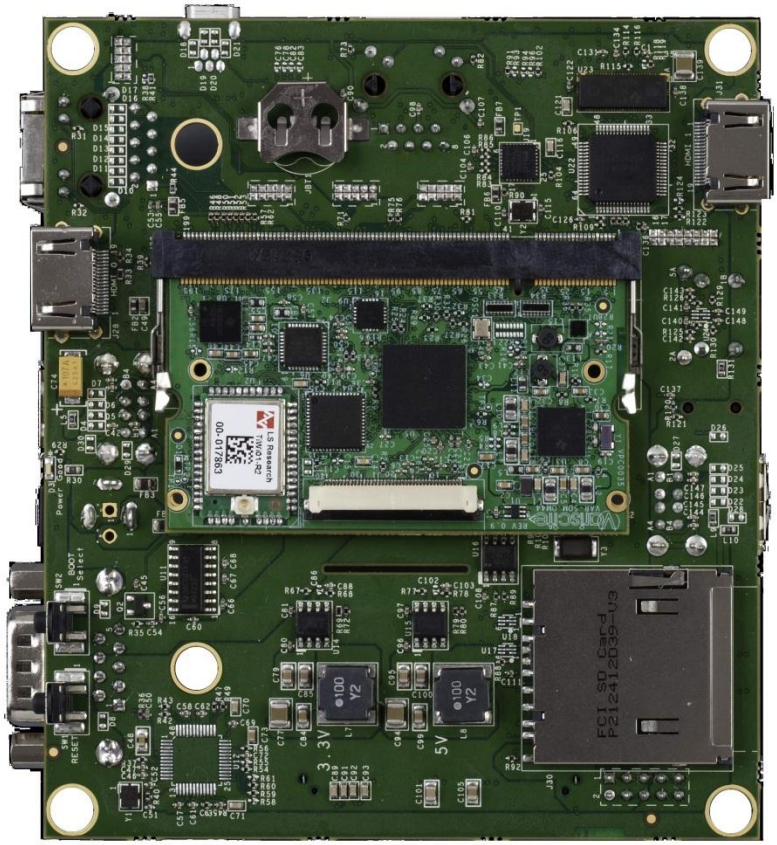
VARISCITE LTD

VAR-OM44CustomBoard Rev. 0.9.1 Datasheet

Carrier board for VAR-SOM-OM44
V1.0



Variscite Ltd.
60 Medinat Hayudimst Street
Hertzelia-Pituach
POB 12598
46722, Israel
Phone +972 (9) 9562910 • Fax +972 (9) 9589477

Revision History

Revision	Date	Notes
1.0	22/09/2011	Initial

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1 Overview

This chapter gives a general overview of the VAR-OM44CustomBoard.

1.1 General Information

The VAR-OM44CustomBoard is a single board computer, utilizing all the VAR-SOM-OM44 System-on-Module features. For development and production, the VAR-OM44CustomBoard serves both as a complete development kit and as an end-product, assembled according to your specification at the an optimized price-point. The VAR-OM44CustomBoard is available in two main configurations:

- SBC
- DVK

1.1.1 SBC Configuration

The SBC configuration, with an optional on board SATA HDD, forms a powerful, hand-held sized computing system with all standard peripheral interfaces as 4 x USB host ports, HDMI, Gigabit Ethernet, SD card and audio. All connectors are arranged in the VAR-OM44CustomBoard rear/ front panel and easily fit to any required mechanics.

1.1.2 DVK Configuration

The DVK configuration is assembled with a large variety of debug & testing means. OTG interface, 10/100BaseT Ethernet, parallel LCD FFC/FPC connector, JTAG, serial interfaces and GPIO expansion connectors enable full VAR-SOM-OM44 testing, evaluating and interfacing to custom hardware or a third party evaluation kit.

1.1.3 Variscite Products Support

- VAR-SOM-OM44 System-on-Module

1.1.4 O.S. Support

- Linux BSP
- Android

1.1.5 Additional Information

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

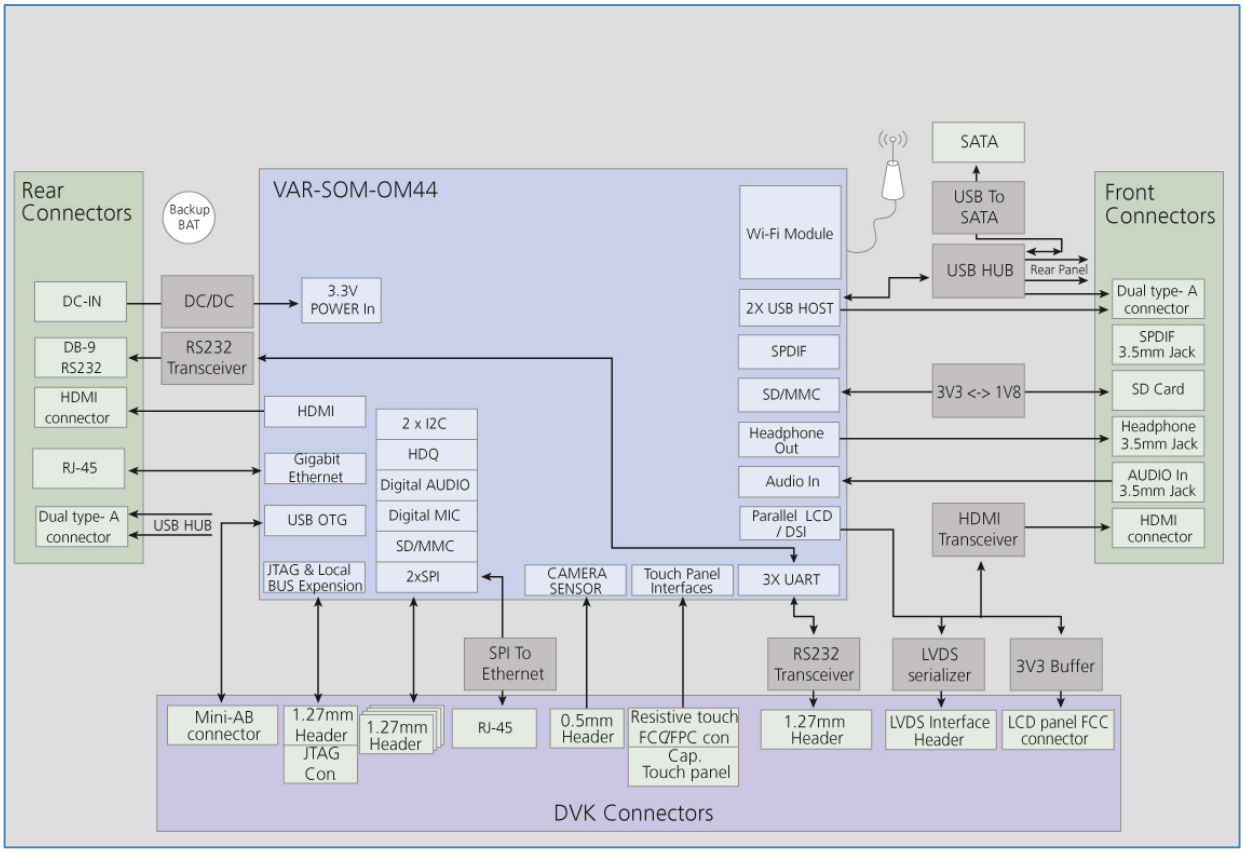
For further information contact Variscite support at: mailto:support@variscite.com.

1.2 VAR-OM44CustomBoard Features Summary:

- SO-DIMM 200 pin socket
  - Compatible with VAR-SOM-OM44
- Dual Display
  - HDMI
  - LCD parallel interface connector compatible with U.R.T, 7", TFT display module
  - 24-bit LVDS transmitter (TI's FlatLink™ compatible)
- Touch Panel Interface
  - Resistive (4-wire) – 4-pin FFC/FPC connector
  - Capacitive (I2C based) – 10-pin 1.27 mm header
- Ethernet
  - 10/100/1000BaseT – RJ45
  - 10/100BaseT – RJ45
- USB
  - USB 2.0 OTG, mini AB type
  - 4 x USB2.0 host Type A
- AUDIO
  - 3.5 mm headphones jack
  - 3.5 mm line in jack
  - S/PDIF out
- SATA
  - Gen1i/Gen1m of serial ATA II electrical specification 2.5 (7 +15, female connector)
- SD-Card slot
- 2 x UART (RS232 levels)
  - DB-9 – Male (DTE)
  - IDC10 header
- JTAG
- Expansion connectors:
  - GPMC - Local Bus interface
  - SD/MMC interface
  - RAW image-sensor module interface
  - SPI
  - I2C
  - MSBSP/I2S
  - UART
  - Digital microphone
  - GPIOs
  - 4-bit, general purpose, bidirectional 1.8V ←→ 3.3V level translation header

- Power
  - Power Terminal/ 2.5 mm DC jack options
  - 7.5 V -14 V DC Input
  - RTC backup coin battery socket

1.3 Block Diagram



1.4 Board Layout

The VAR-OM44CustomBoard's physical dimensions are 120 x 105 mm.

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

Top Side - Detailed View

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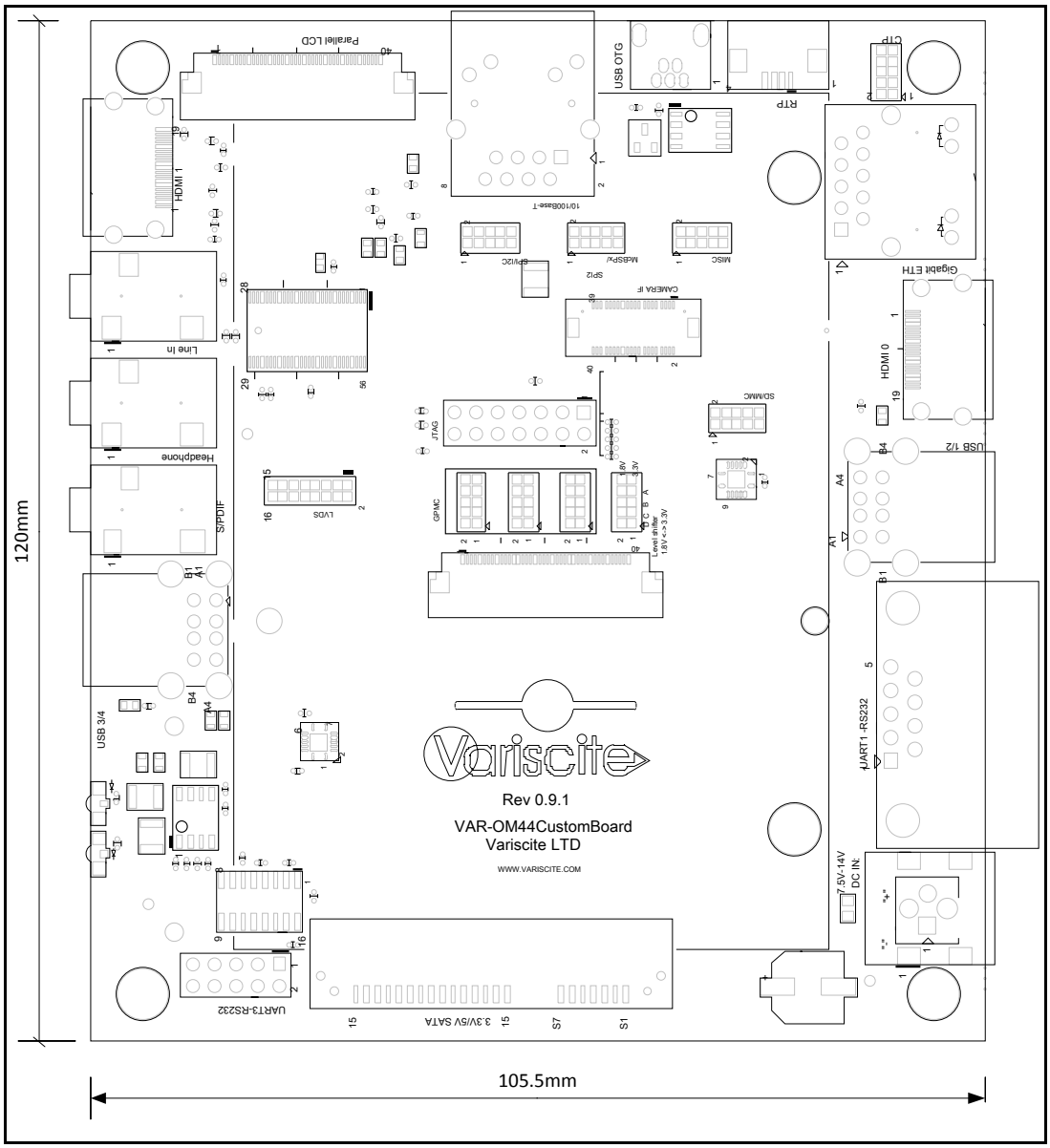

1.5 VAR-OM44CustomBoard Connectors

The table below lists all available connectors on the VAR-OM44CustomBoard - refer to Chapter 2 for a more detailed description and the pin-out of each connector.

Reference	Function	Type
J1	UART1 (RS232)	D-Type – Male
J2	HDMI 0	HDMI
J3	Power In	2.5 MM DC Jack * Assembly option with J4
J4	Power In	Terminal Block * Assembly option with J3
J5	USB Host , Ports 1/2	2 x USB TYPE A
J6	10/100/1000Mbps Port	RJ-45
J7	Capacitive Touch Panel	Header, 2 x 5, 1.27 mm
J8	Resistive Touch Panel	FFC/FPC, 4 wire,1 mm
J9	SD/MMC	Header, 2 x 5, 1.27 mm
J10	MISC	Header, 2 x 5, 1.27 mm
J11	USB OTG	USB Mini AB
J12	Camera Interface	Header, 2 x 20, 0.5 mm
J13	General Purpose, 4 x Bi-directional 1.8V to 3.3V Level Shifter	Header, 2 x 5,1.27 mm
J14	McBSPx/SPI1	Header, 2 x 5, 1.27 mm
J15	GPMC	Header, 2 x 5, 1.27 mm
J16	VAR-SOM-OM44 GPMC & JTAG Connection	FFC/FPC, 40-pin
J17	10/100Mbps T Port	RJ-45
J18	GPMC	Header, 2 x 5, 1.27 mm
J19	JTAG	Header, 2x7, 2.54 mm
J20	SATA Hard Drive	SATA 5 +7 Female
J21	SPI/I2C	Header, 2 x 5, 1.27 mm
J22	GPMC	Header, 2 x 5, 1.27 mm
J23	24-bit LVDS	Header, 2 x 7, 1.27 mm
J24	24-bit, Parallel LCD	FFC/FPC , 40-pin
J25	UART3 (RS232)	Header, 2 x 5, 2.54 mm
J26	USB Host, Ports 3/4	2 x USB TYPE A
J27	S/PDIF Out	Jack 3.5 mm
J28	AUDIO In	Jack 3.5 mm
J29	Headphone Jack	Jack 3.5 mm
J31	VAR-Som-OM44 Socket	SODIMM, 200-pin 1.8V

Reference	Function	Type
J32	SD Slot	SD Card
JBT1	RTC Battery Holder	CR1225

Table 1 - 1 VAR-OM44CustomBoard Connectors

2 Detailed Description

2.1 Overview

This chapter details the VAR-OM44CustomBoard features and external interfaces, most are driven by the VAR-SOM-OM44. Please refer to the VAR-SOM-OM44 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-OM44CustomBoard Signal:
VAR-OM44CustomBoard schematic signal name

Type:
Pin Type & Direction:

- I – In
- O – Out
- DS – Differential Signal
- A – Analog
- P – Power Pin

Description:
Short pin functionality description

2.2 VAR-SOM-OM44 Interfaces

2.2.1 SO-DIMM 200 (J31)

The VAR-OM44CustomBoard features a SO-DIMM200 1.8V standard connector compatible with the VAR-SOM-OM44 System-on-Module devices. Please refer to the VAR-SOM-OM44 module data sheet for a complete signal description.

2.2.2 40-pin SFF/FPC (J16)

The VAR-OM44CustomBoard features a 40-pin SFF/FPC connector in order to support VAR-SOM-OM44 GPMC/JTAG expansion connectivity. Please refer to the VAR-SOM-OM44 module data sheet for a complete signal description.

2.3 Standard External Interfaces

2.3.1 HOST USB (J5, J26)

The VAR-OM44CustomBoard supports four USB 2.0 type A host ports. The dual J5 USB host connector is driven by an on-board USB hub, while the dual J26 USB host connector is driven by both an on-board HUB and the VAR-SOM-OM44 USB Host 2 interface.

2.3.1.1 USB Host 0/1 Connector Pin-out (J5)

Pin #	VAR-OM44CustomBoard Signal	Type	Description
A1	VCC_USB1	O	5V Power Supply. 500 mA Max.
A2	USB_HUB_DN1	IO	USB Data Negative
A3	USB_HUB_DP1	IO	USB Data Positive
A4	GND	P	
B1	VCC_USB2	O	5V Power Supply. 500 mA Max.
B2	USB_HUB_DN2	IO	USB Data Negative
B3	USB_HUB_DP2	IO	USB Data Positive
B4	GND		

Table 2 - 1 USB Host1/2 Connector Connector Pin-out (J5)

2.3.1.2 USB Host 2, 3 Connector Pin-out (J26)

Pin #	VAR-OM44Custom Board Signal	Type	Description
A1	VCC_USB4	O	5V Power Supply. 500 ma Max.
A2	USBH_DN1	IO	USB Data Negative (VAR-SOM-OM44)
A3	USBH_DP1	IO	USB Data Negative (VAR-SOM-OM44)
A4	GND	P	
B1	VCC_USB4	O	5V Power Supply. 500 mA Max.
B2	USB_HUB_DN3	IO	USB Data Negative
B3	USB_HUB_DP3	IO	USB Data Positive
B4	GND		

2

2.3.2 USB OTG Connector Pin-out (J11)

The VAR-OM44CustomBoard OTG, min iAB type connector is driven by the VAR-SOM-OM44 OTG interface.

Pin #	VAR-OM44CustomBoard Signal	Type	Description
1	USB_OTG_VBUS	IO	5V In/Out (Client/Host)
2	USB_OTG_DN	IO	USB Data Negative
3	USB_OTG_DP	IO	USB Data Positive
4	USB_OTG_ID	I	USB OTG ID Signal (‘1’ - Device Mode)
5	GND	P	

Table 2 - 2 USB OTG Connector Pin-out (j11)

2.3.3 SD Card (J32)

The SD card interface is based on the VAR-SOM-OM44 SD/MMC2 interface. In order to support a 3.3V IO interface, a bi-directional buffer is used.

2.3.3.1 SD Card Slot Connector Pin-out (J32)

Pin #	VAR-OM44CustomBoard Signal	Type	Description
1	MMC2_DAT3	IO	MMC Parallel Data 3.3V
2	MMC2_CMD	IO	MMC Command 3.3V
3	GND	P	
4	VCC_SD	P	SD Card VCC 3.3V
5	MMC2_CKO	O	MMC Clock 3.3V
6	GND	P	
7	MMC2_DAT0	IO	MMC Parallel Data 3.3V
8	MMC2_DAT1	IO	MMC Parallel Data 1.8V
9	MMC2_DAT2	IO	MMC Parallel Data 1.8V
10	MMC2_CD	I	MMC Card Detect 1.8V
11	GND	P	
12	SD_WP	I	MMC Write Protected 1.8V

Table 2 - 3 SD Card Slot Connector Pin-out (J32)

2.3.4 Ethernet (J6, J17)

The VAR-OM44CustomBoard features two Ethernet interfaces:

- 10/100/1000BaseT
- 10/100BaseT

Both Ethernet interfaces are exposed by a standard RJ45 Ethernet jack with integrated magnetics. The Giga Ethernet port is directly connected to VAR-SOM-OM44 on-board Gigabit Ethernet PHY, while the fast Ethernet port is driven by on-board SPI to fast Ethernet Bridge IC.

2.3.4.1 10/100/1000BaseT Connector Pin-out (J6)

Pin #	VAR-OM44Custom Board Signal	Type	Description
1	VCC 3V3	P	
2	GETH_TR0P	DIO	Bi-directional Pair Positive
3	GETH_TR0N	DIO	Bi-directional Pair Negative
4	GETH_TR1P	DIO	Bi-directional Pair Positive
5	GETH_TR1N	DIO	Bi-directional Pair Negative
6	GETH_TR2P	DIO	Bi-directional Pair Positive
7	GETH_TR2N	DIO	Bi-directional Pair Negative
8	GETH_TR3P	DIO	Bi-directional Pair Positive
9	GETH_TR3N	DIO	Bi-directional Pair Negative
10	GND	P	
11	SPEED_A	A	LED Anode
12	SPEED_K	A	LED Cathode
13	LINK_A	A	LED Anode
14	LINK_K	A	LED Cathode

Table 2 - 4 10/100/1000Mbps RJ45 Connector Pin-out (J6)

2.3.4.2 10/100BaseT Connector Pin-out (J17)

Pin #	VAR-OM44Custom Board Signal	Type	Description
1	ETH_TXP	DO	Tx Pair Positive
2	ETH_TXN	DO	Tx Pair Negative
3	ETH_RXP	DI	Rx Pair Positive
4	VCCA_3V3	AP	
5	VCCA_3V3	AP	
6	ETH_RXN	DI	Rx Pair Negative
7	NC		
8	DGND	P	

9	SPEED1_A	A	Speed LED Anode
10	SPEED1_K	A	Speed LED Cathode
11	LINK1_K	A	Link LED Anode
12	LINK1_A	A	Link LED Cathode

Table 2 - 5 10/100/10Mbps RJ45 Connector Pin-out (J17)

2.3.5 HDMI 0 (J2)

The VAR-44CustomBoard features a HDMI connector to interface an external monitor. The HDMI connector is driven by native VAR-SOM-OM44 HDMI signals.

2.3.5.1 HDMI Connector Pin-out (J2)

Pin #	VAR-OM44Custom Board Signal	Type	Description
1	DAT2+	DO	HDMI Data 2 Positive
2	DAT2_S	P	GND
3	DAT2-	DO	HDMI Data 2 Negative
4	DAT1+	DO	HDMI Data 1 Positive
5	DAT1_S	P	GND
6	DAT1-	DO	HDMI Data 1 Negative
7	DAT0+	DO	HDMI Data 0 Positive
8	DAT0_S	P	GND
9	DAT0-	DO	HDMI Data 0 Negative
10	CLK+	DO	HDMI Clock Positive
11	CLK _S	P	GND
12	CLK 0-	DO	HDMI Clock Negative
13	CEC	IO	
14	NC	NC	
15	SCL	IO	HDMI I2C Data
16	SDA	IO	HDMI I2C Clock
17	DDC/CEC GND	P	GND
18	+5V	P	5V Output

Table 2 - 6 HDMI Connector Pin-out (J2)

2.3.6 AUDIO

The VAR-OM44CustomBoard feature three 3.5 mm jacks for audio interfaces, all are directly driven by VAR-SOM-OM44.

- Headphone jack
- Line in
- S/PDIF out

2.3.6.1 Headphone Jack Connector Pin-out (J29)

Pin #	VAR-OM44Custom Board Signal	Type	Description
1	GND	AP	
2	AUD_OUT_L	AI	Pre-amped Audio Signal
3	AUD_OUT_R	AI	Pre-amped Audio Signal

Table 2 - 7 Headphone Jack Connector Pin-out (J29)

2.3.6.2 Line In Jack Connector Pin-out (J28)

Pin #	VAR-OM44Custom Board Signal	Type	Description
1	GND	AP	
2	AUD_IN_R	AI	Line In Right Input
3	AUD_IN_L	AI	Line In Left Input

Table 2 - 8 Line In Jack Connector Pin-out (J28)

2.3.6.3 S/PDIF Connector Pin-out (J27)

Pin #	VAR-OM44Custom Board Signal	Type	Description
1	GND	AP	
2	S/PDIF Signal	O	Digital S/PDIF Signal
3	GND	AP	

Table 2 - 9 S/PDIF Jack Connector Pin-out (J27)

2.3.7 RS232 -DTE (J1)

The RS232 DTE interface is driven by the VAR-SOM-OM44 UART1 interface and an RS232 transceiver. Together with an on-board standard, male D-Type9 connector, this serves as a DTE interface for connecting a third party DCE (modem) device.

2.3.7.1 RS232 -DTE Connector Pin-out (J1)

Pin #	VAR-OM44Custom Board Signal	Type	Description
1			
2	UART1_RX_C	I	UART#1 Receive
3	UART1_TX_C	O	UART#1 Transmit
4			
5	DGND	Power	
6			
7	UART1_RTS_C	O	UART#1 RTS
8	UART1_CTS_C	I	UART#1 CTS
9			

Table 2 - 10 RS232 DTE Connector Pin-out (J1)

2.3.7.2 SATA (J20)

The VAR-OM44CustomBoard features a Gen1i/Gen1m of SATA II Electrical Specification 2.5 connector, based on USB 2.0 to SATA Bridge IC. The SATA connector (female 7 + 15-pins) can be connected directly to any third party, off-the-shelf 3.3V/5V 2.5" HDD.

Note: The VAR-OM44CustomBoard features two mechanical holes, compatible with 2.5" HDD mechanics for attaching the HDD to the VAR-OM44CustomBoard PCB. These are available only with SBC configuration.

2.3.7.3 SATA Connector Pin-out (J20) - Optional

Reference	VAR-OM44Custom Board Signal	Type	Description
P1	VCC_3V3	P	
P2	VCC_3V3	P	
P3	VCC_3V3	P	
P4	DGND	P	
P5	DGND	P	
P6	DGND	P	
P7	VCC_5V	P	
P8	VCC_5V	P	
P9	VCC_5V	P	
P10	DGND	P	
P11	DGND	P	

Reference	VAR-OM44Custom Board Signal	Type	Description
P12	DGND	P	
P13	NC		
P14	NC		
P15	NC		
S1	DGND	P	
S2	SATAC_TXP	DO	Differential Tx DATA, Positive
S3	SATAC_TXN	DO	Differential Tx DATA, Negative
S4	DGND	P	
S5	SATAC_RXN	DI	Differential Rx DATA, Negative
S6	SATAC_RXP	DI	Differential Rx DATA, Positive
S7	DDGN	P	

Table 2 - 11 SATA Connector Pin-out (J20)

2.4 DVK External Interfaces

This section describes the additional available features with the VAR-SOM-OM44 DVK configuration.

2.4.1 Parallel LCD (J24)

A 24-bit LCD interface, driven by VAR-SOM-OM44 parallel LCD interface and exposed by a standard 40-pin FFC/FPC, 0.5 mm pitch, connector. The Connector pin-out is compatible with U.R.T, 7”, TFT LCD module (UMSH-8272MD-1T). A 1.8V to 3.3V level translator is used in order to support the LCD module IO level specifications.

2.4.1.1 Parallel LCD Connector Pin-out (JJ24)

Pin #	VAR-OM44Custom Board Signal	Type	Description
1	VCC_5V	P	VLED ,5V
2	VCC_5V	P	VLED ,5V
3	BACKLIGHTEN_3V3	O	Backlight Brightness Control
4	DGND	P	GLED
5	DGND	P	GLED
6	VCC_3V3	P	VCC
7	VCC_3V3	P	VCC
8	MODE	O	MODE
9	DISPC2_DE_B	O	Data Enable
10	DISPC2_VSYNC_B	O	Vertical Sync

Pin #	VAR-OM44Custom Board Signal	Type	Description
11	DISPC2_HSYNC_B	O	Horizontal Sync
12	DGND	P	
13	DISPC2_DATA7_B	O	Blue Bit 5
14	DISPC2_DATA6_B	O	Blue Bit 4
15	DISPC2_DATA5_B	O	Blue Bit 3
16	DGND	P	
17	DISPC2_DATA4_B	O	Blue Bit 2
18	DISPC2_DATA3_B	O	Blue Bit 1
19	DISPC2_DATA2_B	O	Blue Bit 0
20	DGND	P	
21	DISPC2_DATA15_B	O	Green Bit 5
22	DISPC2_DATA14_B	O	Green Bit 4
23	DISPC2_DATA13_B	O	Green Bit 3
24	DGND	P	
25	DISPC2_DATA12_B	O	Green Bit 2
26	DISPC2_DATA11_B	O	Green Bit 1
27	DISPC2_DATA10_B	O	Green Bit 0
28	DGND	P	
29	DISPC2_DATA23_B	O	Red Bit 5
30	DISPC2_DATA22_B	O	Red Bit 4
31	DISPC2_DATA21_B	O	Red Bit 3
32	DGND	P	
33	DISPC2_DATA20_B	O	Red Bit 2
34	DISPC2_DATA19_B	O	Red Bit 1
35	DISPC2_DATA18_B	O	Red Bit 0
36	DGND	P	
37	DISPC2_PCLK_B	O	Clock
38	DGND	P	
39	LR	O	Left /Right Select
40	DGND	O	Up/ Down Select

Table 2 - 12 LCD Connector Connector Pin-out (J24)

2.4.2 LVDS Interface Connector (J23)

The VAR-OM44CustomBoard LVDS interface, compatible with a 24-bit, four lane LVDS interface LCDs, is driven by an on-board TI SN75LVDS83B LVDS transmitter. LVDS data is sourced from the VAR-SOM-OM44 parallel LCD interface.
The LVDS connector is a 1.27 mm pitch 7 x 2 header.

2.4.3 LVDS Signals (J23)

Pin #	Signal	Type	Description
1	RXIN0-	DO	LVDS Lane 0, Negative Signal
2	RXIN2-	DO	LVDS Lane 2, Negative Signal
3	RXIN0+	DO	LVDS Lane 0, Positive Signal
4	RXIN2+	DO	LVDS Lane 2, Positive Signal
5	DGND	P	
6	DGND	P	
7	RXIN1-	DO	LVDS Lane 1, Negative Signal
8	CLKIN+	DO	LVDS Clock 0, Positive Signal
9	RXIN1+	DO	LVDS Lane 1, Positive Signal
10	CLKIN-	DO	LVDS Clock, Negative Signal
11	VCC_5V	POWER	
12	DGND	POWER	
13	VCC_3V3	POWER	
14	RXIN3+	DO	LVDS Lane 3, Positive Signal
15	BACKLIGHTEN_3V3	O	Backlight Brightness Control
16	RXIN3-	DO	LVDS Lane 3, Negative Signal

Table 2 - 13 LVDS Connector Connector Pin-out (J23)

2.4.4 Touch Panel Connectors (J7/J8)

The VAR-OM44CustomBoard supports two touch panel interfaces:

- Resistive touch panels
- Capacitive touch panels

The resistive touch panel connector, exposed by the 4-wire FCC/FPC connector (Molex, 52207-0485), is driven by VAR-SOM-OM44 touch panel interface, capacitive touch panels and usually requires an I2C interface, supported by a 5 x 2 1.27 mm header, exposing VAR-SOM-OM44 I2C3 signals.

2.4.4.1 Resistive Touch Panel Connector Pin-out (J8)

Pin #	VAR-OM44Custom Board Signal	Type	Description
1	TS_X-	AI	Touch Screen X Minus
2	TS_Y+	AI	Touch Screen Y Plus
3	TS_X+	AI	Touch Screen X Plus
4	TS_Y-	AI	Touch Screen Y Minus

Table 2 - 14 Resistive Touch Panel Connector Pin-out (J8)

2.4.4.2 Capacitive Touch Panel Connector Pin-out (J7)

Pin #	VAR-OM44Custom Board Signal	Type	Description
1	VCC_3V3	P	
2	VCC_5V	P	
3	VIO	P	
4	CPT_INT	I	Capacitive Touch Panel Interrupt
5	I2C3_SDA	IO	3.3V version of VAR-SOM-OM44 I2C3 Interface
6	NC		
7	I2C3_SCL	O	3.3V version of VAR-SOM-OM44 I2C3 Interface
8	NC		
9	DGND	P	
10	VCC_3V3	P	

Table 2 - 15 Capacitive Touch Panel Connector Pin-out (J7)

2.4.5 RS232 - Debug (J25)

The RS232 debug port is driven by the VAR-SOM-OM44 UART3 interface and a RS232 transceiver. Exposed by a 10-pin IDC header, this port can be connected to a DTE device (i.e. PC) using a standard cable. Note that this port is usually serves as low level software debug port.

2.4.5.1 RS232 -Debug Connector Pin-out (J25)

Pin #	VAR-OM44Custom Board Signal	Type	Description
1	NC		
2	UART3_RX_C	I	UART#3 Receive
3	UART3_TX_C	O	UART#3 Transmit
4	NC		
5	GND	Power	
6	NC		
7	UART3_RTS_C	O	UART#3 RTS
8	UART3_CTS_C	I	UART#3 CTS
9	NC		
10	NC		

Table 2 - 16 RS232 – Debug Connector Pin-out (J25)

2.4.6 Camera (J12)

The VAR-OM44CustomBoard supports two CSI (Camera Serial Interface channels) and one 8-bit CPI (Camera Parallel Interface). Both are directly driven by the VAR-SOM-OM44. The camera expansion connectors are a Hirose Electric 0.5 mm Header, DF17(3.0)-040DS-0.5V(57), recommended mating connectors - Hirose Electric and DF17(2.0)-040DP-0.5V(57).

2.4.6.1 Camera Connector Pin-out (J12)

Pin #	VAR-OM44Custom Board Signal	Parallel Camera Signal	VAR-SOM-OM44 PIN
1	VIO		
2	VCC_3V3		
3	CSI22_DX0	CAM2 _D3	141
4	CSI21_DX0		50
5	CSI22_DY0	CAM2 _D2	143
6	CSI21_DY0		52
7	CSI22_DX1	CAM2 _D1	135
8	CSI21_DX1		130
9	CSI22_DY1		137
10	CSI21_DY1		132
11	DGND		
12	DGND		
13	CSI22_DY2	CAM2 _WEN	136
14	CSI21_DX2		56
15	CSI22_DX2	CAM2 _FLD	138

Pin #	VAR-OM44Custom Board Signal	Parallel Camera Signal	VAR-SOM-OM44 PIN
16	CSI21_DY2		54
17	CSI21_DX3		53
18	CSI21_DX4	CAM2 _D5	129
19	CSI21_DY3	CAM2 _D6	55
20	CSI21_DY4		131
21	DGND		
22	DGND		
23	CAM_SHUTTER	CAM2 _HS	72
24	BACKLIGHTEN	CAM2 _D9	76
25	CAM_GLB_RESET	CAM2 _PCLK	59
26	HUB_REST	CAM2 _D7	78
27	KPD_ROW3_CAM4_D2 _GPIO_175	CAM2 _D4	85
28	CAM_STROBE	CAM2 _VS	80
29	KPD_ROW2_CAM2_D1 1_GPIO_3		87
30	VCC_5V		

Table 2 - 17 Camera Interface Connector Pin-out (J12)

2.4.7 SD/MMC4 (J9)

SD/MMC4 expansion connector pins are directly connected to the VAR-SOM-OM44 pins. Note that the signals are shared with an on-board Wi-Fi module and can't be used if the Wi-Fi module is enabled.

2.4.7.1 SD/MMC4 Connector Pin-out (J9)

Pin #	VAR-OM44Custom Board Signal	VAR-SOM-OM44 PIN
1	SDMMC4_CLK	164
2	VCC_3V3	
3	SDMMC4_CMD	166
4	VIO	
5	SDMMC4_DAT0	168
6	SDMMC4_DAT1	170
7	SDMMC4_DAT3	174
8	MMC4_GPIO	194
9	SDMMC4_DAT2	172
10	DGND	164

Table 2 - 18 SD/MMC4 Connector Pin-out (J9)

2.4.8 MISC (J10)

The **miscellaneous** expansion connector exposes a number of VAR-SOM-OM44 interfaces:

- HDQ (one-wire)
- Digital microphone
- UART2
- PWM (backlight enable)

All interfaces are directly connected to VAR-SOM-OM44 pins – for more details refer to the VAR-SOM-OM44 data sheet.

2.4.8.1 MISC Connector Pin-out (J10)

Pin #	VAR-OM44Custom Board Signal	VAR-SOM-OM44 PIN
1	BACKLIGHTEN	158
2	HDQ_GPIO127	82
3	FREF_CLK1_OUT	49
4	DMIC_CLK	186
5	DMIC_DAT	188
6	UART2_TX	69
7	UART2_CTS	65
8	UART2_RTS	67
9	UART2_RX	71
10	DGND	1

Table 2 - 19 MISC Connector Pin-out (J10)

2.4.9 McBSPx/SPI1 (J14)

McBSPx/SPI1 expansion connector pins are directly connected to the VAR-SOM-OM44 pins – for more details refer to the VAR-SOM-OM44 data sheet.

2.4.9.1 McBSPx/SPI1 Connector Pin-out (J14)

Pin #	VAR-OM44Custom Board Signal	VAR-SOM-OM44 PIN
1	VCC_3V3	
2	MCBSP1_CLKX	27
3	MCBSP2_CLK	98
4	MCBSP1_DR	176
5	MCBSP2_DR	102
6	MCBSP1_DX	95
7	MCBSP2_DX	104
8	MCBSP1_FSX	93
9	MCBSP2_FSX	106
10	DGND	1

Table 2 - 20 McBSP/SPI Connector Pin-out (J14)

2.4.10 SPI1/I2Cx (J21)

SPI1/I2Cx expansion connector pins are directly connected to the VAR-SOM-OM44 pins – for more details refer to the VAR-SOM-OM44 data sheet.

2.4.10.1 SPI1/I2Cx Connector Pin-out (J21)

Pin #	VAR-OM44Custom Board Signal	VAR-SOM-OM44 PIN
1	VIO	117
2	MCSPI1_SCLK	37
3	MCSPI1_CS0	34
4	MCSPI1_SIMO	39
5	I2C3_SCL	63
6	MCSPI1_SOMI	41
7	I2C4_SDA	99
8	I2C3_SDA	61
9	I2C4_SCL	101
10	DGND	1

Table 2 - 21 SPI1/I2Cx Connector Pin-out (J21)

2.4.11 GPMC

GPMC expansion connector pins are directly connected to the VAR-SOM-OM44 pins - for more details refer to VAR-SOM-OM44 data sheet. In order to apply this expansion, a 40-pin flat cable should be used to connect between the VAR-SOM-OM44 expansion connector and J16 on VAR-OM44CustomBoard.

2.4.11.1 GPMC 1 Connector Pin-out (J15)

Pin #	VAR-OM44Custom Board Signal	VAR-SOM-OM44 Expansion Connector PIN
1	VIO	117
2	VCC_3V3	
3	GPMC_NADV_ALE	37
4	GPMC_NCS1	35
5	GPMC_NOE_SDMMC2_CLK	38
6	GPMC_NCS0	34
7	GPMC_NWESDMMC2_CMD	39
8	GPMC_A22	33
9	GPMC_NBE0_CLE	40
10	GPMC_A21	32

Table 2 - 22 GPMC 1 Connector Pin-out (J15)

2.4.11.2 GPMC 2 pin-out (J18)

Pin #	VAR-OM44Custom Board Signal	VAR-SOM-OM44 Expansion Connector PIN
1	DGND	1
2	GPMC_CLK	25
3	GPMC_AD13	27
4	GPMC_AD11	23
5	GPMC_AD14	28
6	GPMC_AD10	22
7	GPMC_AD15	29
8	GPMC_AD9	21
9	GPMC_A20	31
10	GPMC_AD8	20

Table 2 - 23 GPMC 2 Connector Pin-out (J18)

2.4.11.3 GPMC 3 Connector Pin-out (J22)

Pin #	VAR-OM44Custom Board Signal	VAR-SOM-OM44 Expansion Connector PIN
1	DGND	1
2	GPMC_AD12	26
3	GPMC_AD4	15
4	GPMC_AD3	14
5	GPMC_AD5	16
6	GPMC_AD0	11
7	GPMC_AD6	18
8	GPMC_AD1	12
9	GPMC_AD7	19
10	GPMC_AD2	13

Table 2 - 24 GPMC 3 Connector Pin-out (J22)

2.4.12 JTAG (J19)

JTAG expansion connector pins are directly connected to the VAR-SOM-OM44 pins. The connector is compatible with standard 2 x 7, 2.54 mm JTAG cables. In order to apply this expansion a 40-pin flat cable should be used to connect between the VAR-SOM-OM44 expansion connector and J16 on VAR-OM44CustomBoard.

2.4.13 JTAG Connector Pin-out (J19)

Pin #	VAR-OM44Custom Board Signal	VAR-SOM-OM44 Expansion Connector PIN
1	JTAG_TMS	2
2	JTAG_NTRST	3
3	JTAG_TDI	1
4	DGND	9
5	VIO	10
6	NC	
7	JTAG_TDO	4
8	DGND	9
9	JTAG_RTCK	5
10	DGND	9
11	JTAG_TCK	8
12	DGND	9
13	JTAG_EMU0	6
14	JTAG_EMU1	7

15	JTAG_TMS	2
16	JTAG_NTRST	3
17	JTAG_TDI	1
18	DGND	9

Table 2 - 25 JTAG Connector Pin-out (J19)

2.4.14 Level Translator (J13)

The level translation expansion connector is a standalone utility. Featuring TI's TXB0104, it enables 1.8V level IOs (used by the VAR-SOM-OM44 IO) shifting to a 3.3V levels IO commonly used. The device is a 60 Mbps bi-directional level shifter - for more information refer to the TXB0104 data sheet.

2.4.15 Level Translator Connector Pin-out (J13)

Pin #	VAR-OM44Custom Board Signal	Description
1	VCC_3V3	Power
2	DGND	Power
3	GP4_3V3	3V3 Level In/Out #4
4	GP4_1V8	1V8 Level In/Out #4
5	GP3_3V3	3V3 Level In/Out #3
6	GP3_1V8	1V8 Level In/Out #3
7	GP2_3V3	3V3 Level In/Out #2
8	GP2_1V8	1V8 Level In/Out #2
9	GP1_3V3	3V3 Level In/Out #1
10	GP1_1V8	1V8 Level In/Out #1

Table 2 - 26 Level Translator Connector Pin-out (J13)

2.5 User Interfaces

2.5.1 LED Indications

2.5.1.1 Power On LED (D5)

D5 indicates that the 5 V power rail of the VAR-SOM-OM44 is on.

2.5.1.2 GP LED (D3, D4)

The General Purpose functionality LED is controlled by VAR-SOM-OM44 pins using a 1.8 V to 3.3V level shifter. The VAR-OM44CustomBoard OTG connector is driven by the VAR-SOM-OM44 OTG interface.

LED Reference	VAR-OM44CustomBoard Signal	VAR-SOM-OM44 PIN
3	LED_0_3V3	180
4	LED_1_3V3	182

Table 2 - 27 GP LED

2.5.2 Control Buttons

2.5.2.1 Reset Button (SW1)

System Hardware-reset

2.5.2.2 Boot Select (SW2)

The boot select switch sets the VAR-SOM-OM44 boot source and sequence. If the VAR-SOM-OM44 external boot is required, it should be pressed during this time.

Position	Logic Level	Boot Source	Boot Device Order
Released	'0'	Internal	MMC1 (micro SD Card), UART
Pressed	'1'	External	MMC2,UART

Table 2 – 29 Boot Select Switch Modes

2.5.3 Power Input (J2/J5)

The VAR-OM44CustomBoard is powered by a 7 to 14 V DC power supply, using one of the connectors below (Assembly option).

2.5.3.1 DC-IN Jack (J3)

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

Jack Part number: KOBI CON, 163-0180-EX

2.5.3.2 Terminal Block (J4)

Pin #	Signal
1	GND
2	VCC IN

Table 2 - 28 Terminal Block Connector Pin-out (J4)

2.5.3.3 RTC Backup Battery (JB1)

The VAR-OM44 features a CR1225 battery holder powering the VAR-SOM-OM44 RTC backup supply rail.

3 Electrical Environmental Specifications

3.1 Absolute Maximum Electrical Specifications

	Min	Max
Main Power Supply DC-IN	-0.3 V	23 V
External Interfaces	Unless otherwise specified, refer to the VAR-SOMOM44 data sheet	

Table 3 - 1 Absolute Maximum Electrical Specifications

3.2 Operational Electrical Specifications

	Min	Max
Main Power supply, DC-IN	7V	14V
External Interfaces	Unless otherwise specified refer to VAR-SOMOM44 data sheet	

Table 3 - 2 Operational Electrical Specifications

4 Environmental Specifications

	Min	Max
Commercial Operating Temperature Range	0 ^{0}C	+70 ^{0}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 4 - 1 Environmental Specifications

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7 Contact Information

Headquarters:

Variscite Ltd.
60, Medinat Hayehudimst Street
P.O.B 12598
46722, Israel

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

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

Corporate Website: www.variscite.com