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Rev. 1.1, 04/2026

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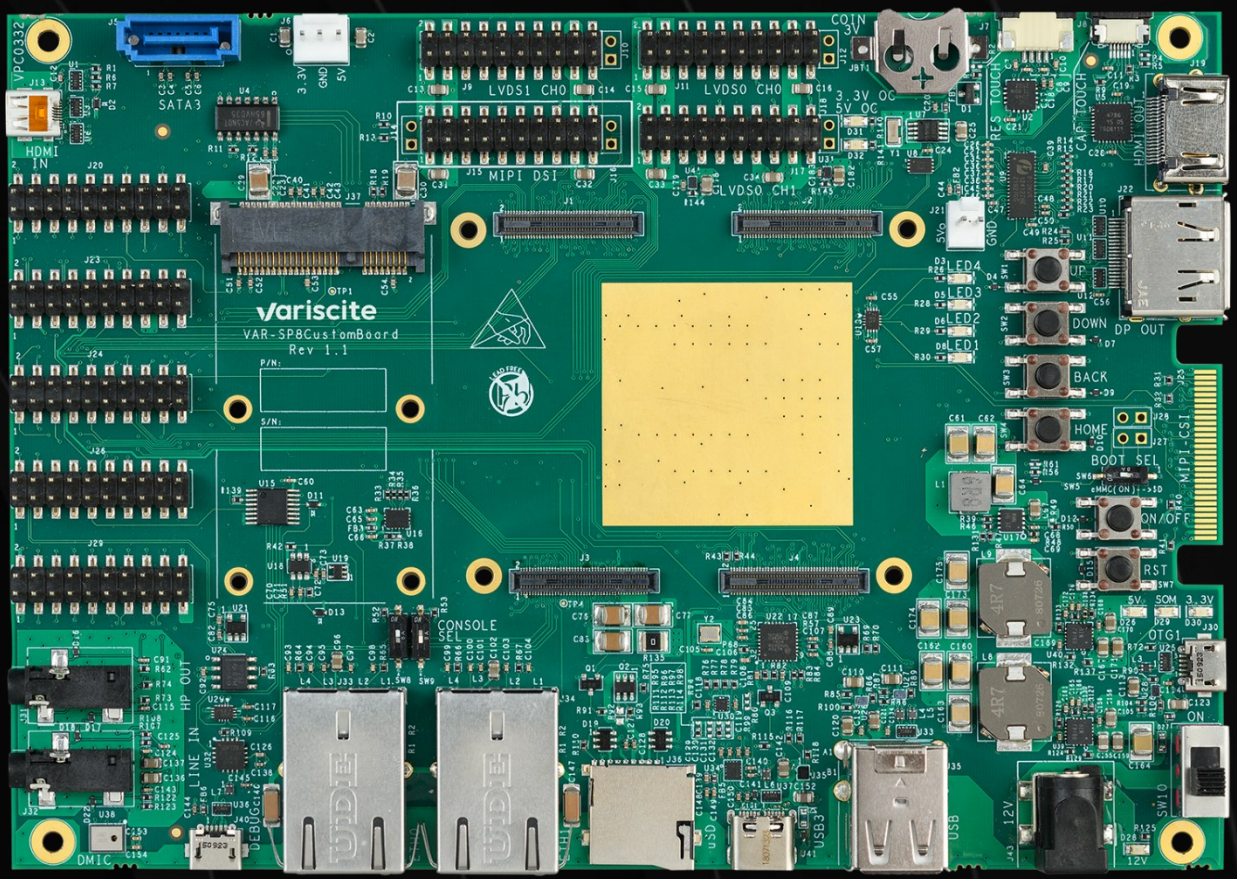
VAR-SP8CustomBoard Datasheet
Carrier-board for the SPEAR-MX8
V 1.x



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VAR-SP8CustomBoard Datasheet

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Variscite Ltd.
4, Hamelacha Street
Lod
P.O.B 1121
Airport City, 70100
ISRAEL

Tel: +972 (9) 9562910
Fax: +972 (9) 9589477

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1.0	Oct 7, 2019	Initial
1.1	Apr 06, 2026	Added a note in the 2.3.7 section

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1 Overview

1.1 General Information

The VAR-SP8CustomBoard is a complete development board, utilizing all of the SPEAR-MX8 System-on-Module's features. It is assembled with large variety of user and debug interfaces, enabling it to serve as both a complete development kit or as a stand-alone end-product.

1.1.1 Supporting Variscite products

- SPEAR-MX8
- 7" Capacitive touch LCD

1.1.2 Supporting O.S

- Linux
- Android

1.1.3 Additional information

Board schematics as well as mechanical CAD data base is available to download at www.variscite.com,

SW support information can be found: http://variwiki.com/

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

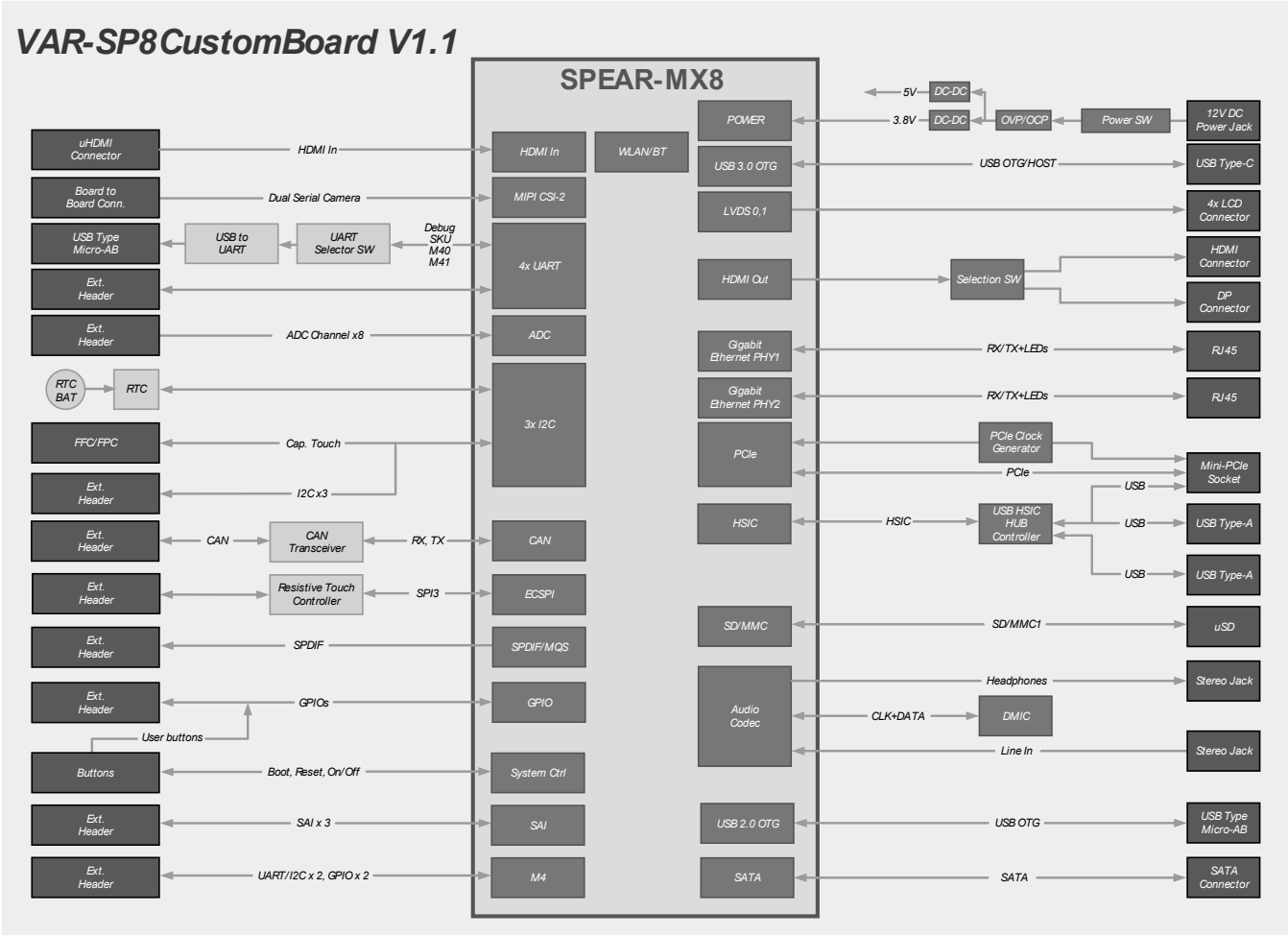
1.2 VAR-SP8CustomBoard features summary

- Quad DF40C-90DS-0.4V(51) Connectors, compatible with the SPEAR-MX8 SOM
- Display
  - 2x 18-bit LVDS Interface supporting Variscite's 7" TFT capacitive touch LCD
  - HDMI 2.0a
  - Display Port 1.3/ eDP 1.4
- Touch panel interface
  - Capacitive - I2C based
  - Resistive – SPI based
- Ethernet
  - 2x 10/100/1000BaseT – RJ45
- PCIe
  - Mini PCIe
- SATA
  - Micro SATA connector
- USB
  - USB3.0/2.0 OTG Type C
  - USB2.0 OTG Type Micro USB
  - 2x USB2.0 Host Type A
- AUDIO
  - 3.5mm Headphones jack
  - 3.5mm Line in jack
  - Digital Microphone
- Micro SD-Card slot
- Camera
  - Serial interface – MIPI CSI x4 lanes (Via Extension Card)
  - HDMI-In Interface micro HDMI connector
- CAN Bus
  - CAN Transceiver via Header
- Debug
  - USB debug - Type Micro AB
- RTC
  - ISL12057 Chip
- Additional
  - UART, PWM, SAI (Serial Audio Interface), SPI, I2C, GPIOs, etc. - Headers
  - General purpose LED, Buttons

- Power
  - 12V DC Input. - 2.0mm DC jack / 2 pin Terminal Block
  - 5V,3.3V DC Out – 2 pin Header SATA Power
  - 5V, DC Out – 2 pin Header FAN Power
  - RTC Backup battery - CR1225 Battery Holder

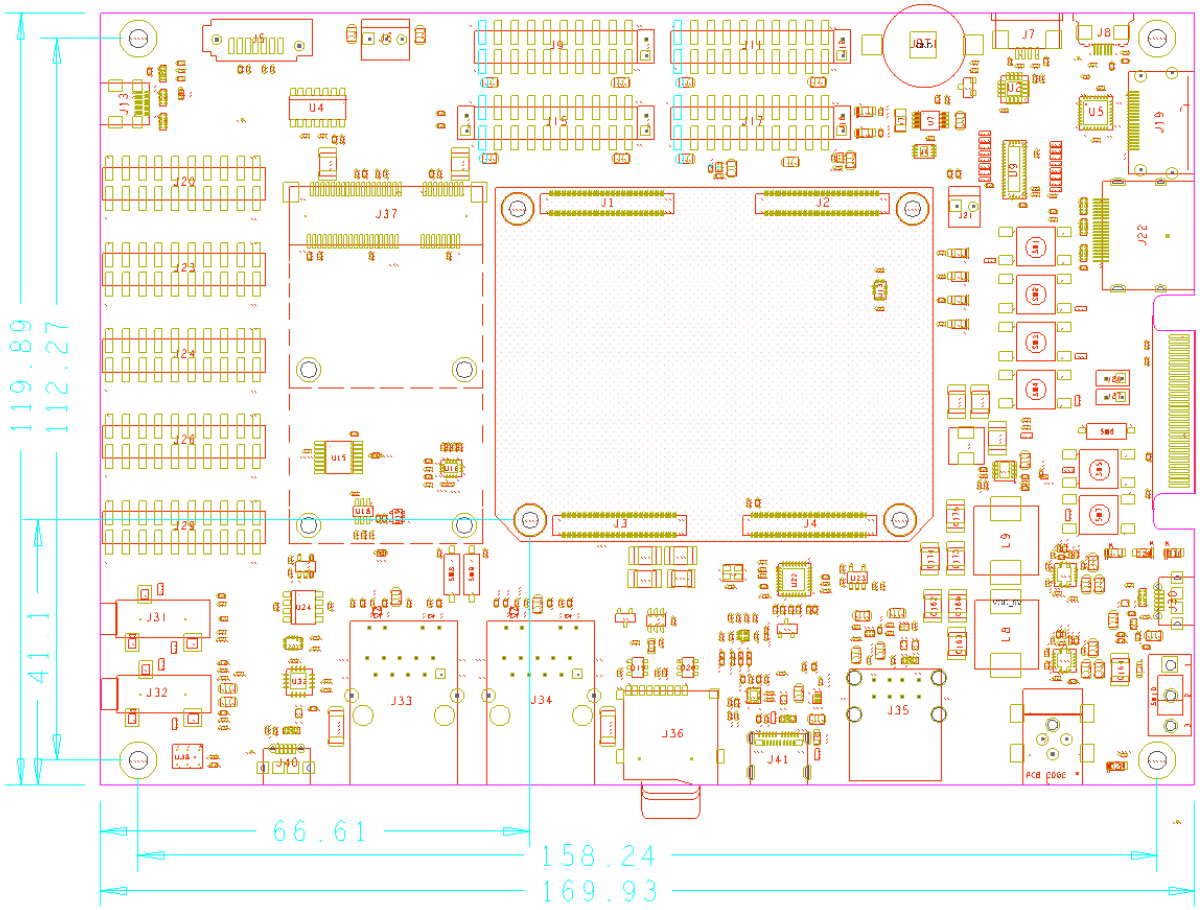
1.3 Block Diagram

1.3.1 VAR-SP8CustomBoard



1.4 Board Layout

The VAR-SP8CustomBoard's physical dimensions are 169.93 x 119.89 mm.



Detailed CAD files are available for download at www.variscite.com.

1.5 VAR-SP8CustomBoard connectors

The below table lists all available connectors on the VAR-SP8CustomBoard,
Refer to chapter 2 for a more detailed description and Pin-out of each connector.

Table 1-1 VAR-SP8CustomBoard connectors

Reference	Function	Type
J1	SPEAR-MX8 J1 Connector	DF40C-90DS
J2	SPEAR-MX8 J2 Connector	DF40C-90DS
J3	SPEAR-MX8 J3 Connector	DF40C-90DS
J4	SPEAR-MX8 J4 Connector	DF40C-90DS
J5	SATA Connector	Micro SATA
J6	SATA Power Connector	Header 3 position, 2.54mm keyed
J7	Resistive Touch Connector	FFC/FPC 4-pin
J8	Capacitive Touch Connector	FFC/FPC 6-pin
J9	LVDS1 Channel 0 Connector	Header SMT, 10x2, 2.54mm
J10	LVDS1 Channel 0 Lane 3 Connector	Header TH, 2x1, 2.54mm
J11	LVDS0 Channel 0 Connector	Header SMT, 10x2, 2.54mm
J12	LVDS0 Channel 0 Lane 3 Connector	Header TH, 2x1, 2.54mm
J13	Micro HDMI In Connector	Micro HDMI
J14	I2C1 Connector	Header TH, 2x1, 2.54mm
J15	DSI Connector	Header SMT, 10x2, 2.54mm
J16	DSI Lane 3 Connector	Header TH, 2x1, 2.54mm
J17	LVDS0 Channel 1 Connector	Header SMT, 10x2, 2.54mm
J18	LVDS0 Channel 1 Lane 3 Connector	Header TH, 2x1, 2.54mm
J19	HDMI Out Connector	HDMI
J20	SPI & M40 Interfaces Header	Header SMT, 10x2, 2.54mm
J21	Fan Power Connector	Header TH, 2x1, 2.54mm keyed
J22	Display Port Connector	DP
J23	GPIO Header	Header SMT, 10x2, 2.54mm
J24	SAI Header	Header SMT, 10x2, 2.54mm
J25	MIPI-CSI 4 lanes	Edge Connector mates to HSEC8-130-01-SM-DV-A
J26	UART & CAN & GPT Header	Header SMT, 10x2, 2.54mm
J27	Testing 1 Header	Header TH, 2x1, 2.54mm
J28	Testing 2 Header	Header TH, 2x1, 2.54mm
J29	ADC & Tamper & HDMI Header	Header SMT, 10x2, 2.54mm
J30	USB2.0 OTG	Micro USB Type AB
J31	Headphones	Audio Jack 3.5 mm
J32	Line In	Audio Jack 3.5 mm

Reference	Function	Type
J33	10/100/1000Mbps ETH0 Port	RJ-45
J34	10/100/1000Mbps ETH1 Port	RJ-45
J35	Dual USB 2.0 Host	USB 2.0 Type A Stacked
J36	SD-MMC	Micro SD Connector
J37	Mini PCIe Connector	Mini PCIe Conn, 2x26 0.8mm
J40	USB Debug	USB Type micro AB
J41	USB 3.0/2.0 OTG	USB Type C
J42	Power In	2 Pin Terminal Block
J43	Power In	DC In Jack 2.0 mm
JBT1	RTC Battery Holder	CR1225 Battery Holder

2 Detailed Description

2.1 Overview

This chapter details the VAR-SP8CustomBoard features and external interfaces, some of which are driven directly by the SPEAR-MX8 SOM.

Please refer to the SOM data sheet for more information.

Table 2-1 describes this chapter table header and acronyms used.

Table 2-1: Acronyms used on tables column header

Column		Meaning
Pin#	x	Pin number on a connector
Type		Pin type & direction
	I	INPUT
	O	OUTPUT
	DS	Differential Signal
	A	Analog
	P	Power
Signal		VAR-SP8CustomBoard schematic signal name
Description		Pin functionality description

2.2 VAR-SP8CustomBoard Interfaces

2.2.1 SOM

The VAR-SP8CustomBoard features Quad DF40C-90DS Board to Board connectors to connect with the SPEAR-MX8 System-on-module.
Please refer to the SOM module data sheet for a complete signal description and pin-out of J1 - J3.

2.3 Standard External Interfaces

2.3.1 USB & SATA

The VAR-SP8CustomBoard features a USB Type C OTG connector.

USB Type C OTG connector provides USB3.0/2.0 OTG connectivity port.

2.3.1.1 USB3.0/2.0 Type-C OTG Connector Pin-out (J41)

Table 2-2: USB Type-C OTG Connector Pin-out (J41)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
A1	GND	P	Ground return
A2	SS_TX1_P	DSO	SuperSpeed diff. pair #1, TX, positive
A3	SS_TX1_N	DSO	SuperSpeed diff. pair #1, TX, negative
A4	USB_SS3_VBUS	P	Bus power
A5	USB_SS3_CC1	IO	Configuration channel
A6	USB_C_OTG2_DP	DSIO	Non-SuperSpeed diff. pair, pos. 1, positive
A7	USB_C_OTG2_DN	DSIO	Non-SuperSpeed diff. pair, pos. 1, negative
A8	SBU1	IO	Sideband use (SBU)
A9	USB_SS3_VBUS	P	Bus power
A10	SS_RX2_N	DSI	SuperSpeed diff. pair #4, RX, negative
A11	SS_RX2_P	DSI	SuperSpeed diff. pair #4, RX, positive
A12	GND	P	Digital Ground
B1	GND	P	Digital Ground
B2	SS_TX2_P	DSO	SuperSpeed diff. pair #3, TX, positive
B3	SS_TX2_N	DSO	SuperSpeed diff. pair #3, TX, negative
B4	USB_SS3_VBUS	P	Bus power
B5	USB_SS3_CC2	IO	Configuration channel
B6	USB_C_OTG2_DP	DSIO	Non-SuperSpeed diff. pair, pos. 2, positive
B7	USB_C_OTG2_DN	DSIO	Non-SuperSpeed diff. pair, pos. 2, negative
B8	SBU2	IO	Sideband use (SBU)
B9	USB_SS3_VBUS	P	Bus power
B10	SS_RX1_N	DSI	SuperSpeed diff. pair #2, RX, negative
B11	SS_RX1_P	DSI	SuperSpeed diff. pair #2, RX, positive
B12	GND	P	Digital Ground
SH1	GND	P	SHIELD pin reference
SH2	GND	P	SHIELD pin reference
SH3	GND	P	SHIELD pin reference
SH4	GND	P	SHIELD pin reference

2.3.1.2 SATA 2.0 Connector Pin-out (J5)

Table 2-3: SATA 2.0 Connector Pin-out (J5)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	GND	P	Digital ground
2	SATAC_TXP	DSIO	SATA Transmit Lane Diff. Positive
3	SATAC_TXN	DSIO	SATA Transmit Lane Diff. Negative
4	GND	P	Digital ground
5	SATAC_RXN	DSIO	SATA Receive Lane Diff. Negative
6	SATAC_RXP	DSIO	SATA Receive Lane Diff. Positive
7	GND	P	Digital ground
8	GND	P	Digital ground
9	GND	P	Digital ground

2.3.1.3 SATA Power DC-Out Pin-out (J6)

A 5V,3.3V power output is available via shrouded 3 pin header for SATA power.
Mating Housing Molex 22-01-3037; Connector Terminal Female Molex 08-50-0114;

Table 2-4: SATA Power DC-Out Connector Pin-out (6)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	BASE_PER_3V3	P	Base Board 3.3V
2	GND	P	Ground Return
3	VCC_5V	P	Base board 5V

2.3.1.4 Dual USB 2.0 HOST Connector Pin-out (J35)

The VAR-SP8CustomBoard features on board USB HUB that utilizes SPEAR-MX8 HSIC Interface.

3 Downstream ports of the HUB are divided: 2 ports are connected to J35 and one port connected to mini PCI-Express Card.

Table 2-5: Dual USB2.0 Host Connector Pin-out (J35)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
A1	USB#A_HOST_VBUS	P	+5V power supply. 500ma max
A2	USB#A_HOST_DN_C	DSIO	USB Data Negative
A3	USB#A_HOST_DP_C	DSIO	USB Data Positive
A4	USB#A_HOST_GND	P	Digital ground
B1	USB#B_HOST_VBUS	P	+5V power supply. 500ma max
B2	USB#B_HOST_DN_C	DSIO	USB Data Negative
B3	USB#B_HOST_DP_C	DSIO	USB Data Positive
B4	USB#B_HOST_GND	P	Digital ground
5	GND	P	SHIELD pin reference
6	GND	P	SHIELD pin reference
7	GND	P	SHIELD pin reference
8	GND	P	SHIELD pin reference

2.3.1.5 USB 2.0 OTG Connector Pin-out (J30)

Table 2-6: USB 2.0 OTG Connector Pin-out (J30)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	USB_HOST3_VBUS	P	5V power input
2	USB_HOST3_DM	DSIO	USB Data Negative
3	USB_HOST3_DP	DSIO	USB Data Positive
4	USB_OTG1_ID	I	USB Micro ID signal
5	GND	P	Digital Ground
6	GND	P	SHIELD pin reference
7	GND	P	SHIELD pin reference
10	GND	P	SHIELD pin reference
11	GND	P	SHIELD pin reference

2.3.2 Micro SD Card

Micro SD Card interface is driven by the USDHC interface of the of the SOM.

2.3.2.1 Micro SD card slot Connector Pin-out (J36)

Table 2-7: Micro SD Card Slot Connector Pin-out (J36)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	USDHC1_DAT2	IO	SD Parallel Data2
2	USDHC1_DAT3	IO	SD Parallel Data3
3	USDHC1_CMD	IO	SD Command
4	SW_3P3_SD1	P	SD card 3.3V supply
5	USDHC1_CLK	I	SD Clock
6	GND	P	Digital Ground
7	USDHC1_DAT0	IO	SD Parallel Data0
8	USDHC1_DAT1	IO	SD Parallel Data1
9	USDHC1_CD_B	O	SD Card Detect
10	GND	P	SHIELD pin reference
11	GND	P	SHIELD pin reference
12	GND	P	SHIELD pin reference
13	GND	P	SHIELD pin reference

2.3.3 Mini PCIe

The SOM PCI Express interface is exposed by the VAR-SP8CustomBoard through a standard Mini PCI Express connector supporting connection of mini PCI Express expansion card.

2.3.3.1 Mini PCIe Connector Pin-out (J37)

Table 2-8: mini PCI Express Connector Pin-out (J37)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	PCIE_CTRL0_WAKE_B	O	PCIe Wake
2	BASE_PER_3V3	P	Base board 3.3V
3			
4	GND	P	Digital Ground
5			
6	BASE_PER_1V5	P	Base board 1.5V #1 Limited to 300mA
7			
8			
9	GND	P	Digital Ground
10			
11	PCIE_REFCLK100M_N	DSI	PCIe Clock Diff. Negative; 100MHz HCSL

Pin #	VAR-SP8CustomBoard Signal	Type	Description
12			
13	PCIE_REFCLK100M_P	DSI	PCIe Clock Diff. Positive; 100MHz HCSL
14			
15	GND	P	Digital Ground
16			
17			
18	GND	P	Digital Ground
19			
20	MPCIE_W_DISN	I	PCIe Disable (via T.P.)
21	GND	P	Digital Ground
22	PCIE_CTRL0_PERST_B	O	PCIe Reset signal
23	PCIE_CRXM	DSI	PCIe Receive Lane Diff. Negative
24	BASE_PER_3V3	P	Base board 3.3V
25	PCIE_CRXP	DSI	PCIe Receive Lane Diff. Positive
26	GND	P	Digital Ground
27	GND	P	Digital Ground
28	BASE_PER_1V5	P	Base board 1.5V #1 Limited to 300mA
29	GND	P	Digital Ground
30	GPT1_CLK(I2C2_SCL)	I	I2C #A Clock
31	PCIE_CTXM	DSO	PCIe Transmit Lane Diff. Negative
32	GPT1_CAPTURE(I2C2_SDA)	IO	I2C #A Data
33	PCIE_CTXP	DSO	PCIe Transmit Lane Diff. Positive
34	GND	P	Digital Ground
35	GND	P	Digital Ground
36	USB_HUB_P3_DM		
37	GND	P	Digital Ground
38	USB_HUB_P3_DP		
39	BASE_PER_3V3	P	Base board 3.3V
40	GND	P	Digital Ground
41	BASE_PER_3V3	P	Base board 3.3V
42			
43	GND	P	Digital Ground
44			
45			
46			
47			
48	BASE_PER_1V5	P	Base board 1.5V #1 Limited to 300mA

Pin #	VAR-SP8CustomBoard Signal	Type	Description
49			
50	GND	P	Digital Ground
51			
52	BASE_PER_3V3	P	Base board 3.3V

2.3.4 Ethernet

The VAR-SP8CustomBoard exports both of the SOM's Gigabit Ethernet interfaces, provided by its' on SOM PHYs to a standard RJ45 Ethernet jack connectors with integrated magnetics.
Please refer to the SOM datasheet for more information.

2.3.4.1 ETH0 10/100/1000BaseT RJ45 Connector Pin-out (J33)

Table 2-9: ETH0 10/100/100BaseT RJ45 Connector Pin-out (J33)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
L1	GND	I	Activity LED Anode
L2	ETH0_LED_ACT (via R65)	O	Activity LED Cathode
L3	ETH0_LED_LINK_10_100	IO	Link 10/100 Indication LED
L4	ETH0_LED_LINK_1000 (via R64)	IO	Link 1000 Indication LED
R1	ETH0_MDI_A_P	DSIO	Bi-directional diff. pair A positive
R2	ETH0_MDI_A_N	DSIO	Bi-directional diff. pair A negative
R3	ETH0_MDI_B_P	DSIO	Bi-directional diff. pair B positive
R4	ETH0_MDI_B_M	DSIO	Bi-directional diff. pair B negative
R5	TCT2	O	Primary transformer common pin
R6	TCT4	O	Primary transformer common pin
R7	ETH0_MDI_C_P	DSIO	Bi-directional diff. pair C positive
R8	ETH0_MDI_C_M	DSIO	Bi-directional diff. pair C negative
R9	ETH0_MDI_D_P	DSIO	Bi-directional diff. pair D positive
R10	ETH0_MDI_D_M	DSIO	Bi-directional diff. pair D negative
SH1	GND_EARTH	P	EARTH
SH2	GND_EARTH	P	EARTH

2.3.4.2 ETH1 10/100/1000BaseT RJ45 Connector Pin-out (J34)

Table 2-10: ETH1 10/100/100BaseT RJ45 Connector Pin-out (J34)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
L1	GND	I	Activity LED Anode

Pin #	VAR-SP8CustomBoard Signal	Type	Description
L2	ETH1_LED_ACT (via R67)	O	Activity LED Cathode
L3	ETH1_LED_LINK_10_100	IO	Link 10/100 Indication LED
L4	ETH1_LED_LINK_1000 (via R66)	IO	Link 1000 Indication LED
R1	ETH1_MDI_A_P	DSIO	Bi-directional diff. pair A positive
R2	ETH1_MDI_A_N	DSIO	Bi-directional diff. pair A negative
R3	ETH1_MDI_B_P	DSIO	Bi-directional diff. pair B positive
R4	ETH1_MDI_B_M	DSIO	Bi-directional diff. pair B negative
R5	TCT2	O	Primary transformer common pin
R6	TCT4	O	Primary transformer common pin
R7	ETH1_MDI_C_P	DSIO	Bi-directional diff. pair C positive
R8	ETH1_MDI_C_M	DSIO	Bi-directional diff. pair C negative
R9	ETH1_MDI_D_P	DSIO	Bi-directional diff. pair D positive
R10	ETH1_MDI_D_M	DSIO	Bi-directional diff. pair D negative
SH1	GND_EARTH	P	EARTH
SH2	GND_EARTH	P	EARTH

Table 2-11: RJ-45 Connector Led status (J33, J34)

STATUS / LED	10M Link	10M Active	100M Link	100M Active	1000M Link	1000M Active
LED_LINK_10_100	OFF	OFF	ON	ON	OFF	OFF
LED_LINK_1000	OFF	OFF	OFF	OFF	ON	ON
LED_LINK_10_100_1000	OFF	OFF	ON	ON	ON	ON
LED_ACT	ON	BLINK	ON	BLINK	ON	BLINK

2.3.5 Audio

The VAR-SP8CustomBoard features two 3.5mm jacks for analog audio interfaces.

- Headphone
- Line in

The analog audio interface signals are driven by the SOM Audio Codec. Please refer to the SOM data sheet for complete audio codec information.

Also, a digital microphone is implemented on the VAR-SP8CustomBoard, see schematics for U38.

2.3.5.1 Line-In Jack Connector Pin-out (J32)

Table 2-12: Line-In Jack Connector Pin-out (J32)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	AGND	AP	Analog ground return for audio.
2	LINEIN1_LP	AI	Line in Left input
3	LINEIN1_RP	AI	Line in Right input

2.3.5.2 Headphone Jack Connector Pin-out (J31)

Table 2-13: Headphone out Jack Connector Pin-out (J31)

Pin #	*VAR-SP8CustomBoard Signal*	*Type*	*Description*
1	HPOUTFB	AP	Analog ground return for audio.
2	HPLOUT	AO	Headphone out Left
3	HPROUT	AO	Headphone out Right

2.3.6 Serial Camera

The VAR-SP8CustomBoard supports a MIPI CSI camera sensor input using an extension camera board connected to an edge connector in the VAR-SP8CustomBoard.

The Camera Board Mating connector: SAMTEC 60POS 0.8mm pitch,
HSEC8-130-01-SM-DV-A

2.3.6.1 Serial Camera Connector Pin-out (J25)

Table 2-14: Serial Camera Connector Pin-out (J25)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	BASE_PER_3V3	P	Base board 3.3V
2	GND	P	Digital Ground
3	BASE_PER_3V3	P	Base board 3.3V
4	MIPI_CSI1_I2C0_SDA	IO	Camera 1 I2C Data
5	SW_1P8	P	Base board 1.8V
6	MIPI_CSI1_I2C0_SCL	I	Camera 1 Camera I2C Clock
7	SW_1P8	P	Base board 1.8V
8	GND	P	Digital Ground
9	GND	P	Digital Ground
10	MIPI_CSI1_GPIO0_01	O	Camera 1 Power down signal
11	MIPI_CSI0_DATA0_P	DSI	Camera 0 Lane0 positive
12	MIPI_CSI1_GPIO0_00	O	Camera 1 Reset signal
13	MIPI_CSI0_DATA0_N	DSI	Camera 0 Lane0 negative
14	SCU_GPIO0_05(GPIO1_IO01)	I	Camera 1 Optional control signal
15	GND	P	Digital Ground
16	ADC_IN1	I	Camera 1 Sync signal
17	MIPI_CSI0_CLK_P	DSI	Camera 0 Clock positive
18	GND	P	Digital Ground
19	MIPI_CSI0_CLK_N	DSI	Camera 0 Clock negative
20	MIPI_CSI1_MCLK_OUT	I	Camera 1 Trigger signal
21	GND	P	Digital Ground
22	GND	P	Digital Ground
23	MIPI_CSI0_DATA1_P	DSI	Camera 0 Lane1 positive
24	MIPI_CSI1_DATA3_N	DSI	Camera 1 Lane3 negative
25	MIPI_CSI0_DATA1_N	DSI	Camera 0 Lane1 negative
26	MIPI_CSI1_DATA3_P	DSI	Camera 1 Lane3 positive
27	GND	P	Digital Ground
28	GND	P	Digital Ground
29	MIPI_CSI0_DATA2_P	DSI	Camera 0 Lane2 positive
30	MIPI_CSI1_DATA2_N	DSI	Camera 1 Lane2 negative
31	MIPI_CSI0_DATA2_N	DSI	Camera 0 Lane2 negative
32	MIPI_CSI1_DATA2_P	DSI	Camera 1 Lane2 positive

Pin #	VAR-SP8CustomBoard Signal	Type	Description
33	GND	P	Digital Ground
34	GND	P	Digital Ground
35	MIPI_CSI0_DATA3_P	DSI	Camera 0 Lane3 positive
36	MIPI_CSI1_DATA1_N	DSI	Camera 1 Lane1 negative
37	MIPI_CSI0_DATA3_N	DSI	Camera 0 Lane3 negative
38	MIPI_CSI1_DATA1_P	DSI	Camera 1 Lane1 positive
39	GND	P	Digital Ground
40	GND	P	Digital Ground
41	MIPI_CSI0_MCLK_OUT	I	Camera 2 Trigger signal
42	MIPI_CSI1_CLK_N	DSI	Camera 1 Clock negative
43	GND	P	Digital Ground
44	MIPI_CSI1_CLK_P	DSI	Camera 1 Clock positive
45	ADC_IN0	I	Camera 0 Sync signal
46	GND	P	Digital Ground
47	SCU_GPIO0_06(GPIO1_IO02)	I	Camera 0 Optional control signal
48	MIPI_CSI1_DATA0_N	DSI	Camera 1 Lane0 negative
49	MIPI_CSI0_GPIO0_00	O	Camera 0 Reset signal
50	MIPI_CSI1_DATA0_P	DSI	Camera 1 Lane0 positive
51	MIPI_CSI0_GPIO0_01	O	Camera 0 Power down signal
52	GND	P	Digital Ground
53	GND	P	Digital Ground
54	SW_1P8	P	Base board 1.8V
55	MIPI_CSI0_I2C0_SCL	I	Camera 0 Camera I2C Clock
56	SW_1P8	P	Base board 1.8V
57	MIPI_CSI0_I2C0_SDA	IO	Camera 0 I2C Data
58	BASE_PER_3V3	P	Base board 3.3V
59	GND	P	Digital Ground
60	BASE_PER_3V3	P	Base board 3.3V

Note
Camera control (reset, power down, sync, trigger, optional) and I2C interfaces run at 1.8V levels.

2.3.7 HDMI Input port

The VAR-SP8CustomBoard can receive HDMI signal using standard micro HDMI connector.

Note: The HDMI IN is not fully supported by NXP, therefore the HDMI IN section is not assembled on the board.

2.3.7.1 HDMI In Connector Pin-out (J13)

Table 2-15: HDMI In Connector Pin-out (J13)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	HDMI_RX0_HPD	DI	HDMI In Hot Plug Detect
2			
3	HDMI_RX0_DATA2_P	DSI	HDMI In Data 2 Positive
4	GND	P	Digital Ground
5	HDMI_RX0_DATA2_N	DSI	HDMI In Data 2 Negative
6	HDMI_RX0_DATA1_P	DSI	HDMI In Data 1 Positive
7	GND	P	Digital Ground
8	HDMI_RX0_DATA1_N	DSI	HDMI In Data 1 Negative
9	HDMI_RX0_DATA0_P	DSI	HDMI In Data 0 Positive
10	GND	P	Digital Ground
11	HDMI_RX0_DATA0_N	DSI	HDMI In Data 0 Negative
12	HDMI_RX0_CLK_P	DSI	HDMI In Clock Positive
13	GND	P	Digital Ground
14	HDMI_RX0_CLK_N	DSI	HDMI In Clock Negative
15	HDMI_RX0_CEC	DI	HDMI In DDC CEC
16	GND	P	Digital Ground
17	HDMI_RX0_DDC_SCL	DI	HDMI In DDC I2C Clock
18	HDMI_RX0_DDC_SDA	DIO	HDMI In DDC I2C Data
19	HDMI_RX0_MON_5V	P	5V power supply
20	GND	P	Digital Ground
21	GND	P	Digital Ground
22	GND	P	Digital Ground
23	GND	P	Digital Ground

2.3.8 LVDS

The VAR-SP8CustomBoard exposes the Two LVDS interface available on the SPEAR-MX8 SOM.

By default, the first LVDS is Dual channel and can support up to 1080p, the second LVDS is single channel and can support up to 720p resolutions.
The interface is exposed to three Variscite standard 20 pin Headers; Fourth data bit of each interface is extended using additional 2 pin TH connector.

J7 used for connecting Variscite's standard 7" LVDS LCD screen.

Notes:
SPEAR-MX8 pins which by default export DSI interface can alternatively export second channel of second LVDS Interface, this will upgrade the second LVDS Interface to 1080p.
Please refer to SOM datasheet for more information.

2.3.8.1 LVDS0 Channel0 Connector Pin-out (J11)

Table 2-16: LVDS0 Connector Pin-out (J11)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	VCC_DISP_3V3	P	Display power 3.3V
2	VCC_DISP_3V3	P	Display power 3.3V
3	GND	P	Digital Ground
4	GND	P	Digital Ground
5	LVDS0_CH0_TX0_N	DSO	LVDS0 Ch0 Data0 Diff. Negative
6	LVDS0_CH0_TX0_P	DSO	LVDS0 Ch0 Data0 Diff. Positive
7	GND	P	Digital Ground
8	LVDS0_CH0_TX1_N	DSO	LVDS0 Ch0 Data1 Diff. Negative
9	LVDS0_CH0_TX1_P	DSO	LVDS0 Ch0 Data1 Diff. Positive
10	GND	P	Digital Ground
11	LVDS0_CH0_TX2_N	DSO	LVDS0 Ch0 Data2 Diff. Negative
12	LVDS0_CH0_TX2_P	DSO	LVDS0 Ch0 Data2 Diff. Positive
13	GND	P	Digital Ground
14	LVDS0_CH0_CLK_N	DSO	LVDS0 Ch0 Clock Diff. Negative
15	LVDS0_CH0_CLK_P	DSO	LVDS0 Ch0 Clock Diff. Positive
16	GND	P	Digital Ground
17	VCC_DISP_5V	P	Display Backlight LED 5V power
18	VCC_DISP_5V	P	Display Backlight LED 5V power
19	LVDS0_GPIO0_IO00(LVDS0_PWM0_OUT)	IO	Backlight Brightness Control
20	GND	P	Digital Ground

2.3.8.2 LVDS0 Channel0 Data3 Extension Connector Pin-out (J12)

Table 2-17: LVDS0 Channel0 Data3 Connector Pin-out (J12)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	LVDS0_CH0_TX3_N	DSO	LVDS0 Ch0 Data3 Diff. Negative
2	LVDS0_CH0_TX3_P	DSO	LVDS0 Ch0 Data3 Diff. Positive

2.3.8.3 LVDS0 Channel1 Connector Pin-out (J17)

Table 2-18: LVDS0 Channel1 Connector Pin-out (J17)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	VCC_DISP_3V3	P	Display power 3.3V
2	VCC_DISP_3V3	P	Display power 3.3V
3	GND	P	Digital Ground
4	GND	P	Digital Ground
5	LVDS0_CH1_TX0_N	DSO	LVDS0 Ch1 Data0 Diff. Negative
6	LVDS0_CH1_TX0_P	DSO	LVDS0 Ch1 Data0 Diff. Positive
7	GND	P	Digital Ground
8	LVDS0_CH1_TX1_N	DSO	LVDS0 Ch1 Data1 Diff. Negative
9	LVDS0_CH1_TX1_P	DSO	LVDS0 Ch1 Data1 Diff. Positive
10	GND	P	Digital Ground
11	LVDS0_CH1_TX2_N	DSO	LVDS0 Ch1 Data2 Diff. Negative
12	LVDS0_CH1_TX2_P	DSO	LVDS0 Ch1 Data2 Diff. Positive
13	GND	P	Digital Ground
14	LVDS0_CH1_CLK_N	DSO	LVDS0 Ch1 Clock Diff. Negative
15	LVDS0_CH1_CLK_P	DSO	LVDS0 Ch1 Clock Diff. Positive
16	GND	P	Digital Ground
17	VCC_DISP_5V	P	Display Backlight LED 5V power
18	VCC_DISP_5V	P	Display Backlight LED 5V power
19	LVDS0_GPIO0_IO00(LVDS0_PWM0_OUT)	IO	Backlight Brightness Control
20	GND	P	Digital Ground

2.3.8.4 LVDS0 Channel1 Data3 Extension Connector Pin-out (J18)

Table 2-19: LVDS0 Channel1 Data3 Connector Pin-out (J18)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	LVDS0_CH1_TX3_N	DSO	LVDS0 Ch1 Data3 Diff. Negative
2	LVDS0_CH1_TX3_P	DSO	LVDS0 Ch1 Data3 Diff. Positive

2.3.8.5 LVDS1 Channel0 Connector Pin-out (J9)

Table 2-20: LVDS1 Channel0 Connector Pin-out (J9)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	VCC_DISP_3V3	P	Display power 3.3V
2	VCC_DISP_3V3	P	Display power 3.3V
3	GND	P	Digital Ground
4	GND	P	Digital Ground
5	LVDS1_CH0_TX0_N	DSO	LVDS1 Ch0 Data0 Diff. Negative
6	LVDS1_CH0_TX0_P	DSO	LVDS1 Ch0 Data0 Diff. Positive
7	GND	P	Digital Ground
8	LVDS1_CH0_TX1_N	DSO	LVDS1 Ch0 Data1 Diff. Negative
9	LVDS1_CH0_TX1_P	DSO	LVDS1 Ch0 Data1 Diff. Positive
10	GND	P	Digital Ground
11	LVDS1_CH0_TX2_N	DSO	LVDS1 Ch0 Data2 Diff. Negative
12	LVDS1_CH0_TX2_P	DSO	LVDS1 Ch0 Data2 Diff. Positive
13	GND	P	Digital Ground
14	LVDS1_CH0_CLK_N	DSO	LVDS1 Ch0 Clock Diff. Negative
15	LVDS1_CH0_CLK_P	DSO	LVDS1 Ch0 Clock Diff. Positive
16	GND	P	Digital Ground
17	VCC_DISP_5V	P	Display Backlight LED 5V power
18	VCC_DISP_5V	P	Display Backlight LED 5V power
19	MIPI_DSI0_GPIO0_IO00	IO	Backlight Brightness Control
20	GND	P	Digital Ground

2.3.8.6 LVDS1 Channel0 Data3 Extension Connector Pin-out (J10)

Table 2-21: LVDS1 Channel0 Data3 Connector Pin-out (J10)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	LVDS1_CH0_TX3_N	DSO	LVDS1 Ch0 Data3 Diff. Positive
2	LVDS1_CH0_TX3_P	DSO	LVDS1 Ch0 Data3 Diff. Negative

2.3.9 DSI Display

The VAR-SP8CustomBoard exposes the Quad Lane DSI interface available on the SPEAR-MX8 SOM.

By default, DSI option is assembled on the SOM, but on some special assembly SOMs the DSI interface is replaced by second channel of LVDS1 interface.

2.3.9.1 DSI Display Connector Pin-out (J15)

Table 2-22: DSI Display Connector Pin-out (J15)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	VCC_DISP_3V3	P	Display power 3.3V
2	VCC_DISP_3V3	P	Base board power 1.8V
3	GND	P	Digital Ground
4	GND	P	Digital Ground
5	MIPI_DSI0_DATA0_N	DSO	DSI Data0 Diff. Negative
6	MIPI_DSI0_DATA0_P	DSO	DSI Data0 Diff. Positive
7	GND	P	Digital Ground
8	MIPI_DSI0_DATA1_N	DSO	DSI Data1 Diff. Negative
9	MIPI_DSI0_DATA1_P	DSO	DSI Data1 Diff. Positive
10	GND	P	Digital Ground
11	MIPI_DSI0_DATA2_N	DSO	DSI Data2 Diff. Negative
12	MIPI_DSI0_DATA2_P	DSO	DSI Data2 Diff. Positive
13	GND	P	Digital Ground
14	MIPI_DSI0_CLK_N	DSO	DSI Clock Diff. Negative
15	MIPI_DSI0_CLK_P	DSO	DSI Clock Diff. Positive
16	GND	P	Digital Ground
17	VCC_DISP_5V	P	Display Backlight LED 5V power
18	VCC_DISP_5V	P	Display Backlight LED 5V power
19	LVDS1_GPIO0_IO00(LVDS1_PWM0_OUT)	IO	Backlight Brightness Control
20	GND	P	Digital Ground

2.3.9.2 DSI Data3 Extension Connector Pin-out (J16)

Table 2-23: DSI Data3 Connector Pin-out (J16)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	MIPI_DSI0_DATA3_P	DSO	DSI Data2 Diff. Positive
2	MIPI_DSI0_DATA3_N	DSO	DSI Data2 Diff. Negative

2.3.9.3 DSI I2C Control Extension Connector Pin-out (J14)

Table 2-24: DSI I2C Control Connector Pin-out (J14)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	USB_SS3_TC3(I2C1_SDA)	DIO	DSI I2C Control Data
2	USB_SS3_TC1(I2C1_SCL)	DO	DSI I2C Control Clock

2.3.10 HDMI, DP

The VAR-SP8CustomBoard exposes HDMI interface of SPEAR-MX8 SOM. HDMI pads are shared between HDMI and DP interfaces on the iMX8QM SoC. The selection between HDMI and DP routing on the board controlled by Pin J4.11 of the SOM.

2.3.10.1 HDMI Connector Pin-out (J19)

Table 2-25: HDMI Connector Pin-out (J19)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	HDMI_D2_P	DSO	HDMI TMDS Diff. Data 2; Positive
2	GND	P	Digital Ground
3	HDMI_D2_N	DSO	HDMI TMDS Diff. Data 2; Negative
4	HDMI_D1_P	DSO	HDMI TMDS Diff. Data 1; Positive
5	GND	P	Digital Ground
6	HDMI_D1_N	DSO	HDMI TMDS Diff. Data 1; Negative
7	HDMI_D0_P	DSO	HDMI TMDS Diff. Data 0; Positive
8	GND	P	Digital Ground
9	HDMI_D0_N	DSO	HDMI TMDS Diff. Data 0; Negative
10	HDMI_CK_P	DSO	HDMI TMDS Diff. Clock; Positive
11	GND	P	Digital Ground
12	HDMI_CK_N	DSO	HDMI TMDS Diff. Clock; Negative
13	HDMI_CEC_CON	DIO	HDMI Consumer Electronics Control
14	HDMI_UTIL_CON	DIO	HDMI Utility
15	HDMI_SCL_CON	DO	HDMI EDID Clock

Pin #	VAR-SP8CustomBoard Signal	Type	Description
16	HDMI_SDA_CON	DIO	HDMI EDID Data
17	GND	P	Digital Ground
18	HDMI_5V_CON	P	HDMI 5V power supply
19	HDMI_HPD_CON	DI	HDMI Hot Plug Detect
MTG1	GND	P	Digital Ground
MTG2	GND	P	Digital Ground
MTG3	GND	P	Digital Ground
MTG4	GND	P	Digital Ground

2.3.10.2 DP Connector Pin-out (J22)

Table 2-26: DP Connector Pin-out (J22)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	EDP_D0_P	DSO	DP Diff. Data0; Positive
2	GND	P	Digital Ground
3	EDP_D0_N	DSO	DP Diff. Data0; Negative
4	EDP_D1_P	DSO	DP Diff. Data1; Positive
5	GND	P	Digital Ground
6	EDP_D1_N	DSO	DP Diff. Data1; Negative
7	EDP_D2_P	DSO	DP Diff. Data2; Positive
8	GND	P	Digital Ground
9	EDP_D2_N	DSO	DP Diff. Data2; Negative
10	EDP_D3_P	DSO	DP Diff. Data3; Positive
11	GND	P	Digital Ground
12	EDP_D3_N	DSO	DP Diff. Data3; Negative
13	CONFIG1	DI	Configuration 1
14	CONFIG2	DI	Configuration 2
15	EDP_AUX_P	DSO	DP Diff. AUX; Positive
16	GND	P	Digital Ground
17	EDP_AUX_N	DSO	DP Diff. AUX; Negative
18	EDP_HPD	DI	DP Hot Plug Detect
19	GND	P	Digital Ground
20	BASE_PER_3V3	P	DP 3.3V power supply
MECH1	GND	P	Digital Ground
MECH2	GND	P	Digital Ground
MECH3	GND	P	Digital Ground

Pin #	VAR-SP8CustomBoard Signal	Type	Description
MECH4	GND	P	Digital Ground

2.3.11 Capacitive Touch

The VAR-SP8CustomBoard provides a capacitive Touch interface exposed to FFC/FPC connector for connecting to Variscite's standard 7" Capacitive touch LCD screen.

2.3.11.1 Capacitive Touch Panel Connector Pin-out (J8)

Table 2-27: Capacitive Touch Panel Connector Pin-out (J8)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	LVDS1_GPIO01(GPIO1_IO11)	IO	Capacitive Touch Reset; Active Low;
2	HDMI_TX0_TS_SDA(I2C0_SDA)	IO	I2C0 Clock
3	HDMI_TX0_TS_SCL(I2C0_SCL)	IO	I2C0 Data
4	LVDS0_GPIO01(GPIO1_IO05)	IO	Capacitive Touch Interrupt; Active low
5	BASE_PER_3V3	P	Base board 3.3V
6	GND	P	Digital Ground
7	GND	P	Digital Ground
8	GND	P	Digital Ground

2.3.12 Resistive Touch

The VAR-SP8CustomBoard provides a resistive interface exposed to an FFC/FPC connector for connecting to resistive touch LCD screen.

2.3.12.1 Resistive Touch Connector Pin-out (J7)

Table 2-28: Resistive Touch Connector Pin-out (J7)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	TS_X-	AI	X negative side plate connection
2	TS_Y+	AI	Y positive side plate connection
3	TS_X+	AI	X positive side plate connection
4	TS_Y-	AI	Y negative side plate connection
5	GND	P	Digital Ground
6	GND	P	Digital Ground

2.3.13 USB - Debug

The VAR-SP8CustomBoard exposes the SOM debug UART through an on-board UART-to-USB Bridge exposed to a Micro USB connector. The Bridge can be connected to one of the below interfaces of the SOM. The selection via SW8 and S9 dip switches.

Table 2-29: UART to USB bridge options

Option #	Selected UART	SW9	SW8
1	SKU Console UART	Off	Off
2	A53/A7 Console UART	Off	On
3	M1 - 1 UART	On	Off
4	M4 -2 UART	On	On

2.3.13.1 USB Debug Connector Pin-out (J40)

Table 2-30: USB Debug Connector Pin-out (J40)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	DEBUG_VBUS_C	P	5V power input
2	USB_DEBUG_DM_C	DSIO	USB Data Negative
3	USB_DEBUG_DP_C	DSIO	USB Data Positive
4	GND	I	USB Micro ID signal (Slave function)
5	GND	P	Digital Ground
6	GND	P	SHIELD pin reference
7	GND	P	SHIELD pin reference
10	GND	P	SHIELD pin reference
11	GND	P	SHIELD pin reference

2.3.14 Extension Headers

The VAR-SP8CustomBoard exports all unused interfaces through 5 20-Pin Headers.
The following Interfaces are exported.

2.3.14.1 SPI, M4 IO Connector Pin-out (J20)

Table 2-31: SPI, M4 IO Connector Pin-out (J20)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	SPI0_SCK	DIO	SPI0 Serial Clock
2	M40_GPIO0_00	DIO	M40 GPIO0 IO00
3	SPI0_SDO	DIO	SPIO0 Serial Data Output
4	M40_GPIO0_01	DIO	M40 GPIO0 IO01
5	SPI0_SDI	DIO	SPI0 Serial Data Input
6			
7	SPI0_CS0	DIO	SPI0 Chip Select 0
8			
9	SPI0_CS1	DIO	SPI0 Chip Select 1
10	SW_3P3	P	3.3V power supply
11	GND	P	Digital Ground
12	GND	P	Digital Ground
13	SPI2_SCK	DIO	SPI2 Serial Clock
14	M41_GPIO0_01	DIO	M41 GPIO0 IO01
15	SPI2_SDO	DIO	SPI2 Serial Data Output
16	M41_GPIO0_00	DIO	M41 GPIO0 IO00
17	SPI2_SDI	DIO	SPI2 Serial Data Input
18	M41_I2C0_SCL	DIO	M41 I2C0 Serial Clock
19	SPI2_CS0	DIO	SPI2 Chip Select 0
20	M41_I2C0_SDA	DIO	M41 I2C0 Serial Data

2.3.14.2 CAN, SPDIF, RS485, USDHC1 Connector Pin-out (J23)

Table 2-32: CAN, SPDIF, RS485, USDHC1 Connector Pin-out (J23)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	VCC_5V	P	5V power supply
2	RS485_Y	DSO	RS422 Output Y side
3	GND	P	Digital Ground

Pin #	VAR-SP8CustomBoard Signal	Type	Description
4	RS485_Z	DSO	RS422 Output Z side
5	FLEXCAN2_RX(GPIO4_IO01)	DIO	CAN2 Receive
6	RS485_B	DSI	RS422 Input B side
7	FLEXCAN2_TX(GPIO4_IO02)	DIO	CAN2 Transmit
8	RS485_A	DSI	RS422 Input A side
9	P2_LDO4	P	PMIC 2 LDO4 output for general purpose
10	ENET1_REFCLK_125M_25M(GPIO4_IO16)	DIO	Ethernet 1 Reference clock
11	SPDIF0_RX	DIO	Sony/Phillips Digital Interface Channel 0 Receive
12	ENET0_MDC	DO	Ethernet Serial Management Interface Clock (Used on SOM)
13	SPDIF0_TX	DIO	Sony/Phillips Digital Interface Channel 0 Transmit
14	ENET0_MDIO	DIO	Ethernet Serial Management Interface Data (Used on SOM)
15	SW_1P8	P	1.8V power supply
16	ENET0_REFCLK_125M_25M(GPIO4_IO15)	DIO	Ethernet 0 Reference clock
17	USDHC1_DATA4(GPIO5_IO19)	DIO	SD Card Interface 1 Data4 (voltage level switches between 3.3V and 1.8V)
18	USDHC1_DATA6(GPIO5_IO21)	DIO	SD Card Interface 1 Data6 (voltage level switches between 3.3V and 1.8V)
19	USDHC1_DATA5(GPIO5_IO20)	DIO	SD Card Interface 1 Data5 (voltage level switches between 3.3V and 1.8V)
20	USDHC1_STROBE(GPIO5_IO23)	DIO	SD Card Interface 1 Strobe (voltage level switches between 3.3V and 1.8V)

2.3.14.3 MLB, SAI Connector Pin-out (J24)

Table 2-33: MLB, SAI Connector Pin-out (J24)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	MLB_SIG(SAI3_RXC)	DIO	Media Local Bus Signal
2	ESAI1_FSR	DIO	Enhanced Serial Audio Interface 1 Receive Frame Clock
3	MLB_CLK(SAI3_RXFS)	DIO	Media Local Bus Clock
4	ESAI1_SCKR	DIO	Enhanced Serial Audio Interface 1 Receive Bit Clock
5	MLB_DATA(SAI3_RXD)	DIO	Media Local Bus Data
6	ESAI1_TX5_RX0	DIO	Enhanced Serial Audio Interface 1 Transmit Data 5 or Receive Data 0
7	SAI1_RXD	DIO	Serial Audio Interface 1 Receive
8	ESAI1_TX4_RX1	DIO	Enhanced Serial Audio Interface 1 Transmit Data 4 or Receive Data 1
9	SAI1_TXD(SAI1_RXC)	DIO	Serial Audio Interface 1 Transmit
10	ESAI1_FST	DIO	Enhanced Serial Audio Interface 1 Transmit Frame Clock
11	SAI1_TXFS(SAI1_RXFS)	DIO	Serial Audio Interface 1 Transmit Frame Clock
12	ESAI1_SCKT	DIO	Enhanced Serial Audio Interface 1 Transmit Bit Clock
13	SPI2_CS1(SAI0_TXFS)	DIO	Serial Audio Interface 0 Transmit Frame Clock
14	ESAI1_TX0	DIO	Enhanced Serial Audio Interface 1 Transmit Data 0
15	SAI1_TXC(SAI0_TXC)	DIO	Serial Audio Interface 0 Transmit Bit Clock
16	ESAI1_TX1	DIO	Enhanced Serial Audio Interface 1 Transmit Data 1
17	SAI1_RXFS(SAI0_RXD)	DIO	Serial Audio Interface 0 Receive Frame Clock
18	ESAI1_TX2_RX3(GPIO2_IO10)	DIO	Enhanced Serial Audio Interface 1 Transmit Data 2 or Receive Data 3
19	SAI1_RXC(SAI0_TXD)	DIO	Serial Audio Interface 0 Receive Bit Clock
20	ESAI1_TX3_RX2(GPIO2_IO11)	DIO	Enhanced Serial Audio Interface 1 Transmit Data 3 or Receive Data 2

2.3.14.4 I2C, GPT, CAN, UART Connector Pin-out (J26)

Table 2-34: I2C, GPT, CAN, UART Connector Pin-out (J26)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	CANL0	DIO	Controller Area Network Bus 0 Low
2	HDMI_TX0_TS_SCL(I2C0_SCL)	DIO	HDMI Touch Screen I2C Clock
3	CANH0	DIO	Controller Area Network Bus 0 High
4	HDMI_TX0_TS_SDA(I2C0_SDA)	DIO	HDMI Touch Screen I2C Data
5	FLEXCAN1_RX	DIO	Controller Area Network Bus 1 Receive
6	GPT0_CLK	DIO	General Purpose Timer 0 Clock
7	FLEXCAN1_TX	DIO	Controller Area Network Bus 1 Transmit
8	GPT0_CAPTURE	DIO	General Purpose Timer 0 Capture
9	UART0_TX	DIO	UART 0 Transmit
10	GPT0_COMPARE	DIO	General Purpose Timer 0 Compare
11	UART0_RX	DIO	UART0 Receive
12	GPT1_CLK(I2C2_SCL)	DIO	General Purpose Timer 1 Clock
13	UART0_RTS_B	DIO	UART0 RTS
14	GPT1_CAPTURE(I2C2_SDA)	DIO	General Purpose Timer 1 Capture
15	UART0_CTS_B	DIO	UART 0 CTS
16	ENET1_MDC(I2C4_SCL)	DIO	I2C4 Clock
17	LVDS0_I2C1_SCL(UART2_TX)	DIO	LVDS I2C1 Clock
18	ENET1_MDIO(I2C4_SDA)	DIO	I2C4 Data
19	LVDS0_I2C1_SDA(UART2_RX)	DIO	LVDS I2C1 Data
20	GND	P	Digital Ground

2.3.14.5 Tamper, HDMI, ADC Connector Pin-out (J29)

Table 2-35: Tamper, HDMI, ADC Connector Pin-out (J29)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	SW_1P8	P	1.8V power supply
2	AGND	P	Analog Ground (Audio Ground)
3	SNVS_TAMPER_IN0	DI	Tamper In 0
4	ADC_IN0	DIO	Analog to Digital Converter Input 0
5	SNVS_TAMPER_IN1	DI	Tamper In 1
6	ADC_IN1	DIO	Analog to Digital Converter Input 1
7	SNVS_TAMPER_OUT0	DO	Tamper Out 0
8	ADC_IN2	DIO	Analog to Digital Converter Input 2
9	SNVS_TAMPER_OUT1	DO	Tamper Out 1
10	ADC_IN3	DIO	Analog to Digital Converter Input 3
11	HDMI_RX0_ARC_P	DSI	HDMI In Audio Return Channel Positive
12	ADC_IN4	DIO	Analog to Digital Converter Input 4
13	HDMI_RX0_ARC_N	DSI	HDMI In Audio Return Channel Negative
14	ADC_IN5	DIO	Analog to Digital Converter Input 5
15	HDMI_AUX_P	DSO	Display Port Out Auxiliary Channel Positive
16	ADC_IN6	DIO	Analog to Digital Converter Input 6
17	HDMI_AUX_N	DSO	Display Port Out Auxiliary Channel Negative
18	ADC_IN7	DIO	Analog to Digital Converter Input 7
19	SW_1P8	P	1.8V power supply
20	AGND	P	Analog Ground (Audio Ground)

2.4 User Interfaces

2.4.1 Control Buttons

2.4.1.1 Power Switch (SW10)

The Power Switch SW10 Connect/Isolate the DC Power input to the VAR-SP8CustomBoard.

2.4.1.2 Boot Select (SW6)

The Boot select switch SW6 sets the SOM boot source & sequence. Refer to the SOM data sheet for detailed Boot description.

Table 2-36: Boot Select modes (SW3)

Position	Boot Mode Pin Logic Level	Boot Source
ON	Low	Internal (eMMC)
OFF	High	External (SD card)

Note:

Note: Resistor options exist to support other boot sources for SPEAR-MX8. Please refer to SOM datasheet and VAR-SP8CustomBoard schematics.

2.4.1.3 Reset Button (SW7)

A press on SW7 will perform a system reset of the SOM.

2.4.1.4 User Buttons (SW1, SW2, SW3, SW4)

SW1, SW2, SW3, and SW4 are User Buttons for general use. The buttons are connected to unused pins of the SD Card interface. The voltage levels of these lines depend on the type of the SD Card attached to the system. In Linux release they can be configured in the device tree file as e.g. Back, Home, Volume Up, and Volume Down.

2.4.2 LED Indications

2.4.2.1 Power-On LEDs (D26, D28, D29, D30)

Three LED indicators used:

- **D26** indicates that the VAR-SP8CustomBoard Carrier VCC_5V power is ON
- **D28** indicates that the VAR-SP8CustomBoard VCC_12V DC IN is ON.
- **D29** indicates that the SPEAR-MX8 SOM VCC_3V7 power is ON
- **D30** indicates that the VAR-SP8CustomBoard Carrier VCC_3V3 power is ON

2.4.2.2 Over current LEDs (D31, D32)

The VAR-SP8CustomBoard has 2 on board load switches with current limit protection.
The switches are to prevent damage to LCD when LVDS/DSI display cable in connected in wrong orientation.
The LED indicators are connected to the Load switches and indicate fault state.
After lit, VAR-SP8CustomBoard VCC_12V DC IN must be power cycled for load switches to turn on again.

- **D31** indicates over current on VAR-SP8CustomBoard BASE_PER_3V3 rail
- **D32** indicates over current on VAR-SP8CustomBoard VCC_5V rail

2.4.2.3 GP LEDs (D3, D5, D6, D8)

LEDs D3, D5, D6, D8 are a General-Purpose functionality LEDs controlled by GPIO.

2.4.3 Power

The VAR-SP8CustomBoard is powered by a +12V power supply, connected either through a 2.0 mm power plug or alternatively through a 2 pin Terminal block.

A 5V fan power output is available via shrouded 2 pin header.
Mating Housing Molex 22-01-3027; Connector Terminal Female Molex 08-50-0114;

2.4.3.1 DC-in Jack Pin-out (J43)

Table 2-37: DC-in Jack Pin-out (J43)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	GND	P	Digital Ground
2	GND	P	Digital Ground
3	VCC_12V_PJ	P	Power supply 12V
4	VCC_12V_PJ	P	Power supply 12V

2.4.3.2 DC-in Terminal Block Pin-out (J42)

Table 2-38: DC-in 2 pins Terminal Block Pin-out (J42)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	GND	P	Digital Ground
2	VCC_12V_PJ	P	Power supply 12V

2.4.3.3 DC-out FAN 5V Pin-out (J21)

Table 2-39: DC-out 5V FAN Header Pin-out (J21)

Pin #	VAR-SP8CustomBoard Signal	Type	Description
1	FAN_PWR	P	Power supply 5V out
2	GND	P	Ground Return

2.4.3.4 RTC Backup Battery (JBT1)

The VAR-SP8CustomBoard features JBT1, a CR1225 battery holder for powering the On board ISL12057IUZ RTC Module.

3 Electrical Environmental Specifications

3.1 Absolute maximum electrical specifications

Table 3-1: DC Power Input absolute maximum electrical specifications

	Min	Max
Main Power Supply, DC-IN	-0.3V	20V

3.2 Operational electrical specifications

Table 3-2: DC Power Input Operational electrical specifications

	Min	Max
Main Power Supply, DC-IN	8V	18V

4 Environmental specifications

Table 4-1: Environmental specifications

	Min	Max
Commercial operating temperature range	0^0C	+70^0C
MTBF	>10kHRS	
Relative humidity, Operational	10%	90%
Relative humidity, Storage	5%	95%

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6 Contact information

Headquarters

Variscite LTD
4, Hamelacha St.
Lod.
P.O.B 1121
Airport City, 70100
ISRAEL
Phone +972 (9) 9562910 • Fax +972 (9) 9589477

Tel: +972 (9) 9562910
Fax: +972 (9) 9589477

Sales: sales@variscite.com
Technical support: support@variscite.com

Website: www.variscite.com