



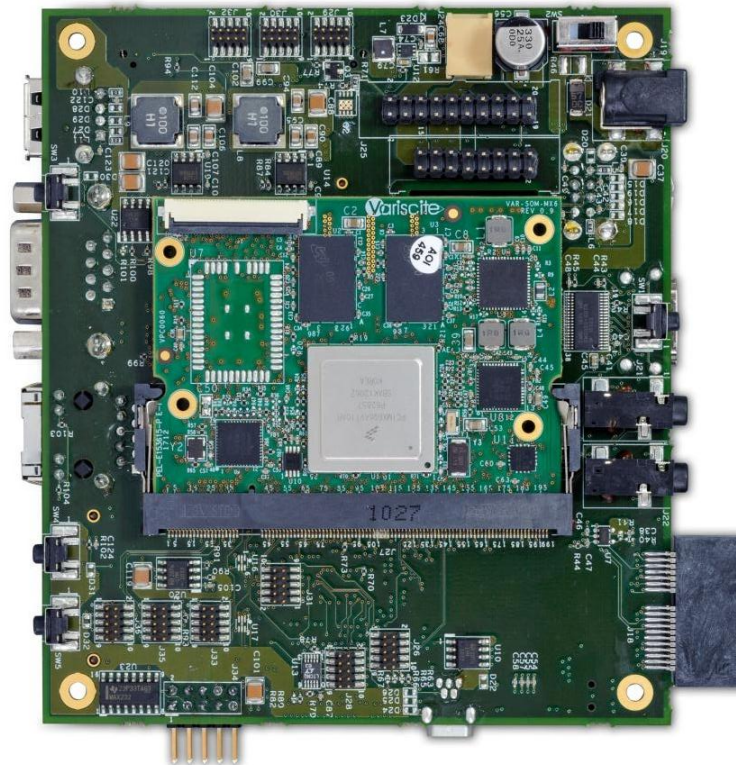
VARISCITE LTD

VAR-MX6CustomBoard Rev. 1.02

Datasheet

Carrier board for VAR-SOM-MX6

V1.0



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Revision History

Revision	Date	Notes
1.0	30/07/2012	Initial

Table of Contents

Revision History.....	iii
Table of Contents	iv
List of Tables	6
1 Overview	7
1.1 General Information	7
1.2 Additional Information	7
1.3 VAR-MX6CustomBoard Features Summary:	8
1.4 Block Diagram.....	9
1.5 Board Layout.....	10
1.6 VAR-MX6CustomBoard Connectors	11
2 Detailed Description	12
2.1 Overview	12
2.2 VAR-SOM-MX6 Interfaces	13
2.2.1 SO-DIMM 200 (J18).....	13
2.3 Standard External Interfaces.....	13
2.3.1 HDMI Connector (J1).....	13
2.3.2 HOST USB (J3, J16)	13
2.3.3 USB OTG (J5)	14
2.3.4 Mini PCIe (J10)	15
2.3.5 USIM Card (J11).....	17
2.3.6 SATA (J12)	17
2.3.7 SD Card (J13).....	18
2.3.8 Ethernet (J14)	19
2.3.9 RS232 – DTE (J15)	19
2.3.10 AUDIO (J20, J21)	20
2.3.11 RS232 – Terminal (J34).....	21
2.4 DVK External Interfaces.....	21
2.4.1 SOM Expansion (J30).....	21

2.4.2	LCD (J9/J6).....	25
2.4.3	Touch panel (J7).....	27
2.4.4	Backlight Power Supply Connector (J23) ^[1]	28
2.4.5	LVDS Interface Connector (J22).....	28
2.4.6	Parallel Camera Interface (J8).....	29
2.4.7	SD/MMC1 (J32).....	29
2.4.8	AUDIO (J37).....	30
2.4.9	CAN1, UART2 (RS485) & DMIC Interface (J26, J35).....	30
2.4.10	SPI1/I2C1, 3 (J28).....	31
2.4.11	DSI (J24).....	32
2.4.12	CSI2 Camera (J17).....	33
2.5	User Interfaces.....	34
2.5.1	LED Indications.....	34
2.5.2	Control Buttons.....	34
2.5.3	Power Input (J18/J19).....	35
2.6	Absolute Maximum Electrical Specifications.....	35
2.7	Operational Electrical Specifications.....	35
3	Environmental Specifications.....	36
4	Legal Notice.....	37
5	Warranty Terms.....	37
6	Contact Information.....	39

List of Tables

Table 1 - 1 VAR-MX6CustomBoard Connectors.....	12
Table 2 - 1 USB Host1/2 Connector Connector Pin-out (J3).....	13
Table 2 - 2 USB Host1/2 Connector Connector Pin-out (J3).....	14
Table 2 - 3 USB Host1/2 Connector Connector Pin-out (J16).....	14
Table 2 - 4 USB OTG Connector Pin-out (J5).....	14
Table 2 - 5 Mini PCI Express Connector Pin-out (J10).....	16
Table 2 - 6 USIM Card Connector Pin-out (J11)	17
Table 2 - 7 SATA Connector Pin-out (J12)	18
Table 2 - 8 SD Card Slot Connector Pin-out (J13).....	18
Table 2 - 9 1G RJ45 Connector Pin-out (J14).....	19
Table 2 - 10 RS232 DTE Connector Pin-out (J15).....	20
Table 2 - 11 Headphone Jack Connector Pin-out (J20)	20
Table 2 - 12 Line In Jack Connector Pin-out (J21).....	20
Table 2 - 13 RS232 – Terminal Connector Pin-out (J34)	21
Table 2 -14 SOM Expansion Connector Pin-out (J30)	22
Table 2 -15 EMI 0 Connector Pin-out (J27)	23
Table 2 -16 EMI 1 Connector Pin-out (J29)	23
Table 2 -17 EMI 2 Connector Pin-out (J31)	24
Table 2 -18 EMI 3 Connector Pin-out (J36)	24
Table 2 -19 JTAG Connector Pin-out (J33).....	25
Table 2 - 20 Resistive LCD Connector Pin-out (J9)	26
Table 2 -21 Capacitive LCD Connector Pin-out (J6)	27
Table 2 - 22 Capacitive Touch Panel Connector Pin-out (J7)	27
Table 2 - 23 Resistive Touch Panel Connector Pin-out (J4)	28
Table 2 -24 Backlight Power Supply Connector Pin-out (J23).....	28
Table 2 - 25 LVDS Connector Connector Pin-out (J22)	29
Table 2 - 26 Parallel Camera Connector Pin-out (J8)	29
Table 2 - 27 SD/MMC1 Header Pin-out (J32)	30
Table 2 - 28 Audio Connector Pin-out (J7)	30
Table 2 - 29 CAN, RS422/485 Pin-out (J26).....	31
Table 2 - 30 Miscellaneous Connector Pin-out (J35)	31
Table 2 - 31 SPI1/I2Cx Connector Pin-out (J28).....	32
Table 2 - 32 I2C3 Connector Pin-out (J2).....	32
Table 2 - 33 DSI Connector Pin-out (J24).....	32
Table 2 - 34 CSI2 Camera Connector Pin-out (J17)	34
Table 2 - 35 Boot Select Switch Modes	34
Table 2 - 36 Terminal Block Connector Pin-out (J19)	35
Table 3 - 1 Absolute Maximum Electrical Specifications	35
Table 3 - 2 Operational Electrical Specifications.....	35
Table 4 - 1 Environmental Specifications.....	36

1 Overview

This chapter gives a general overview of the VAR-MX6CustomBoard.

1.1 General Information

The VAR-MX6CustomBoard is a single board computer, utilizing all the VAR-SOM- System-on-Module features. For development and production, the VAR-CustomBoard serves both as a complete development kit and an end-product, assembled according to your specifications at an optimized price-point.

- VAR-MX6 CustomBoard – evaluation board
 - ✓ Carrier -Board, compatible with VAR-SOM-i.Mx6
 - ✓ Schematics
- VAR-EXT-CB402 – SCI2 Camera module
- O.S support
 - ✓ Linux BSP
 - ✓ Windows Embedded Compact 7
 - ✓ Android

1.2 Additional Information

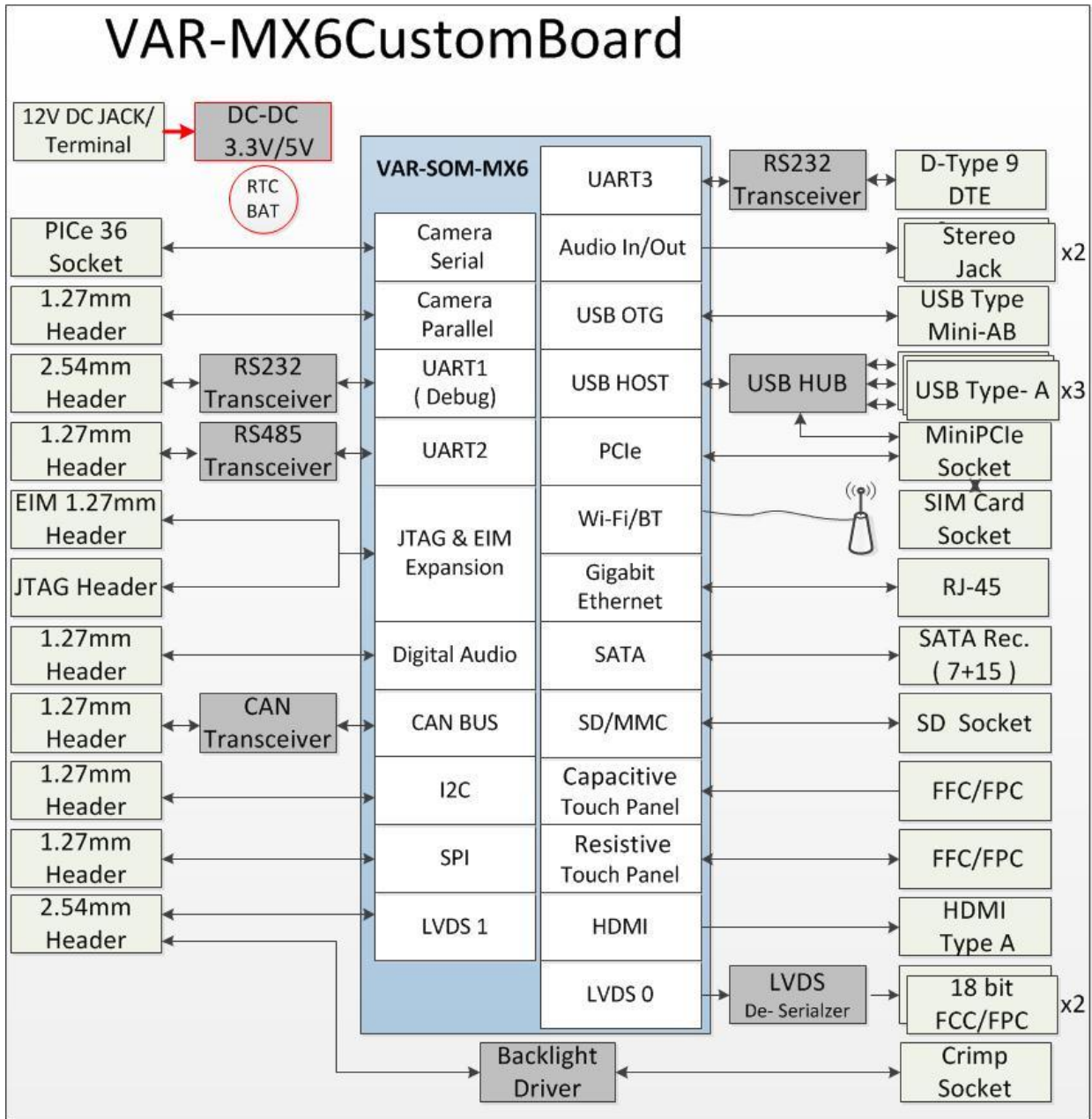
Board schematics as well as a mechanical CAD data base are available for download from: www.variscite.com.

For further information contact Variscite support at: support@variscite.com.

1.3 VAR-MX6CustomBoard Features Summary:

- SO-DIMM200 socket, compatible with the VAR-SOM-MX6
- Display:
 - 2 x 18-bit LCD FPC/FFC (supporting capacitive/resistive modules)
 - 18-bit LVDS header
 - MIPI DSI header
- HDMI type A jack
- Resistive, capacitive touch interface
- Backlight driver
- Gigabit Ethernet port, RJ45
- USB: OTG Mini-AB, type A host x 3
- SATA connector
- SD-Card
- 36-pin PCIe (V2.0) socket
- Wi-Fi/BT
- AUDIO: Line-out, Line-in
- RS232
- Extension headers
 - EIM, JTAG, Camera, CAN, UART 1 and 2, SPI, I2C
- 12 V power supply, RTC coin backup battery socket

1.4 Block Diagram

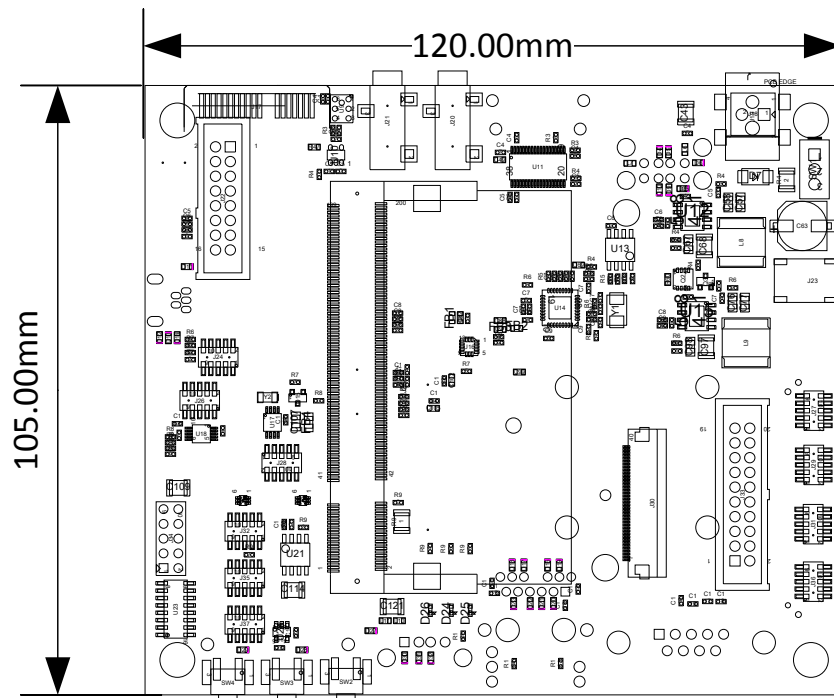


1.5 Board Layout

The VAR-MX6CustomBoard's physical dimensions are depicted in the diagram below.

Detailed CAD files are available for download from: www.variscite.com.

Top Side - Detailed View



1.6 VAR-MX6CustomBoard Connectors

The table below lists all available connectors on the VAR-MX6CustomBoard. Please refer to Chapter 2 for a more detailed description and the pin-out of each connector.

Ref	Function	Type
J1	HDMI connector	CON RCPT HDMI type A R/A SMD
J2	I2C3, Boots0/CPT_INT	Header 5 x 2, 1.27 mm
J3	USB host, ports 1/2	2 x USB type A
J4	Touch panel I/F resistive	FFC/FPC 4-pin
J5	USB OTG	USB connector MINI AB
J6	18-bit RGB LCD with capacitive touch	FFC/FPC 40-pin
J7	Capacitive touch panel I/F	FFC/FPC 10-pin
J8	Camera interface	Header, 8 x 2, 1.27 mm
J9	18-bit RGB LCD with resistive touch	FFC/FPC 40-pin
J10	Mini PCIe	CON 2X26 mini PCIe
J11	uSIM card	CON 6 SIM card
J12	SATA	SATA connector receptacle15+7
J13	MMC-SD card	SDCARD socket
J14	1Gb Ethernet	RJ-45 1GB G/Y Led
J15	RS232	CONN DB9 (male)
J16	USB host	USB type A
J17	Camera	CON PCIE 36-pin
J18	VCC-IN	Con. TH. power 4A (option)
J19	VCC-IN	Power jack (DC terminal)
J20	Headphone out	Audio jack 3.5 mm
J21	Line-in	Audio jack 3.5 mm
J22	LVDS header	Header, 8 x 2, 1.27 mm
J23	LCD backlight	CON 2 PIN crimp style
J24	DSI	Header, 5 x 2, 1.27 mm SMT
J25	VAR-SOM-Mx6	DIMM200
J26	CAN	Header, 5 x 2, 1.27 mm SMT
J27	EMI 0	Header, 5 x 2, 1.27 mm SMT
J28	I2C1/CSPI1	Header, 5 x 2, 1.27 mm SMT
J29	EMI 1	Header, 5 x 2, 1.27 mm SMT
J30	SOM expansion	FFC/FPC 40-pin

Ref	Function	Type
J31	EMI 2	Header, 5 x 2, 1.27 mm SMT
J32	SD/MMC	Header, 5 x 2, 1.27 mm SMT
J33	JTAG connector	Header, 10 x 2, 1.27 mm TH
J34	UART1	Header, 5 x 2, 1.27 mm SMT RA
J35	UART2/DMIC	Header, 5 x 2, 1.27 mm SMT
J36	EMI 3	Header, 5 x 2, 1.27 mm SMT
J37	Digital audio AudMUX 4/SPDIF	Header, 5 x 2, 1.27 mm SMT
JBT1	RTC backup	BAT holder CR1225

Table 1 - 1 VAR-MX6CustomBoard Connectors

2 Detailed Description

2.1 Overview

This chapter details the VAR-MX6CustomBoard features and external interfaces, most are driven by the VAR-SOM-MX6. Please refer to the VAR-SOM-MX6 data sheet for more information regarding those interfaces.

The following list describes this chapter's table column header:

Pin#:

Pin number of the specific connector

VAR-MX6CustomBoard Signal:

VAR-MX6CustomBoard schematic signal name

Type:

Pin type & direction:

- I – In
- O – Out
- DS – Differential signal
- A – Analog

Description:

Short pin functionality description

2.2 VAR-SOM-MX6 Interfaces

2.2.1 SO-DIMM 200 (J18)

The VAR-MX6CustomBoard features a SO-DIMM200 1.8 V standard connector compatible with the VAR-SOM-MX6 System-on-Module devices. Please refer to the VAR-SOM-MX6 module data sheet for a complete description of signals and pin-out.

2.3 Standard External Interfaces

2.3.1 HDMI Connector (J1)

The VAR-MX6CustomBoard features a standard HDMI output connector J1.

2.3.1.1 HDMI Connector Pin-out (J1)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	DAT2+	ODS	HDMI data 2 positive
2	DAT2_S	Power	HDMI data 2 shield
3	DAT2-	ODS	HDMI data 2 negative
4	DAT1+	ODS	HDMI data 1 positive
5	DAT1_S	Power	HDMI data 1 shield
6	DAT1-	ODS	HDMI data 1 negative
7	DAT0+	ODS	HDMI data 0 positive
8	DAT0_S	Power	HDMI data 0 shield
9	DAT0-	ODS	HDMI data 0 negative
10	CLK+	ODS	HDMI clock positive
11	CLK_S	Power	HDMI clock shield
12	CLK-	ODS	HDMI clock negative
13	CEC	IO	One-wire control interface
14	NC		
15	SCL	IO	I2C HDMI interface connected to I2C2
16	SDA	IO	I2C HDMI interface connected to I2C2
17	DDC/CEC GND	Power	One Wire control reference pin
18	+5V	Power	5V power supply
19	DET	I	HDMI hot plug detect input

Table 2 - 1 USB Host1/2 Connector Connector Pin-out (J3)

2.3.2 HOST USB (J3, J16)

The VAR-MX6CustomBoard supports three USB 2.0 host ports. All are driven by an on-board USB hub.

2.3.2.1 USB Host 1/2 Connector Pin-out (J3)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
A1	VCC_USB1	Power	5 V power supply, 500 mA max.
A2	USB_HUB_DN1	DSI/O	USB data negative
A3	USB_HUB_DP1	DSI/O	USB data positive
A4	GND	Power	Digital ground
B1	VCC_USB2	Power	5 V power supply, 500 mA max.
B2	USB_HUB_DN2	DSI/O	USB data negative
B3	USB_HUB_DP2	DSI/O	USB data positive
B4	GND	Power	Digital ground

Table 2 - 2 USB Host1/2 Connector Connector Pin-out (J3)

2.3.2.2 USB Host Connector Pin-out (J16)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	VCC_USB3	Power	5 V power supply, 500 mA max.
2	USB_HUB_DN3	DSI/O	USB data negative
3	USB_HUB_DP3	DSI/O	USB data positive
4	GND	Power	Digital ground

Table 2 - 3 USB Host1/2 Connector Connector Pin-out (J16)

2.3.3 USB OTG (J5)

The VAR-MX6Custom Board OTG is driven by the VAR-SOM-MX6 OTG interface.

2.3.3.1 USB OTG Connector Pin-out (J5)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	OTG_VBUS	Power	5 V in/out (client/host)
2	USB_OTG_DM	DSI/O	USB data minus
3	USB_OTG_DP	DSI/O	USB data plus
4	USB_OTG_ID	I	USB OTG ID signal ('1' - device mode)
5	DGND	Power	Digital ground

Table 2 - 4 USB OTG Connector Pin-out (J5)

2.3.4 Mini PCIe (J10)

The VAR-MX6Custom Board Mini PCI Express interface is exposed by a standard Mini PCI Express connector. Mini PCI Express port is directly connected to VAR-SOM-MX6 board as well as to USIM socket (J11) , supporting PCIe modems. Refer to the VAR-SOM-MX6 module data sheet for a complete interface description.

2.3.4.1 Mini PCIe Connector Pin-out (J10)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	SPDIF_OUT_PCIE_PCIE_WAKE_B		
2	BASE_PER_3V3	Power	3.3 V power supply
3	NC		Not connected
4	DGND	Power	Digital ground
5	NC		Not connected
6	VCC_1V5_PCIE	Power	1.5V power supply limited to 300 mA
7	NC		Not connected
8	PCIE_UIM_PWR	O	SIM card VCC power supply
9	DGND	Power	Digital ground
10	PCIE_UIM_DATA	IO	SIM card data
11	PCIE_REFCLKM	DSO	PCIE clock pair negative
12	PCI3_UIM_CLK	O	SIM card clock
13	PCIE_REFCLKP	DSO	PCIE clock pair positive
14	PCIE_UIM_RST	O	SIM card reset
15	DGND	Power	Digital ground
16	PCIE_UIM_VPP	O	SIM card VPP power supply
17	NC		Not connected
18	DGND	Power	Digital ground
19	NC		Not connected
20	SPDIF_IN_PCIE_DIS_B	O	Disable signal
21	DGND	Power	Digital ground
22	AUDMUX4_RXC_PCIE_RESET_B	O	Reset signal
23	PCIE_RXM	DSI	PCIE receive pair negative
24	BASE_PER_3V3	Power	3.3V power supply
25	PCIE_RXP	DSI	PCIE receive pair positive
26	DGND	Power	Digital ground
27	DGND	Power	Digital ground
28	VCC_1V5_PCIE	Power	1.5V power supply limited to 300 mA
29	DGND	Power	Digital ground
30	I2C3_SCL	IO	I2C3 clock
31	PCIE_TXM	DSO	PCIE transmit pair negative
32	I2C3_SDA	IO	I2C3 data
33	PCIE_TXP	DSO	PCIE transmit pair positive

Pin #	VAR-MX6CustomBoard Signal	Type	Description
34	DGND	Power	Digital ground
35	DGND	Power	Digital ground
36	USB_HUB_DN4	DSIO	USB data minus
37	DGND	Power	Digital ground
38	USB_HUB_DP4	DSIO	USB data plus
39	BASE_PER_3V3	Power	3.3 V power supply
40	DGND	Power	Digital ground
41	BASE_PER_3V3	Power	3.3 V power supply
42	LED_WWAN_B	I	WWAN LED input
43	DGND	Power	Digital ground
44	LED_WLAN_B	I	WLAN LED input
45	NC		Not connected
46	LED_WPAN_B	I	WPAN LED input
47	NC		Not connected
48	VCC_1V5_PCIE	Power	1.5 V power supply limited to 300 mA
49	NC		Not connected
50	DGND	Power	Digital ground
51	NC		Not connected
52	BASE_PER_3V3	Power	3.3 V power supply

Table 2 – 5 Mini PCI Express Connector Pin-out (J10)

2.3.5 USIM Card (J11)

The VAR-MX6Custom Board has on-board USIM card slot connected to the Mini PCI Express interface.

2.3.5.1 USIM Card Connector Pin-out (J11)

Pin #	VAR-Signal	Type	Description
1	VCC	POWER	USIM power supply
2	RESET	O	USIM reset signal
3	CLK	O	USIM clock signal
4	GND	POWER	Digital ground
5	VPP	POWER	USIM programming power supply
6	I/O	IO	USIM data signal

Table 2 – 6 USIM Card Connector Pin-out (J11)

2.3.6 SATA (J12)

Enabling SATA storage devices , the VAR-MX6Custom Board provides SATA signals & power connection through a standard 22–pin (7+5) female SATA connector (J120).

2.3.6.1 SATA Connector Pin-out (J12)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
P1	V33_1	POWER	3.3 V power supply
P2	V33_2	POWER	3.3 V power supply
P3	V33/PC	POWER	3.3 V power supply
P4	GND_4	POWER	Digital ground
P5	GND_5	POWER	Digital ground
P6	GND_6	POWER	Digital ground
P7	V5/PC	POWER	5 V power supply
P8	V5_2	POWER	5 V power supply
P9	V5_3	POWER	5 V power supply
P10	GND_7	POWER	Digital ground
P11	DAS/DSS	RESERVED	Connected to digital ground
P12	GND_8	POWER	Digital ground
P13	V12/PC	POWER	12V power supply (unconnected)
P14	V12_2	POWER	12V power supply (unconnected)
P15	V12_3	POWER	12V power supply (unconnected)
S1	GND_1	POWER	Digital ground
S2	TXP	ODS	SATA transmit pair positive
S3	TXN	ODS	SATA transmit pair negative
S4	GND_2	POWER	Digital ground
S5	RXN	IDS	SATA receive pair negative
S6	RXP	IDS	SATA receive pair positive

Pin #	VAR-MX6CustomBoard Signal	Type	Description
S7	GND_3	POWER	Digital ground

Table 2 – 7 SATA Connector Pin-out (J12)

2.3.7 SD Card (J13)

The SD card interface is driven by the VAR-SOM-MX6 SD/MMC0 interface. Refer to the VAR-SOM-MX6 module data sheet for a complete interface description.

2.3.7.1 SD Card Slot Connector Pin-out (J13)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	SDMMC2_DAT3	DSI/O	SD parallel data 3
2	SDMMC2_CMD	DSI/O	SD command
3	DGND	Power	Digital ground
4	VCC_SD	Power	SD card VCC
5	SDMMC2_CLK	O	SD clock
6	DGND	Power	Digital ground
7	SDMMC2_DAT0	DSI/O	SD parallel data 0
8	SDMMC2_DAT1	DSI/O	SD parallel data 1
9	SDMMC2_DAT2	DSI/O	SD parallel data 2
10	SDMMC2_CD_CAN2_TX	I	SD card detect
11	SD_WP_CAN2_RX	I	SD write protected
12	DGND	Power	Digital ground
13	DGND	Power	Digital ground

Table 2 - 8 SD Card Slot Connector Pin-out (J13)

2.3.8 Ethernet (J14)

The VAR-MX6Custom Board 10/100/1000 Mbps Ethernet interface is exposed by a standard RJ45 Ethernet jack with integrated magnetics. The Ethernet port is directly connected to the VAR-SOM-Mx6 on-board Ethernet PHY (connected to the i.MX6 RGMII interface). Please refer to the VAR-SOM-MX6 module data sheet for a complete interface description.

2.3.8.1 10/100/1000BaseT Connector Pin-out (J14)

Pin #	VAR-MX6CustomBoard Signal	Type	Description																		
1	TRCT3	O																			
2	TR3-	DI/O	Bi-directional pair 3 negative																		
3	TR3+	DI/O	Bi-directional pair 3 positive																		
4	TR2+	DI/O	Bi-directional pair 2 positive																		
5	TR2-	DI/O	Bi-directional pair 2 negative																		
6	TRCT2	O	Bias capacitor for pair 2																		
7	TRCT4	O	Bias capacitor for pair 4																		
8	TR4+	DI/O	Bi-directional pair 4 positive																		
9	TR4-	DI/O	Bi-directional pair 4 negative																		
10	TR1-	DGND	Bi-directional pair 1 negative																		
11	TR1+		Bi-directional pair 1 positive																		
12	TRCT1	O	Bias capacitor for pair 1																		
13	Y-	Cathode	PHY LED 2 – see LED 1 description																		
14	Y+	Anode	Anode of LED 2																		
15	O-	Cathode	PHY LED 1																		
			<table border="1"> <thead> <tr> <th>LED1</th> <th>LED2</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>Off</td> <td>Off</td> <td>Link off</td> </tr> <tr> <td>Blinking</td> <td>Off</td> <td></td> </tr> <tr> <td>On</td> <td>Off</td> <td>1G link</td> </tr> <tr> <td>On</td> <td>Blinking</td> <td></td> </tr> <tr> <td>On</td> <td>On</td> <td>Speed ok</td> </tr> </tbody> </table>	LED1	LED2	Status	Off	Off	Link off	Blinking	Off		On	Off	1G link	On	Blinking		On	On	Speed ok
			LED1	LED2	Status																
			Off	Off	Link off																
			Blinking	Off																	
On	Off	1G link																			
On	Blinking																				
On	On	Speed ok																			
16	+	Anode	Anode of Led 1, 3																		
17	G-	Cathode	Led 3, unconnected																		

Table 2 - 9 1G RJ45 Connector Pin-out (J14)

2.3.9 RS232 – DTE (J15)

The RS232 DTE interface is driven by the VAR-SOM-i.Mx6 UART3 interface and a RS232 transceiver. Together with an on-board standard, male D-type9 connector, this connector serves as a DTE interface for connecting third party DCE (i.e. modem) devices.

2.3.9.1 RS232 – DTE Connector Pin-out (J15)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	NC		
2	UART3_RX_C	I	UART3 receive
3	UART3_TX_C	O	UART3 transmit
4	NC		
5	DGND	Power	Digital ground
6	NC		
7	UART3_RTS_C	O	UART3 RTS
8	UART3_CTS_C	I	UART3 CTS
9	NC		

Table 2 - 10 RS232 DTE Connector Pin-out (J15)

2.3.10 AUDIO (J20, J21)

The VAR-MX6 CustomBoard feature two 3.5 mm jacks for audio interfaces

- Headphone jack (J20)
- Line in jack (J21)

Both interfaces are driven by the VAR-SOM-MX6, on board AUDIO CODEC device. Please refer to the VAR-SOM-MX6 module data sheet for a complete interface description.

2.3.10.1 Headphone Jack Connector Pin-out (J20)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	GND	AP	Audio Ground
2	HP_OUT_R	AI	Headphone-out right
3	HP_OUT_L	AI	Headphone-out left

Table 2 - 11 Headphone Jack Connector Pin-out (J20)

2.3.10.2 Line in Jack Connector Pin-out (J21)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	GND	Power	
2	AUD_IN_R	AI	Line-in right input
3	AUD_IN_L	AI	Line-in left input

Table 2 - 12 Line In Jack Connector Pin-out (J21)

2.3.11 RS232 – Terminal (J34)

The RS232 DTE interface is driven by the VAR-SOM-i.Mx6 UART3 interface and a RS232 transceiver. Together with an on-board standard male D-Type9 connector, this connector serves as a DTE interface for connecting third party DCE (i.e. modem) devices.

2.3.11.1 RS232 – Terminal Connector Pin-out (J34)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1			
2	UART1_RX_C	I	UART3 receive
3	UART1_TX_C	O	UART3 transmit
4	BASE_PER_3V3	Power	Power supply 3.3 V
5	DGND	Power	Digital ground
6			
7			
8	UART1_CTS_C	O	UART3 RTS
9	UART1_RTS_C	I	UART3 CTS
10			

Table 2 - 13 RS232 – Terminal Connector Pin-out (J34)

2.4 DVK External Interfaces

This section describes the additional available interface, using non-standard connectors. Those interfaces can be used for connecting any third party hardware. Most of those signals are exposed by a 1.27 mm 2 x 5 header that mates with any 1.27 mm receptacle.

Connector example: Sullins Connector Solutions, LPPB052NFSS-RC

<http://www.digikey.com/product-detail/en/LPPB052NFSS-RC/S9006E-05-ND/1786338>

Cable example: Samtec , FFSD-05-D-08.00-01-N

<http://uk.farnell.com/samtec/ffsd-05-d-08-00-01-n/lead-1-27mm-idc-8in-10way/dp/1934656>

2.4.1 SOM Expansion (J30)

VAR-SOM-i.Mx6 features additional Expansion 40-pin FFC connector. This connector connects to the VAR-MX6CustomBoard using a short 40-pin FFC cable. The signals from this connector then routed to J27, J29, J31, J33, J36 connectors for easy access.

2.4.1.1 SOM Expansion Connector Pin-out (J30)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	JTAG_TDI	I	JTAG data In

Pin #	VAR-MX6CustomBoard Signal	Type	Description
2	EIM_A16	IO	Local Bus A [16] signal
3	JTAG_NTRST	I	JTAG reset TAP controller
4	JTAG_TMS	I	JTAG test mode select
5	JTAG_TCK	O	JTAG test clock
6	EIM_A17	IO	Local Bus A[17] signal
7	JTAG_TDO	O	JTAG data out
8	DGND	Power	Digital ground
9	EIM_WAIT	IO	Local Bus wait signal
10	EIM_A18	IO	Local Bus A [18] signal
11	EIM_A24	IO	Local Bus A [24] signal
12	EIM_CS0	IO	Local Bus CS [0] signal
13	EIM_CS1	IO	Local Bus CS [1] signal
14	EIM_A22	IO	Local Bus A [22] signal
15	EIM_OE	IO	Local Bus OE signal
16	EIM_EB1	IO	Local Bus EB [1] signal
17	EIM_DA3	IO	Local Bus DA [3] signal
18	EIM_DA6	IO	Local Bus DA [6] signal
19	EIM_DA1	IO	Local Bus DA [10] signal
20	EIM_A20	IO	Local Bus A [20] signal
21	EIM_DA5	IO	Local Bus DA [5] signal
22	EIM_DA7	IO	Local Bus DA [7] signal
23	EIM_DA8	IO	Local Bus DA [8] signal
24	EIM_A19	IO	Local Bus A [19] signal
25	EIM_LBA	IO	Local Bus LBA signal
26	EIM_EB0	IO	Local Bus EB [0] signal
27	EIM_DA12	IO	Local Bus DA [12] signal
28	EIM_DA14	IO	Local Bus DA [14] signal
29	EIM_BCLK	IO	Local Bus BCLK signal
30	EIM_DA0	IO	Local Bus DA [0] signal
31	EIM_DA15	IO	Local Bus DA [15] signal
32	EIM_DA2	IO	Local Bus DA [2] signal
33	EIM_DA9	IO	Local Bus DA [9] signal
34	EIM_DA4	IO	Local Bus DA [4] signal
35	EIM_DA10	IO	Local Bus DA [10] signal
36	DGND	Power	Digital ground
37	EIM_DA13	IO	Local Bus DA [13] signal
38	EIM_DA11	IO	Local Bus DA [11] signal
39	EIM_A23	IO	Local Bus A [23] signal
40	EIM_RW	IO	Local Bus RW signal

Table 2 –14 SOM Expansion Connector Pin-out (J30)

2.4.1.2 EMI 0 Connector Pin-Out (J27)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	BASE_PER_3V3	Power	Power supply 3.3 V
2	EIM_OE	IO	Local Bus OE signal
3	EIM_CS0	IO	Local Bus CS0 signal
4	EIM_LBA	IO	Local Bus LBA signal
5	EIM_CS1	IO	Local Bus CS1 signal
6	EIM_BCLK	IO	Local Bus BCLK signal
7	EIM_WAIT	IO	Local Bus WAIT signal
8	EIM_EB0	IO	Local Bus EB0 signal
9	EIM_RW	IO	Local Bus RW signal
10	EIM_EB1	IO	Local Bus EB1 signal

Table 2 –15 EMI 0 Connector Pin-out (J27)

2.4.1.3 EMI 1 Connector Pin-Out (J29)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	BASE_PER_3V3	Power	Power supply 3.3 V
2	EIM_DA0	IO	Local Bus DA0 signal
3	EIM_DA1	IO	Local Bus DA1 signal
4	EIM_DA2	IO	Local Bus DA2 signal
5	EIM_DA3	IO	Local Bus DA3 signal
6	EIM_DA4	IO	Local Bus DA4 signal
7	EIM_DA5	IO	Local Bus DA5 signal
8	EIM_DA6	IO	Local Bus DA6 signal
9	EIM_DA7	IO	Local Bus DA7 signal
10	DGND	Power	Digital ground

Table 2 –16 EMI 1 Connector Pin-out (J29)

2.4.1.4 EMI 2 Connector Pin-Out (J31)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	BASE_PER_3V3	Power	Power supply 3.3 V
2	EIM_DA8	IO	Local Bus DA8 signal
3	EIM_DA9	IO	Local Bus DA9 signal
4	EIM_DA10	IO	Local Bus DA10 signal
5	EIM_DA11	IO	Local Bus DA11 signal
6	EIM_DA12	IO	Local Bus DA12 signal
7	EIM_DA13	IO	Local Bus DA13 signal
8	EIM_DA14	IO	Local Bus DA14 signal
9	EIM_DA15	IO	Local Bus DA15 signal

Pin #	VAR-MX6CustomBoard Signal	Type	Description
10	DGND	Power	Digital ground

Table 2 –17 EMI 2 Connector Pin-out (J31)

2.4.1.5 EMI 3 Connector Pin-Out (J36)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	BASE_PER_3V3	Power	Power supply 3.3 V
2	EIM_A16	IO	Local Bus A16 signal
3	EIM_A17	IO	Local Bus A17 signal
4	EIM_A18	IO	Local Bus A18 signal
5	EIM_A19	IO	Local Bus A19 signal
6	EIM_A20	IO	Local Bus A20 signal
7	EIM_A22	IO	Local Bus A21 signal
8	EIM_A23	IO	Local Bus A23 signal
9	EIM_A24	IO	Local Bus A24 signal
10	DGND	Power	Digital ground

Table 2 –18 EMI 3 Connector Pin-out (J36)

2.4.1.6 JTAG Connector Pin-Out (J33)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	JTAG_VREF	O	Reference power supply 3.3 V
2	BASE_PER_3V3	Power	Power supply 3.3 V
3	JTAG_NTRST	O	JTAG reset TAP controller
4	DGND	Power	Digital ground
5	JTAG_TDI	I	JTAG data-in
6	DGND	Power	Digital ground
7	JTAG_TMS	I	JTAG test mode select
8	DGND	Power	Digital ground
9	JTAG_TCK	I	JTAG test clock
10	DGND	Power	Digital ground
11	JTAG_RTCK	O	JTAG test clock return
12	DGND	Power	Digital ground
13	JTAG_TDO	O	JTAG data-out
14	DGND	Power	Digital ground
15	JTAG_NSRST	I	Reset processor signal
16	DGND	Power	Digital ground
17	JTAG_DE	I	JTAG data enable
18	DGND	Power	Digital ground
19	JTAG_DACK	O	JTAG data acknowledge
20	DGND	Power	Digital ground

Table 2 –19 JTAG Connector Pin-out (J33)

2.4.2 LCD (J9/J6)

An on-board LVDS to RGB 18-bit converter designed to provide support for a parallel RGB LCD display. The connector pin-out is compatible with VAR-DVK-MX6 optional 7" LCD modules (resistive/capacitive).

2.4.2.1 LCD Connector Pin-out (Resistive) (J9)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	VCC_5V	Power	VLED, 5V
2	VCC_5V	Power	VLED, 5V
3	PWM_BACKLIGHTEN	O	Backlight brightness control
4	DGND	Power	Ground connection for backlight LED
5	DGND	Power	Ground connection for backlight LED
6	BASE_PER_3V3	Power	MX6CustomBoard peripherals VCC
7	BASE_PER_3V3	Power	MX6CustomBoard peripherals VCC
8	MODE	O	MODE
9	ACBIAS	O	Data enable
10	VSYNC	O	Vertical sync
11	HSYNC	O	Horizontal sync
12	DGND	Power	Digital ground
13	DB7	O	Blue bit 7
14	DB6	O	Blue bit 6
15	DB5	O	Blue bit 5
16	DGND	Power	Digital ground
17	DB4	O	Blue bit 4
18	DB3	O	Blue bit 3
19	DB2	O	Blue bit 2
20	DGND	Power	Digital ground
21	DG7	O	Green bit 7
22	DG6	O	Green bit 6
23	DG5	O	Green bit 5
24	DGND	Power	Digital ground
25	DG4	O	Green bit 4
26	DG3	O	Green bit 3
27	DG2	O	Green bit 2
28	DGND	Power	Digital ground
29	DR7	O	Red bit 7
30	DR6	O	Red bit 6
31	DR5	O	Red bit 5
32	DGND	Power	Digital ground
33	DR4	O	Red bit 4

Pin #	VAR-MX6CustomBoard Signal	Type	Description
34	DR3	O	Red bit 3
35	DR2	O	Red bit 2
36	DGND	Power	Digital ground
37	DCLK	O	Clock
38	DGND	Power	Digital ground
39	LR	O	Left/right select
40	UD	O	Up/down select

Table 2 - 20 Resistive LCD Connector Pin-out (J9)

2.4.2.2 LCD Connector Pin-out (Capacitive) (J6)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	UD	O	Up-/down select
2	LR	O	Left-/right select
3	NC		
4	BASE_PER_3V3	Power	MX6CustomBoard peripherals VCC
5	BASE_PER_3V3	Power	MX6CustomBoard peripherals VCC
6	BASE_PER_3V3	Power	MX6CustomBoard peripherals VCC
7	BASE_PER_3V3	Power	MX6CustomBoard peripherals VCC
8	NC		
9	ACBIAS	O	Data enable
10	DGND	Power	Digital ground
11	DGND	Power	Digital ground
12	DGND	Power	Digital ground
13	DB7	O	Blue bit 7
14	DB6	O	Blue bit 6
15	DB5	O	Blue bit 5
16	DGND	Power	Digital ground
17	DB4	O	Blue bit 4
18	DB3	O	Blue bit 3
19	DB2	O	Blue bit 2
20	DGND	Power	Digital ground
21	DG7	O	Green bit 7
22	DG6	O	Green bit 6
23	DG5	O	Green bit 5
24	DGND	Power	Digital ground
25	DG4	O	Green bit 4
26	DG3	O	Green bit 3
27	DG2	O	Green bit 2
28	DGND	Power	Digital ground
29	DR7	O	Red bit 7

Pin #	VAR-MX6CustomBoard Signal	Type	Description
30	DR6	O	Red bit 6
31	DR5	O	Red bit 5
32	DGND	P	Digital ground
33	DR4	O	Red bit 4
34	DR3	O	Red bit 3
35	DR2	O	Red bit 2
36	DGND	P	Digital ground
37	NC		
38	DCLK	Power	DCLK
39	HSYNC	O	Horizontal sync
40	VSYNC	O	Vertical sync

Table 2 –21 Capacitive LCD Connector Pin-out (J6)

2.4.3 Touch panel (J7)

The VAR-MX6CustomBoard provides support for two types of touch panels: Resistive and Capacitive. There are two different types of connectors available on the VAR-MX6CustomBoard.

2.4.3.1 Capacitive Touch Panel Connector Pin-out (J7)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	DGND	Power	Digital ground
2	VCC	Power	Power supply 3.3 V
3	I2C_SCL	Power	I2C3 clock signal
4	NC		
5	I2C_SDA	Power	I2C3 data signal
6	NC		
7	RESET	DI	Reset signal
8	NC		
9	CPT_INT	DI	Interrupt signal connected to GPIO3[7]
10	DGND	DI	Digital ground

Table 2 - 22 Capacitive Touch Panel Connector Pin-out (J7)

2.4.3.2 Resistive Touch panel connector Pin-out (J4)

Pin #	VAR-MX6CustomBoard Mx6CustomBoard Signal	Type	Description
1	TS_X-	AIO	Touch screen X Minus
2	TS_Y+	AIO	Touch screen Y plus
3	TS_X+	AIO	Touch screen X plus

4	TS_Y-	AIO	Touch screen Y minus
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Table 2 - 23 Resistive Touch Panel Connector Pin-out (J4)

2.4.4 Backlight Power Supply Connector (J23)^[1]

The VAR-MX6CustomBoard backlight power supply was designed for use with backlights up to 32 V.

2.4.4.1 Backlight Power Supply Connector Pin-out (J23)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	LED_BL_K	Power	Power supply for backlight LED minus
2	LED_BL_K	Power	Power supply for backlight LED minus
3	LED_BL_A	Power	Power supply for backlight LED plus
4	LED_BL_A	Power	Power supply for backlight LED plus

Table 2 –24 Backlight Power Supply Connector Pin-out (J23)

[1] Backlight rails are also available on the J22- LVDS header

2.4.5 LVDS Interface Connector (J22)

The VAR-MX6CustomBoard LVDS connector routed directly to the processor LVDS1 interface. Additional to the LVDS signals, is the LVDS connector feature backlight driver, supporting up to 32 V backlight LEDs.

2.4.5.1 LVDS Signals Pin-out (J22)

Pin #	Signal	Type	Description
1	LVDS_TX0_N	DSO	LVDS1 lane 0, negative signal
2	LVDS_TX2_N	DSO	LVDS1 lane 2, negative signal
3	LVDS_TX0_P	DSO	LVDS 1lane 0, positive signal
4	LVDS_TX2_P	DSO	LVDS l1ane 2, positive signal
5	DGND	Power	Digital Ground
6	DGND	Power	Digital Ground
7	LVDS_TX1_N	DSO	LVDS1 lane 1, negative signal
8	LVDS_CLK_P	DSO	LVDS1 clock 0, positive signal
9	LVDS_TX1_P	DSO	LVDS1 lane 1, positive signal
10	LVDS_CLK_N	DSO	LVDS1 clock, negative signal
11	VCC_5V	Power	Power supply 5 V
12	BASE_PER_3V3	Power	Power supply 3.3 V
13	LED_BL_A	Power	Backlight power supply plus
14	LVDS_TX3_N	DSO	LVDS1 lane 3, positive signal
15	LED_BL_K	O	Backlight power supply minus

16	LVDS_TX3_P	DSO	LVDS1 lane 3, negative signal
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Table 2 - 25 LVDS Connector Connector Pin-out (J22)

2.4.6 Parallel Camera Interface (J8)

Parallel camera interface routed directly to the processor CSI0 pins.

2.4.6.1 Parallel Camera Connector Pin-Out (J8)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	BASE_PER_3V3	Power	Power supply 3.3 V
2	CSI0_DAT12	IO	Camera data12 signal
3	CSI0_DAT13	IO	Camera data13 signal
4	CSI0_VSYNC	IO	Camera Vsync signal
5	CSI0_DAT14	IO	Camera data14 signal
6	CSI0_DATA_EN	IO	Camera enable routed to GPIO5[20]
7	CSI0_DAT15	IO	Camera data15 signal
8	CSI0_HSYNC	IO	Camera Hsync signal
9	CSI0_DAT16	IO	Camera data16 signal
10	I2C3_SCL	IO	I2C camera control routed to I2C3
11	CSI0_DAT17	IO	Camera data17 signal
12	I2C3_SDA	IO	I2C camera control routed to I2C3
13	CSI0_DAT18	IO	Camera data18 signal
14	CSI0_PIXCLK	IO	Camera pixel clock signal
15	CSI0_DAT19	IO	Camera data19 signal
16	DGND	POWER	Digital ground

Table 2 - 26 Parallel Camera Connector Pin-out (J8)

2.4.7 SD/MMC1 (J32)

SD/MMC1 expansion connector pins are directly connected to the VAR-SOM-MX6 pins.

2.4.7.1 SD/MMC Header Pin-Out (J32)

Pin #	VAR-MX6CustomBoard Signal	VAR-SOM-MX6 PIN
1	BASE_PER_3V3	Power supply 3.3 V
2	SDMMC1_CLK	SDMMC clock signal
3	SDMMC1_CMD	SDMMC command signal
4	NC	
5	SDMMC1_DAT0	SDMMC data 0 signal
6	SDMMC1_DAT1	SDMMC data 1 signal
7	SDMMC1_DAT3	SDMMC data 3 signal
8	BSEL1_SDMMC1_GPIO_CAM_CRTL	Additional signal routed to GPIO3[13]
9	SDMMC1_DAT2	SDMMC data 2 signal

10	DGND	Digital ground
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Table 2 - 27 SD/MMC1 Header Pin-out (J32)

2.4.8 AUDIO (J37)

2.4.8.1 AUDIO Header Pin-out (J37)

The audio connector exposes the digital audio AudMUX 4/SPDIF signals, (line-in and headphone-out, available on the audio jacks). Those signals are driven by VAR-SOM-Mx6 audio codec. Please refer to the VAR-SOM-MX6 module data sheet for a complete interface description.

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	BASE_PER_3V3	Power	Power supply 3.3_V
2	AUDMUX4_RXC_PCIE_RESET_B	I	Audio Mux RXC signal
3	AUDMUX4_TXC	O	Audio Mux TXC signal
4	AUDMUX4_RXFS_RX485_TX_EN	I	Audio Mux RXFS signal
5	AUDMUX4_TXD	O	Audio Mux TXD signal
6	SPDIF_OUT_PCIE_PCIE_WAKE_B	O	SPDIF Out signal
7	AUDMUX4_TXFS	O	Audio Mux TXFS signal
8	SPDIF_IN_PCIE_DIS_B	I	SPDIF In signal
9	AUDMUX4_RXD	I	Audio Mux RXD signal
10	DGND	Power	

Table 2 - 28 Audio Connector Pin-out (J7)

2.4.9 CAN1, UART2 (RS485) & DMIC Interface (J26, J35)

2.4.9.1 UART2

UART2 interface, directly connected to VAR-SOM-MX6 pins, is exposed by J35. However, it is also connected to a RS485 transceiver, exposing RS485 signals by J26. A 1K resistor is connected in serial to the Rx line to avoid conjunctions in case both interfaces are accidentally used simultaneously.

2.4.9.2 CAN

CAN bus signals interface driven by a CAN bus transceiver (SN65HVD234DR) connected to the VAR-SOM-CAN1 interface pins. ,

2.4.9.3 DMIC

VAR-MX6Customboard features a digital microphone device, connected to the VAR-SOM-MX6 DMIC interface. DMIC interface is also exposed by J26 and by the CSI-2 camera interface connector. Digital microphone device

2.4.9.4 CAN, RS422/485 Connector Pin-out (J26)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	CANL	IO	CAN L signal
2	CANH	IO	CAN H signal
3	DGND	Power	Digital ground
4	DGND	Power	Digital ground
5	B	I	RS422 B signal
6	A	I	RS422 A signal
7	DGND	Power	Digital ground
8	DGND	Power	Digital ground
9	Z	O	RS422 Z signal
10	Y	O	RS422 Y signal

Table 2 - 29 CAN, RS422/485 Pin-out (J26)

2.4.9.5 Miscellaneous Connector Pin-out (J35)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	BASE_PER_3V3	Power	Power supply 3.3 V
2	PWM_BACKLIGHTEN	O	LED backlight PWM signal
3	CLKO2	O	Reference clock 2 signal
4	DMIC_CLK	O	Digital microphone clock
5	DMIC_DAT	I	Digital microphone data
6	UART2_TXD	O	UART2 transmit signal
7	UART2_CTS	I	UART2 clear to send signal
8	UART2_RTS	O	UART2 ready to send signal
9	UART2_RXD	I	UART2 receive signal
10	DGND	POWER	Digital ground

Table 2 - 30 Miscellaneous Connector Pin-out (J35)

2.4.10 SPI1/I2C1, 3 (J28)

SPI1/I2Cx expansion connector pins are directly connected to the VAR-SOM-MX6 pins. Please refer to the VAR-SOM-MX6 module data sheet for a complete interface description.

2.4.10.1 SPI1/I2C1, 3 Connector Pin-out (J28)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	BASE_PER_3V3	Power	Power supply 3.3 V
2	CSPI1_SCLK		SPI clock signal
3	CSPI1_CS0		SPI chip select 0 signal
4	CSPI1_SIMO	O	SPI SIMO signal

5	I2C3_SCL		I2C3 clock signal
6	CSPI1_SOMI	I	SPI SOMI signal
7	I2C1_SDA		IIC1 data signal
8	I2C3_SDA		IIC3 data signal
9	I2C1_SCL		IIC1 clock signal
10	DGND	Power	Digital ground

Table 2 - 31 SPI1/I2Cx Connector Pin-out (J28)

2.4.10.2 I2C3 Connector Pin-Out (J2)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	BASE_PER_3V3	Power	Power supply 3.3 V
2	VCC_5V	Power	Power supply 5 V
3	BASE_PER_3V3	Power	Power supply 3.3 V
4	BOOTSEL0/CPT_INT	IO	GPIO3[7] signal
5	I2C3_SDA	IO	I2C3 data signal
6	NC		
7	I2C3_SCL	IO	IIC3 clock signal
8	NC		IIC3 data signal
9	DGND	Power	IIC1 clock signal
10	DGND	Power	Digital ground

Table 2 - 32 I2C3 Connector Pin-out (J2)

2.4.11 DSI (J24)

DSI connector signals are routed directly to processor DSI interface pins. Please refer to the VAR-SOM-module data sheet for a complete interface description.

2.4.11.1 DSI Connector Pin-out (J24)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
1	BASE_PER_3V3	Power	Power supply 3.3 V
2	CSPI1_SCLK		SPI clock signal
3	CSPI1_CS0		SPI chip select 0 signal
4	CSPI1_SIMO	O	SPI SIMO signal
5	I2C3_SCL		I2C3 clock signal
6	CSPI1_SOMI	I	SPI SOMI signal
7	I2C1_SDA		IIC1 data signal
8	I2C3_SDA		IIC3 data signal
9	I2C1_SCL		IIC1 clock signal
10	DGND	Power	Digital ground

Table 2 - 33 DSI Connector Pin-out (J24)

2.4.12 CSI2 Camera (J17)

CSI2 camera connector signals are routed directly to processor DSI interface pins. Please refer to the VAR-SOM-MX6 module data sheet for a complete interface description.

2.4.12.1 CSI2 Camera Connector Pin-out (J17)

Pin #	VAR-MX6CustomBoard Signal	Type	Description
A1	VCC 2.8V	Power	Power supply 2.8 V
A2	DGND	Power	Digital ground
A3	CSI_D3M	DSIO	CSI data3 negative
A4	CSI_D3P	DSIO	CSI data3 positive
A5	DGND	Power	Digital ground
A6	CSI_D2P	DSIO	CSI data2 positive
A7	CSI_D2M	DSIO	CSI data2 negative
A8	DGND	Power	Digital ground
A9	CSI_D1M	DSIO	CSI data1 negative
A10	CSI_D1P	DSIO	CSI data1 positive
A11	DGND	Power	Digital ground
A12	DGND	Power	Digital ground
A13	CSI_CLK0P	DSIO	CSI clock positive
A14	CSI_CLK0M	DSIO	CSI clock negative
A15	DGND	Power	Digital ground
A16	CSI_D0P	DSIO	CSI data0 positive
A17	CSI_D0M	DSIO	CSI data0 negative
A18	DGND	Power	Digital ground
B1	DGND	Power	Digital ground
B2	NC		
B3	NC		
B4	DGND	Power	Digital ground
B5	DGND	Power	Digital ground
B6	NC		
B7	NC		
B8	DMIC_DAT	I	Digital microphone data signal
B9	DMIC_CLK	O	Digital microphone clock signal
B10	BASE_PER_3V3	Power	Power supply 3.3 V
B11	DGND	Power	Digital ground
B12	I2C1_SCL	IO	Camera control I2C signal
B13	I2C1_SDA	IO	Camera control I2C signal
B14	BASE_PER_3V3	Power	Power supply 3.3 V
B15	NC		
B16	BSEL1_SDMMC1_GPIO_CAM_CRTL	O	Enable signal routed to GPIO3[13]
B17	CLKO2	O	Camera reference clock signal

Pin #	VAR-MX6CustomBoard Signal	Type	Description
B18	DGND	Power	Digital ground

Table 2 - 34 CSI2 Camera Connector Pin-out (J17)

2.5 User Interfaces

2.5.1 LED Indications

2.5.1.1 Power-on LED

D1 indicates that the 5 V power rail of the VAR-SOM-Mx6 is on.

2.5.1.2 Mini PCIE LEDES

PCle LEDs are directly controlled by PCIe module, the below LEDs are available:

- D26 – WPAN
- D24 – WLAN
- D25 - WWAN

2.5.2 Control Buttons

2.5.2.1 Power-on (SW1)

The power-on switch enables VAR-MX6Customboard main power

2.5.2.2 Reset Button (SW4)

System hardware-reset

2.5.2.3 User Button (SW2)

Spare button for user needs

2.5.2.4 Boot Select (SW3)

The boot select switch sets the VAR-SOM-MX6 boot source and sequence. Please refer to the VAR-SOM-MX6 module data sheet for a detailed description.

Position	Logic Level	Boot Source
Released	'1'	Internal
Pressed	'0'	External (MMC)

Table 2 - 35 Boot Select Switch Modes

2.5.3 Power Input (J18/J19)

The VAR-MX6CustomBoard is powered by a 7.5 V to 12 V DC power supply, using one of the connectors below (assembly option).

2.5.3.1 DC-in Jack (J19)

The DC-in power jack is compatible with a standard 2.5 mm / 5.5 mm power plug.

2.5.3.2 Terminal Block (J18)

A Terminal Block can be assembled if a DC jack is not required

Pin #	Signal
1	PWR_IN1
2	PWR_IN2

Table 2 - 36 Terminal Block Connector Pin-out (J19)

2.5.3.3 RTC Backup Battery (JBT1)

The VAR-MX6 features a CR1225 battery holder powering the VAR-MX6Customboard RTC mechanism backup supply rail.

Electrical Environmental Specifications

2.6 Absolute Maximum Electrical Specifications

	Min	Max
Main Power Supply DC-IN	-0.3 V	23 V
External Interfaces	Unless otherwise specified, please refer to the VAR-SOM-MX6 data sheet	

Table 2 - 37 Absolute Maximum Electrical Specifications

2.7 Operational Electrical Specifications

	Min	Max
Main Power Supply, DC-IN	7.5V	12V
External interfaces	Unless otherwise specified, please refer to VAR-SOM-MX6 data sheet	

Table 2 - 38 Operational Electrical Specifications

3 Environmental Specifications

	Min	Max
Commercial operating temperature range	0 °C	+70 °C
Extended operating temperature range	-20 °C	+70 °C
Industrial operating temperature range	-40 °C	+85 °C
MTBF	10000 hrs >	
Shock resistance	50 G/20 ms	
Relative humidity, operational	10 %	90 %
Relative humidity, storage	5 %	95 %
Vibration	20G/0 - 600 Hz	

Table 3 - 1 Environmental Specifications

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