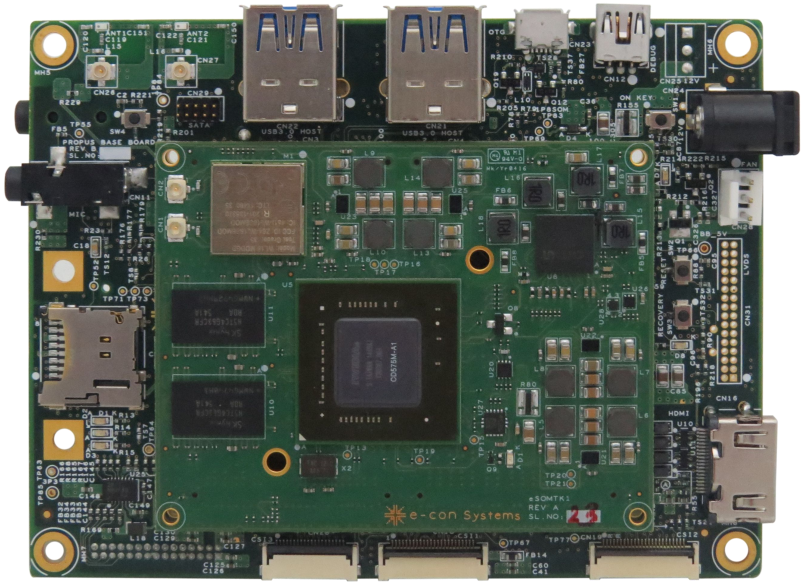
e-con Systems India Pvt Ltd

Propus User Manual Rev 1.1



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1 Introduction

Propus is an eSOMTK1 based Reference Platform designed and developed by e-con Systems. e-con Systems has designed and developed NVIDIA Tegra K1 based Computer-on-Module (System-on-Module), known as eSOMTK1.

Propus is a reference design using eSOMTK1 available to e-con's customers as a simple but effective design that can be taken as a reference by our customers. This Reference platform is targeted for various Industrial applications like Drones, Autonomous Robotic Systems, Medical Imaging, Video Analytics, Advanced Driver Assistance Systems, Single board Computers.

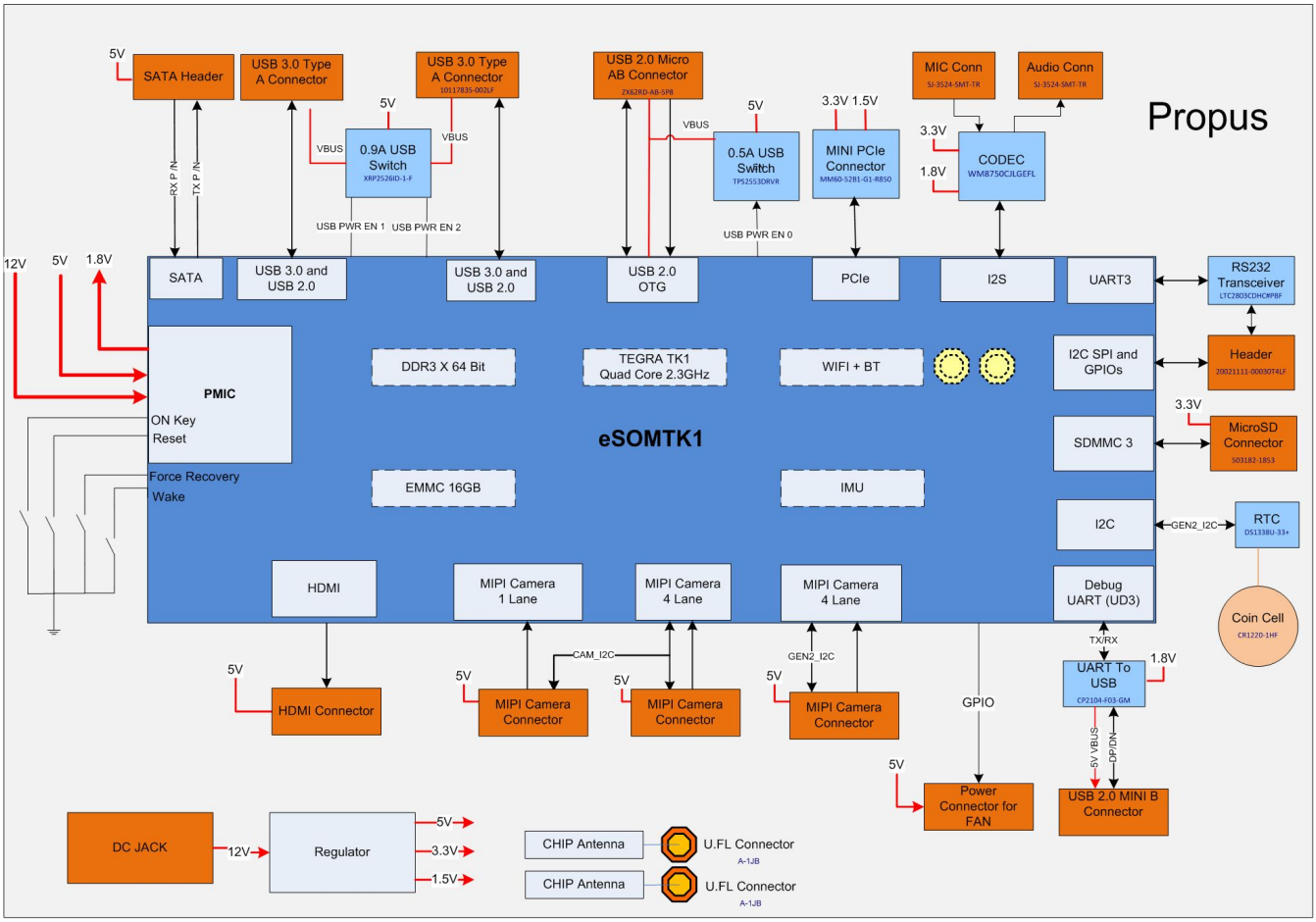
2 Scope

This Hardware User Manual document details the hardware features of the Propus reference platform. This document provides detailed information about all the peripherals and their interfacing scheme with the eSOMTK1. This document also details about any optional modules, supplied by e-con that can be interfaced with this reference platform.

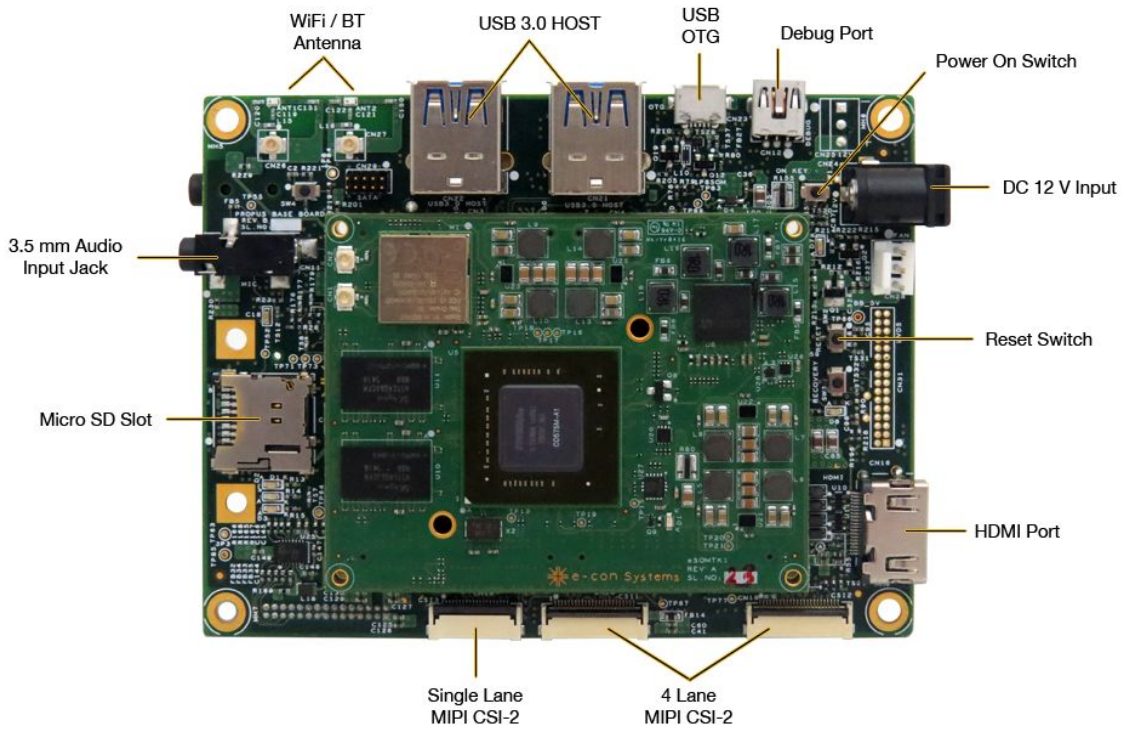
A separate "software user Manual" is provided along with the package to help the user to do software development involving OS development and application development on top of this.

3 Block Diagram

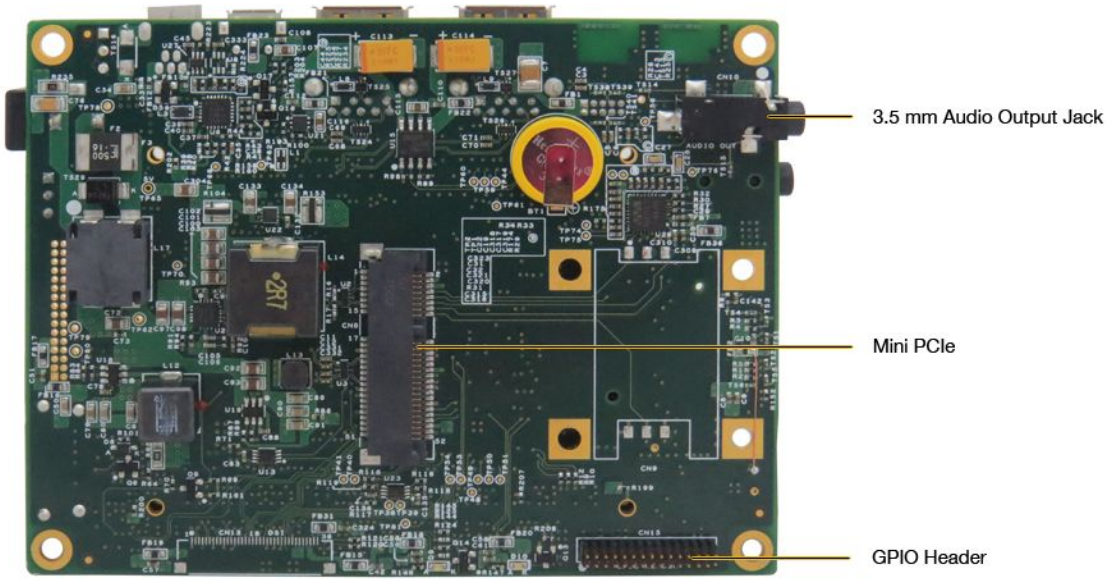
Propus reference platform is designed based on eSOMTK1 with range of I/O and expansion slots including SATA, Audio codec, HDMI, MIPI CSI, PCIe, SD/MMC slot, USB host and OTG and UARTs. Propus being modular in design and tested thoroughly, leads to reduction of the time-to-market for any of the new product idea, tailored around this Reference Platform and can be used for any of the applications which requires intensive computation or graphical operations. To enhance the use of the development kit several camera daughter cards and USB to Ethernet Daughter card is available.



3.1 Top View of Propus



3.2 Bottom View of Propus



3.3 Propus Connector Details

S.No	Description	Connector Reference at Propus
1	MicroSD	CN7
2	Mini PCIe header	CN8
3	SIM Slot	CN9
4	Head Set + Mic Jack	CN10 + CN11
5	Debug USB	CN12
6	MIPI Display Connector	CN13
7	GPIO header	CN15
8	HDMI Port	CN16
9	Camera Header – MIPI CSI1	CN18
10	Camera Header – MIPI CSI2	CN19
11	Camera Header – MIPI CSI3	CN20
12	USB 3.0 Host1	CN21
13	USB 2.0 Host2	CN22
14	USB OTG	CN23
15	Power Jack	CN24
16	Fan Power Connector	CN28
17	ANT1 + ANT2	CN26 + CN27
18	SATA Connector	CN29

3.4 Detailed Connector Pinouts

3.4.1 MMC/SD Card (CN7)

MMC/SD port is used for micro SD card (CN7) Interface.

MicroSD Card Connector Pinout

Pin No	Signal Name	IO Type	IO Level (V)
1	SDMMC3_DAT2_TK1_CONN	IO	3.3V
2	SDMMC3_DAT3_TK1_CONN	IO	3.3V
3	SDMMC_CMD_TK1_CONN	IO	3.3V
4	VCC_3P3_LDO2	PWR	
5	CLK_SDMMC3_CLK_TK1_CONN	IO	3.3V
6	GND	PWR	
7	SDMMC3_DAT0_TK1_CONN	IO	3.3V

8	SDMMC3_DAT1_TK1_CONN	IO	3.3V
9	nSDMMC_CD_TK1_CONN – open drain (pulled to 1.8V IO)	O	1.8V
10	GND	PWR	

3.4.2 Mini PCIe Standard connector (CN8)

Mini PCIe Connector Pinout

Pin No	Signal Name	IO Type	IO Level (V)
1	PEX_WAKE_N_TK1_CONN	IO	3.3V
2	VCC_PCIE_3P3	PWR	
3	NC		
4	GND	PWR	
5	NC		
6	VCC_PCIE_1P5	PWR	
7	PEX_L0_CLKREQ_N_TK1_CONN	IO	3.3V
8	PCIe_UIM_PWR	PWR	
9	GND	PWR	
10	PCIe_UIM_DATA	IO	3.3V
11	PEX_CLK1N_TK1_CONN	DIFF	
12	PCIe_UIM_CLK	IO	3.3V
13	PEX_CLK1P_TK1_CONN	DIFF	
14	PCIe_UIM_RST	IO	3.3V
15	GND	PWR	
16	PCIe_UIM_VPP	PWR	
17	NC		
18	GND	PWR	
19	NC		
20	GPIO_PFF2_TK1_CONN	IO	3.3V
21	GND	PWR	
22	PEX_L0_RST_N_TK1_CONN	IO	3.3V
23	PEX_RX4N_TK1_CONN	DIFF	
24	VCC_PCIE_3P3	PWR	
25	PEX_RX4P_TK1_CONN	DIFF	
26	GND	PWR	
27	GND	PWR	

28	VCC_PCIE_1P5	PWR	
29	GND	PWR	
30	GEN2_I2C_SCL_3P3	IO	3.3V
31	PEX_TX4N_TK1_CONN	DIFF	
32	GEN2_I2C_SDA_3P3	IO	3.3V
33	PEX_TX4P_TK1_CONN	DIFF	
34	GND	PWR	
35	GND	PWR	
36	PCIE_USB_DM	DIFF	
37	GND	PWR	
38	PCIE_USB_DP	DIFF	
39	VCC_PCIE_3P3	PWR	
40	GND	PWR	
41	VCC_PCIE_3P3	PWR	
42	LED_WWAN_B	IO	3.3V
43	GND	PWR	
44	LED_WLAN_B	IO	3.3V
45	NC		
46	LED_WPAN_B	IO	3.3V
47	NC		
48	VCC_PCIE_1P5	PWR	
49	NC		
50	GND	PWR	
51	NC		
52	VCC_PCIE_3P3	PWR	

3.4.3 Headset & MIC Interface (CN10 & CN11)

A 3.5mm STEREO JACK is used for both Headset and MIC interface.

STEREO Audio JACK (CN10) Pinouts

Pin No	Signal Name	IO Type
1	HP_VGND_JACK	PWR
2	HP_R_JACK	O ANALOG
3	HP_L_JACK	O ANALOG
4	HP_DETECT	O DIGITAL

MIC IN JACK (CN11) Pinouts

Pin No	Signal Name	IO Type
1	JACK_GND	PWR
2	MIC_JACK	I ANALOG
3	MIC_JACK	I ANALOG
4	MIC DETECT	PWR

3.4.4 Debug USB (CN12)

In Propus USB to UART Bridge added to the uart interface as shown in the following table and terminated to the USB-mini B connector (CN12) with ESD protection.

Debug USB Port

Pin No	Signal Name	IO Type
1	VBUS_5V	PWR
2	B_UART_USBD-	DIFF
3	B_UART_USBD+	DIFF
4	NC	
5	GND	PWR

3.4.5 MIPI display interface (CN13)

Propus board supports MIPI DSI interface through MIPI LCD Header. The LCD interface signals are terminated at **CN13** of Propus and all the signals are differential.

MIPI display Connector Pinout

Pin No	Signal Name	IO Type	IO Level (V)
1	GND	PWR	
2	DSI_A_CLK_N_TK1_CONN	DIFF	
3	DSI_A_CLK_P_TK1_CONN	DIFF	
4	GND	PWR	

5	DSI_A_D2_P_TK1_CONN	DIFF	
6	DSI_A_D2_N_TK1_CONN	DIFF	
7	GND	PWR	
8	DSI_A_D3_N_TK1_CONN	DIFF	
9	DSI_A_D3_P_TK1_CONN	DIFF	
10	GND	PWR	
11	DSI_A_D0_N_TK1_CONN	DIFF	
12	DSI_A_D0_P_TK1_CONN	DIFF	
13	GND	PWR	
14	DSI_A_D1_P_TK1_CONN	DIFF	
15	DSI_A_D1_N_TK1_CONN	DIFF	
16	GND	PWR	
17	KB_ROW7_TK1_CONN	IO	1.8V
18	KB_ROW17_TK1_CONN	IO	1.8V
19	KB_ROW5_TK1_CONN	IO	1.8V
20	KB_ROW6_TK1_CONN	IO	1.8V
21	KB_ROW3_TK1_CONN	IO	1.8V
22	GND	PWR	
23	SOM_DSI_PWM1	IO	1.8V
24	GND	PWR	
25	KB_ROW4_TK1_CONN	IO	1.8V
26	GEN2_I2C_SDA_3P3	IO	3.3V
27	GEN2_I2C_SCL_3P3	IO	3.3V
28	KB_ROW13_TK1_CONN	IO	1.8V
29	GND	PWR	
30	VCC_BB_5V	PWR	
31	VCC_BB_5V	PWR	
32	VCC_BB_5V	PWR	
33	VCC_3P3	PWR	
34	VCC_3P3	PWR	
35	GND	PWR	
36	VCC_1P8	PWR	

3.4.6 GPIO Header (CN15)

The following eSOMTK1 GPIOs and Signals are terminated in header CN15 for user applications.

GPIO HEADER Pinouts

Pin No	Signal Name	IO Type	IO Level (V)
1	VCC_BB_5V	PWR	
2	VCC_3P3	PWR	
3	GND	PWR	
4	GND	PWR	
5	GND	PWR	
6	VCC_1P8	PWR	
7	GPIO_PI3_TK1_CONN	IO	1.8V
8	GND	PWR	
9	GPIO_PI4_TK1_CONN	IO	1.8V
10	ULPI_NXT_TK1_CONN	IO	1.8V
11	RAM_CODE_2_GPIO_PG6_TK1_CONN	IO	1.8V
12	ULPI_STP_TK1_CONN	IO	1.8V
13	RAM_CODE_3_GPIO_PG7_TK1_CONN	IO	1.8V
14	ULPI_DIR_TK1_CONN	IO	1.8V
15	RAM_CODE_0_GPIO_PG4_TK1_CONN	IO	1.8V
16	ULPI_CLK_TK1_CONN	IO	1.8V
17	GND	PWR	
18	CAM_I2C_SDA_3P3	IO	3.3V
19	RAM_CODE_1_GPIO_PG5_TK1_CONN	IO	1.8V
20	CLK_CAM_I2C_SCL_3P3	IO	3.3V
21	GND	PWR	
22	GND	PWR	
23	RS232_RX	IO	
24	DAP3_DOUT_TK1_CONN	IO	1.8V
25	RS232_CTS	IO	
26	DAP3_DIN_TK1_CONN	IO	1.8V
27	RS232_TX	PWR	
28	DAP3_SCLK_TK1_CONN	IO	1.8V
29	RS232_RTS	IO	
30	DAP3_FS_TK1_CONN	IO	1.8V

3.4.7 HDMI Interface (CN16)

Propus board is equipped with HDMI connector (CN16) with ESD protection.

HDMI Connector Pinout

Pin No	Signal Name	IO Type	IO Level (V)
1	CN_HDMI_D2P	DIFF	
2	GND	PWR	
3	CN_HDMI_D2M	DIFF	
4	CN_HDMI_D1P	DIFF	
5	GND	PWR	
6	CN_HDMI_D1M	DIFF	
7	CN_HDMI_D0P	DIFF	
8	GND	PWR	
9	CN_HDMI_D0M	DIFF	
10	CN_HDMI_CLKP	DIFF	
11	GND	PWR	
12	CN_HDMI_CLKM	DIFF	
13	HDMI_CEC	IO	3.3V
14	NC		
15	I2C_SCL_5V	IO	5V
16	I2C_SDA_5V	IO	5V
17	GND	PWR	
18	VCC_BB_5V	PWR	
19	HDMI_INT_TK1_CONN	IO	5V

3.4.8 Serial Camera Interface – MIPI

Camera MIPI interfaces on the Propus are terminated in CN18, CN19 and CN20 connector. e-con Systems has a wide range camera daughter boards that can be interfaced with the Propus board through this camera interface connector. For availability and pricing information, please contact sales@e-consystems.com.

CAMERA MIPI (CN18) pinout

Pin No	Signal Name	IO Type	IO Level (V)
1	VCC_BB_5V	PWR	
2	VCC_BB_5V	PWR	
3	VCC_BB_5V	PWR	
4	VCC_BB_5V	PWR	

5	CSI_B_D0_N_TK1_CONN	DIFF	
6	CSI_B_D0_P_TK1_CONN	DIFF	
7	CSI_A_D1_N_TK1_CONN	DIFF	
8	CSI_A_D1_P_TK1_CONN	DIFF	
9	GND	PWR	
10	CSI_A_CLK_N_TK1_CONN	DIFF	
11	CSI_A_CLK_P_TK1_CONN	DIFF	
12	GND	PWR	
13	CSI_A_D0_N_TK1_CONN	DIFF	
14	CSI_A_D0_P_TK1_CONN	DIFF	
15	CSI_B_D1_N_TK1_CONN	DIFF	
16	CSI_B_D1_P_TK1_CONN	DIFF	
17	CSI1_PWDN_3P3	IO	3.3V
18	nCSI1_RESET_3P3	IO	3.3V
19	GND	PWR	
20	GND	PWR	
21	CSI1_STROBE_3P3	IO	3.3V
22	CAM_I2C_SDA_3P3	IO	3.3V
23	CLK_CAM_I2C_SCL_3P3	IO	3.3V
24	GND	PWR	

CAMERA MIPI (CN19) pinout

Pin No	Signal Name	IO Type	IO Level (V)
1	VCC_BB_5V	PWR	
2	VCC_BB_5V	PWR	
3	VCC_BB_5V	PWR	
4	VCC_BB_5V	PWR	
5	DSI_B_D2_N_TK1_CONN	DIFF	
6	DSI_B_D2_P_TK1_CONN	DIFF	
7	DSI_B_D1_N_TK1_CONN	DIFF	
8	DSI_B_D1_P_TK1_CONN	DIFF	
9	GND	PWR	
10	DSI_B_CLK_N_TK1_CONN	DIFF	
11	DSI_B_CLK_P_TK1_CONN	DIFF	
12	GND	PWR	
13	DSI_B_D0_N_TK1_CONN	DIFF	

14	DSI_B_D0_P_TK1_CONN	DIFF	
15	DSI_B_D3_N_TK1_CONN	DIFF	
16	DSI_B_D3_P_TK1_CONN	DIFF	
17	CSI2_PWDN_3P3	IO	3.3V
18	nCSI2_RESET_3P3	IO	3.3V
19	GND	PWR	
20	GND	PWR	
21	CSI2_STROBE_3P3	IO	3.3V
22	GEN2_I2C_SDA_3P3	IO	3.3V
23	GEN2_I2C_SCL_3P3	IO	3.3V
24	GND	PWR	

CAMERA MIPI (CN20) pinout

Pin No	Signal Name	IO Type	IO Level (V)
1	VCC_BB_5V	PWR	
2	VCC_BB_5V	PWR	
3	VCC_BB_5V	PWR	
4	VCC_BB_5V	PWR	
5	GND	PWR	
6	GND	PWR	
7	CSI3_PWDN	IO	1.8V
8	nCSI3_RESET	IO	1.8V
9	CSI3_STROBE	IO	1.8V
10	GND	PWR	
11	CSI_E_CLK_N_TK1_CONN	DIFF	
12	CSI_E_CLK_P_TK1_CONN	DIFF	
13	GND	PWR	
14	CSI_E_D0_N_TK1_CONN	DIFF	
15	CSI_E_D0_P_TK1_CONN	DIFF	
16	GND	PWR	
17	CLK_CAM_I2C_SCL_TK1_CONN (CAM_I2C_SDA_3P3)	IO	1.8V
18	CAM_I2C_SDA_TK1_CONN (CLK_CAM_I2C_SCL_3P3)	IO	1.8V
19	GND	PWR	
20	GND	PWR	

3.4.9 USB Host 3.0 Port (CN21)

The eSOMTK1 Module has built in USB Host Controller. Only the needed Power Supply circuits added in Propus base board. USB signals are directly terminated to the USB A connector with ESD protection.

USB Host Port

Pin No	Signal Name	IO Type
1	VBUS_USB1_CN	PWR
2	USB1_DN_TK1_CONN	DIFF
3	USB1_DP_TK1_CONN	DIFF
4	GND	PWR
5	USB3_RX0N_TK1_CONN	DIFF
6	USB3_RX0P_TK1_CONN	DIFF
7	GND	PWR
8	USB3_TX0NC_TK1_CONN	DIFF
9	USB3_TX0PC_TK1_CONN	DIFF

3.4.10 USB Host 2.0 Port (CN22)

The eSOMTK1 Module has built in USB Host Controller. Only the needed Power Supply circuits added in Propus base board. USB signals are directly terminated to the USB A connector with ESD protection.

USB Host Port

Pin No	Signal Name	IO Type
1	VBUS_USB2_CN	PWR
2	USB2_DN_TK1_CONN	DIFF
3	USB2_DP_TK1_CONN	DIFF
4	GND	PWR
5	PEX_USB3_RX1N_TK1_CONN	DIFF
6	PEX_USB3_RX1P_TK1_CONN	DIFF
7	GND	PWR
8	PEX_USB3_TX1NC_TK1_CONN	DIFF
9	PEX_USB3_TX1PC_TK1_CONN	DIFF

3.4.11 USB OTG Port (CN23)

The eSOMTK1 Module has built in USB OTG Controller. Only the needed Connector added in Propus base board. USB OTG signals are directly terminated to the USB-micro AB connector with ESD protection.

USB OTG Port

Pin No	Signal Name	IO Type	IO Level (V)
1	VBUS_USB0_CN	PWR	
2	USB0_DN_TK1_CONN	DIFF	
3	USB0_DP_TK1_CONN	DIFF	
4	USB0_ID_TK1_CONN	I	5V
5	GND	PWR	

3.4.12 Power Jack (CN24)

2.0 * 5.5mm power jack Pinouts

Pin No	Signal Name	IO Type
1	VCC_12V	PWR
2	GND	PWR
3	GND	PWR

3.4.13 Fan Connector (CN28)

2.5mm pitch connector Pinouts

Pin No	Signal Name	IO Type
1	GND	PWR
2	GND	PWR
3	VCC_12V / VCC_5V	PWR

3.4.14 SATA Connector (CN29)

The eSOMTK1 supports SATA specification Rev 3.1 and AHCI specification Rev 1.3.1. SATA interface signal are terminated at **CN29** of Propus base board.

SATA Connector Pinout

Pin No	Signal Name	IO Type	IO Level (V)
1	VCC_BB_5V	PWR	
2	VCC_BB_5V	PWR	

3	GND	PWR	
4	GND	PWR	
5	SATA_RXP_CON		
6	SATA_TXN_CON		
7	SATA_RXN_CON		
8	SATA_TXP_CON		
9	GND	PWR	
10	GND	PWR	

3.4.15 Antenna U.FL Connector (CN26 & CN27)

Propus has Chip antenna connected with U.FL connector. This U.FL connector has to be connected with U.FL connector present in eSOMTK1. U.FL to U.FL Cable should be used to connect the two U.FL connectors.

3.5 RTC (BT1)

Propus supports on-board RTC. Coin-cell battery needs to be added in base board. The battery life time is for ~3 years.

3.6 Electrical Specifications

3.6.1 Absolute maximum Ratings

Supply Voltage ---------- 14V
Supply Current ---------- 3A

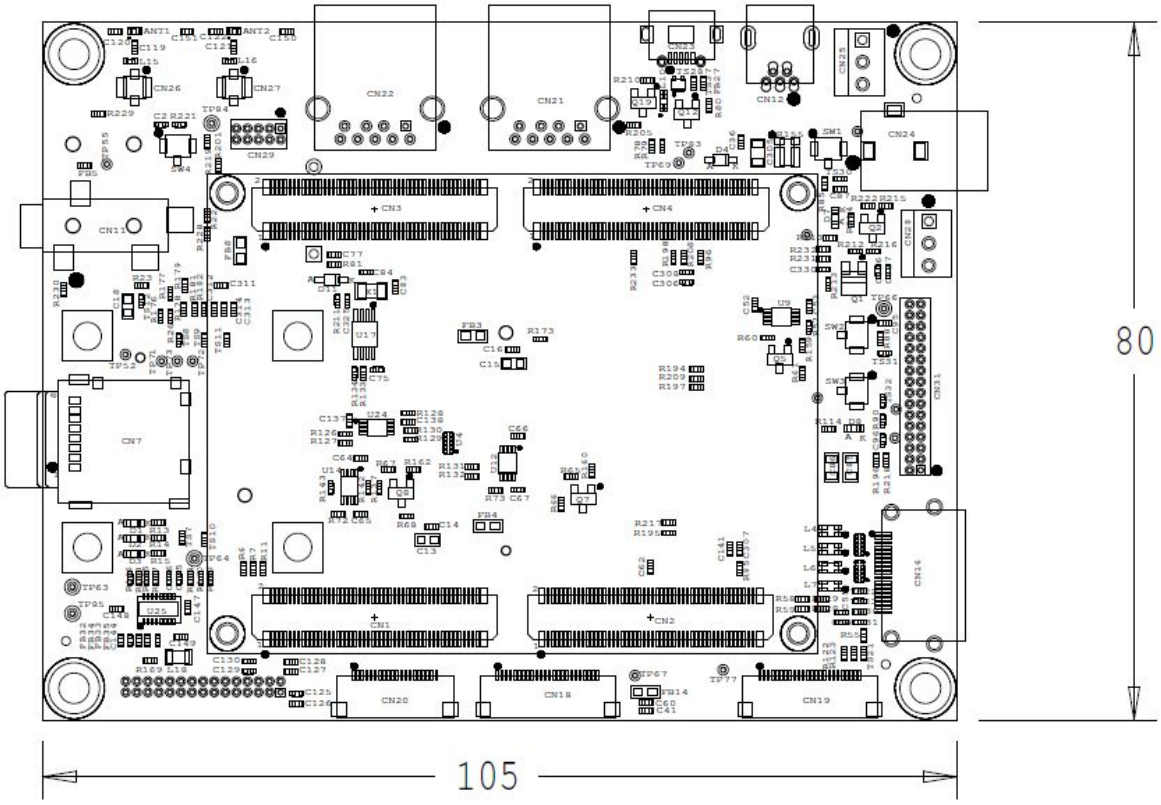
3.6.2 Operating Ratings

Parameter	Min	Typical	Max
Supply Voltage (Vdd)		12V	
Current Consumption (Idd)		TBD	

3.6.3 Power Supply Pinouts

+Ve corresponds to +12 Volts
-Ve corresponds to 0 Volts.

3.7 Propus Mechanicals



Dimensions are in mm.

4 Revision History

Rev No	Date	Major Changes	Author
Rev 1.0	17-Feb-16	Initial draft version	e-con HW Team
Rev 1.1	16-March-16	REV B Base Board Image updated.	e-con HW Team