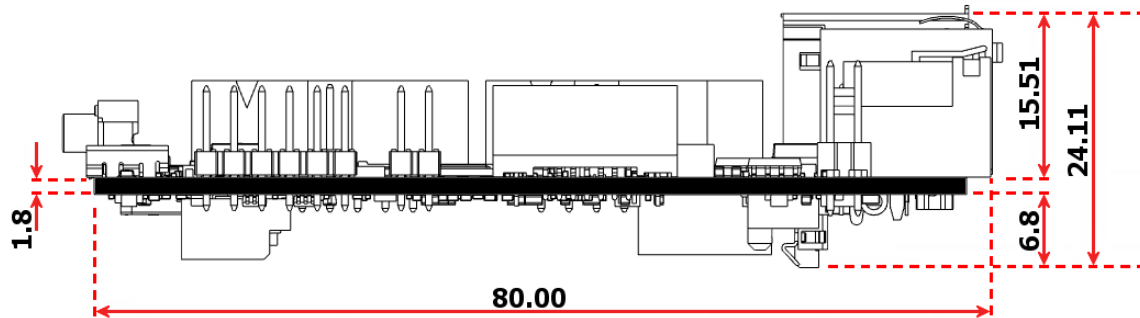
Power header J8 can be used as an ouptut connector for supplying external devices (e.g. 2.5" hard drive or fan). Be sure that +V\_INPUT is within the device voltage specification.

Power header J8 can also supply the whole board when input jack is not fitted.

### 5.2 Mechanical

Dimensions	Width	Length	Height	Unit
PCB (excluding 5mm wide break away tabs)	90 (3.55)	80 (3.15)	1.8 (0.0709)	mm (inch)
PCB (including 5mm wide break away tabs)	100 (3.94)	80 (3.15)	1.8 (0.0709)	mm (inch)





### 5.3 Temperature Range

Symbol	Description	Min	Max	Unit
T_AMB	Operating temperature range	-20	+85	°C

### 5.4 CE compliance of Voipac products

The CE label is a mandatory conformity mark for complex electronic devices placed on the market in the European Economic Area and each product sold within the EU needs a CE Certificate of Conformance that ensures that the product conforms to the essential requirements of the applicable EC directives.

However, if such complex electronic devices are produced for further processing by the industry, skilled development teams or system integrators, they do not need to observe the above mentioned CE requirements and consequently do not need any identification either. This applies to the Voipac Base Boards, because these are not used as stand-alone devices by the general public.

To make sure that Voipac Base Boards can be used in CE marked devices, they are designed to obey the EC directives and the standard configuration Base Boards manufactured by Voipac are tested for Electromagnetic Interference and operating temperature ranges together with corresponding Computer On Module and enclosed in a standard Aluminium case provided to Voipac development kits.

### 5.5 RoHS and WEEE Compliance

All of the products designed and manufactured by VOIPAC TECHNOLOGIES s.r.o. are classified as Electrical and Electronic Equipment (EEE) under the Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2002/95/EC (RoHS). To comply with the RoHS directive, the restricted use of Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent Chromium (Cr 6+), Polybrominated Biphenyls (PBB) and Polybrominated Diphenyl Ethers (PBDE) must be ensured. VOIPAC TECHNOLOGIES s.r.o. guarantees that products ordered after July 1, 2006 are assembled in full compliance with the RoHS directive from the European Parliament and Counsel. The company procedures also complies with the Waste Electrical and Electronic Equipment Directive 2002/96/EC (WEEE) .

## Warranty:

### VOIPAC TECHNOLOGIES s.r.o. Does Not Bear Responsibility for the Following:

- Failure of a product resulting from misuse, accident, modification, unsuitable operating environment, or improper maintenance by user
- Unless otherwise agreed in written, a product does not include technical support and the customer may be able to purchase technical support under separate agreement
- Any technical or other support provided under warranty by VOIPAC TECHNOLOGIES s.r.o. such as assistance, set-up and installation is provided WITHOUT WARRANTY OF ANY KIND.

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