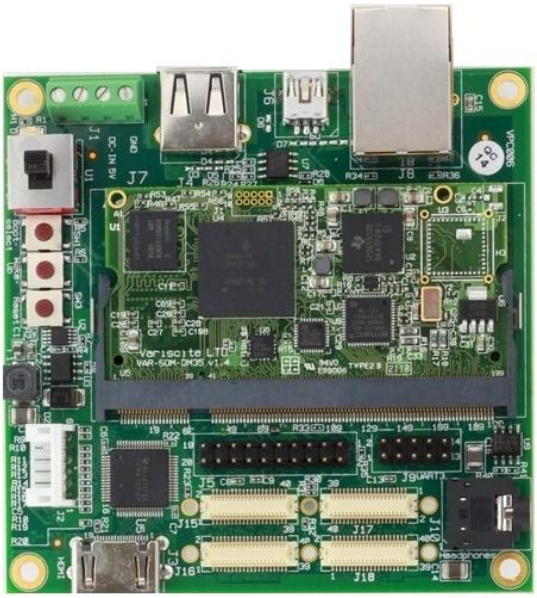
VARISCITE LTD

VAR-3xCustomBoard Datasheet

Carrier-board for VAR-SOM-OM3x / VAR-SOM-AM35 System-on- Modules

Ver 2.1



Variscite Ltd.
60 Mediant Ha'Yehudim.
Hertzelia Pituach
P.O.B 12598
46722, Israel
Phone +972 (9) 9562910 • Fax +972 (9) 9589477

Revision History

Revision	Date	Notes
1.0	17/11/2010	Initial

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1 Overview

This chapter gives a short overview of the VAR-3xCustomBoard.

1.1 General Information

The VAR-3xCustomBoard is a single board computer, compatible with VAR-SOM-OM3X and VAR-SOM-AM3X System-on-Modules.
For development and production, the VAR-3xCustomBoard serves both as a complete development kit and as an en- product, assembled according to your specification for the most optimized price.

Supporting products:

- VAR-SOM-OM3x System-On-Module
- VAR-SOM-AM3x System-On-Module
- VAR- EXT-CB103 Extension board
- VAR- EXT-CB105 Extension board

Supporting O.S:

- Windows CE 6.0 BSP
- Linux 2.6.32 BSP

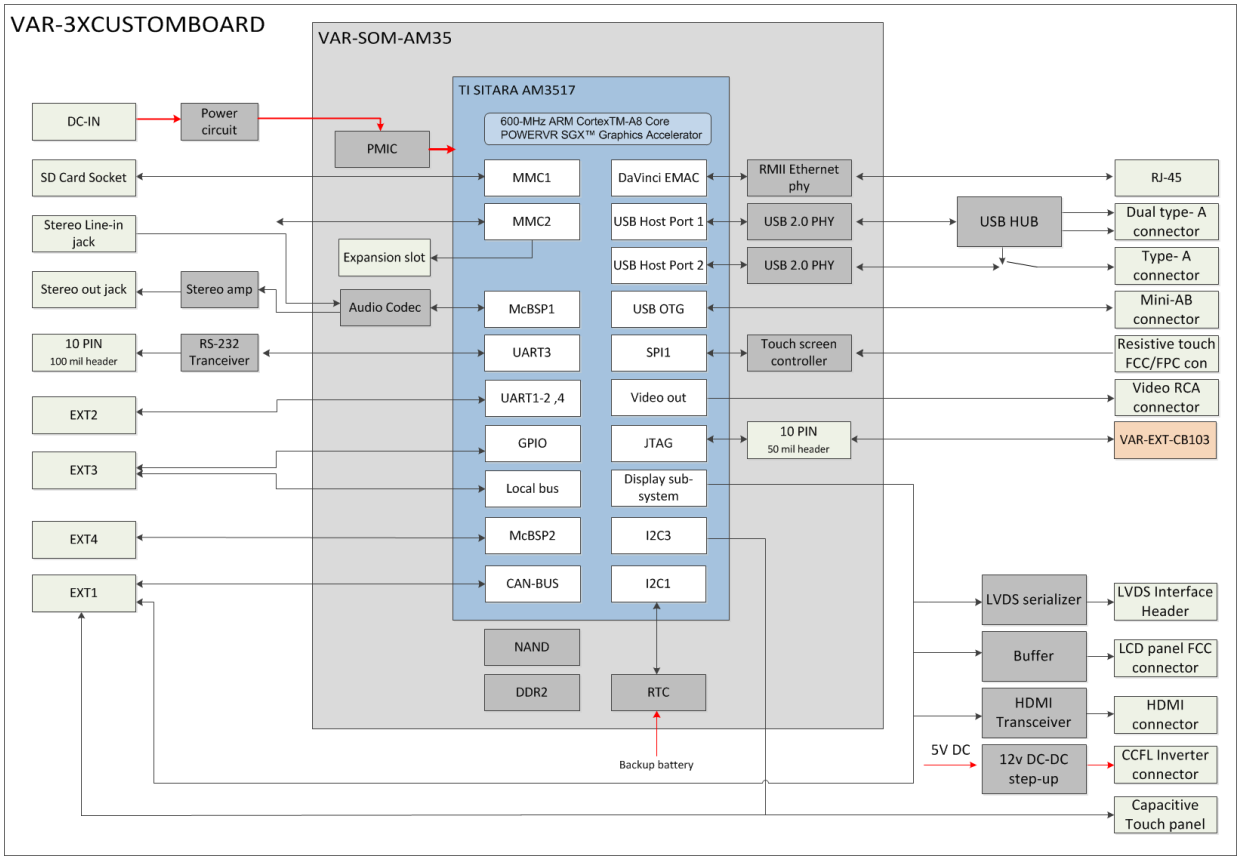
Contact support for further information: mailto:support@variscite.com.

1.2 VAR-3xCustomBoard features summary:

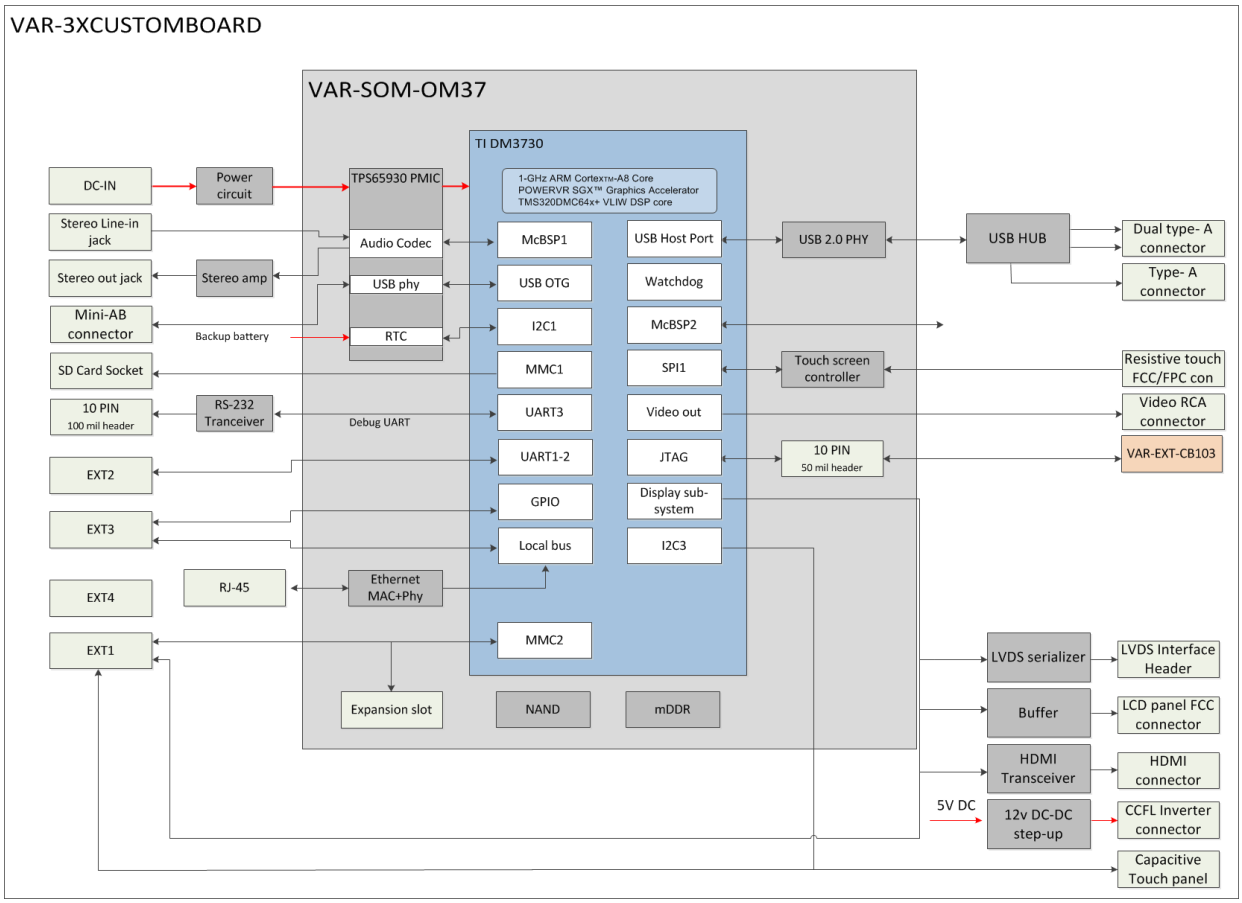
- SO-DIMM200 socket, compatible with VAR-SOM-OM3x / VAR-SOM-AM35 System On Modules
- Display Interfaces
  - 24 bit LVDS transmitter
  - LCD Parallel Interface connector compatible with U.R.T , 7" , TFT LCD panel (UMSH-8272MD-1T)
  - HDMI jack
  - Composite Video Out
- Touch panel interface
  - Resistive
  - Capacitive (I2C based)
- 10/100BaseT - RJ45 Ethernet connector
- USB
  - USB2.0 OTG ,Mini AB type connector
  - 3 x USB2.0 Host Type A connector
- SD-Card slot
- AUDIO
  - 3.5mm Headphones out jack.
  - 3.5mm Line in jack.
- RS232 IDC10 header
- Power
  - Power Terminal/ 2.5mm DC –In jack Options
  - 5V / 6-48V Power Supply Options.
  - 12V step-up regulator for CCFL inverters (LCD backlight)
  - RTC Coin Backup Battery socket
- 4 Extension connectors which expose:
  - LCD interface
  - RAW image-sensor module interface
  - Audio signals
  - TDM serial port
  - 2 UARTs
  - SPI
  - I2C
  - Local Bus interface
  - SD/MMC interface
  - PWM
  - GPIOs

1.3 Block Diagram

1.3.1 VAR-SOM-AM35 based



1.3.2 VAR-SOM-OM37 based

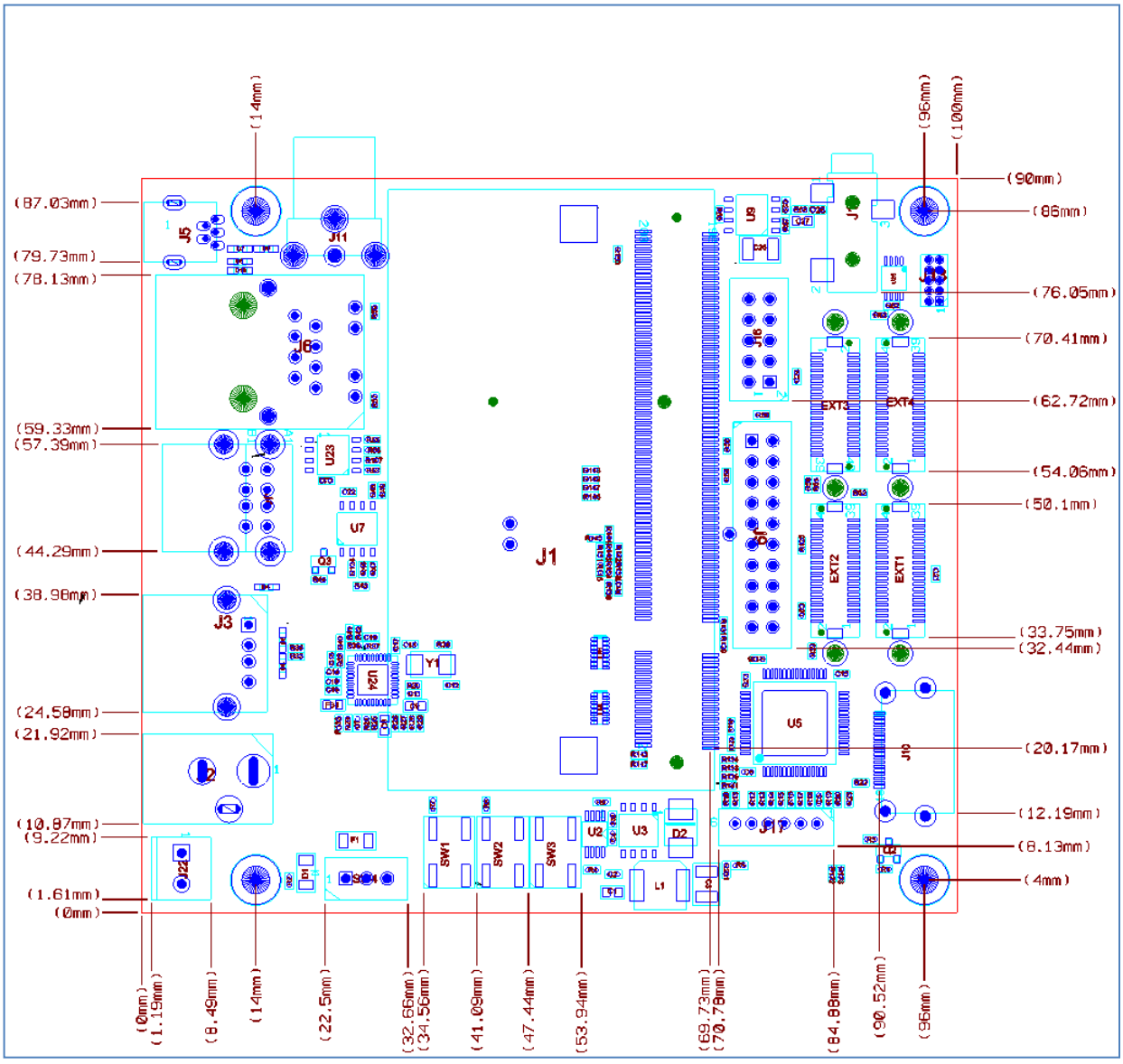


2 Board Layout

The VAR-3xCustomBoard size is 100x90 mm.

Detailed CAD files are available per request. Please contact mailto:support@variscite.com

2.1 Top side - Detailed View (mm)



CustomBoard connectors / headers

Reference	Function
J1	VAR-SOM-xM3x 200 PIN SO-DIMM Socket
J2	DC – In Jack
J22	DC – In Terminal
J3	USB HOST, Type A
J4	USB HOST, Dual Type A
J5	OSB OTG, Mini AB
J6	10/100BaseT -RJ45
J7	SD Slot
J8	LCD - Parallel FFC
J9	LCD - LVDS Header
J10	HDMI
J11	Composite out - RCA
J12	Resistive Touch panel
J13	Capacitive Touch Panel
J14	Line In Jack
J15	Headphone Jack
J16	UART - Header
J17	12V ,Backlight inverter
J18	RTC Back up , 2032 Coin Battery Socket
EXT1	Extension header. see chapter 3.2
EXt2	Extension header. see chapter 3.2
EXT3	Extension header. see chapter 3.2
EXT4	Extension header. see chapter 3.2
SW1	Boot Select (Released - Boot / Pressed - Burn)
SW2	User button
SW3	Hardware reset
SW4	ON / OFF Switch

2-1 Custom Board External Interfaces

3 External Interfaces Details

3.1 SODIM200 SBC Socket (J1)

The VAR-xM3xCustomBoard features SODIMM200 standard connector compatible with the VAR-SOM-xM3x System On a Module devices. Please refer to the VAR-SOM-xM3x module data sheet for a complete signal description.

3.2 Extension Connectors

The VAR-xM3xCustomBoard has 4 extension connectors.
Extension connectors enables, easy prototyping and third party evaluation boards wiring

See VAR-EXT-CB103 / VAR-EXT-CB105 as an example extension boards.
Extension connectors P/N: Hirose - DF15B(1.8)-40DS-0.65V(56)
http://www.hirose.co.jp/cataloge_hp/e67700020.pdf

3.2.1 Parallel LCD Interface Signals (EXT1)

Pin #	VAR- SOM-xM3x Signal
1	VCC12_INV
2	DSS_D0
3	VCC12_INV
4	DSS_D1
5	VCC12_INV
6	DSS_D2
7	DC_IN5V
8	DSS_D3
9	DC_IN5V
10	DSS_D4
11	DC_IN5V
12	DSS_D5
13	VCC3_3
14	DSS_D6
15	VCC3_3
16	DSS_D7
17	VIO
18	DSS_D8
19	GND
20	DSS_D9
21	GND
22	DSS_D10
23	GND
24	DSS_D12
25	DSS_D11
26	DSS_D14
27	DSS_D13
28	DSS_D16
29	DSS_D15

30	DSS_D18
31	DSS_D17
32	DSS_D20
33	DSS_D19
34	DSS_D22
35	DSS_D21
36	DSS_PCLK
37	DSS_D23
38	DSS_HSYNC
39	DSS_VSYNC
40	DSS_ACBIAS

3-1 Parallel LCD Interface Signals (EXT1)

3.2.2 Camera / Serial Interfaces signals (EXT2)

Pin #	VAR- SOM-xM3x Signal
1	N.C.
2	VCC3_3
3	UART2_TX
4	VCC3_3
5	UART2_RX
6	DC_IN5V
7	UART2_CTS
8	DC_IN5V
9	UART2_RTS
10	VIO
11	CAM_D0
12	GND
13	CAM_D1
14	GND
15	CAM_D2
16	UART1_CTS
17	CAM_D3
18	UART1_TX
19	CAM_D4
20	UART1_RX
21	CAM_D5
22	UART1_RTS
23	CAM_D6
24	I2C3_SDA
25	CAM_D7
26	I2C3_SCL
27	CAM_D8
28	CAM_PCLK
29	CAM_D9
30	NC
31	CAM_D10
32	CAM_XCLKA
33	CAM_D11
34	CAM_STROBE
35	CAM_VS
36	CAM_WEN

37	CAM_HS
38	GND
39	CAM_FLD
40	GND

3-2 Camera \ Serial Interfaces signals (EXT2)

3.2.3 Local Bus signals (EXT3)

Pin #	VAR- SOM-xM3x Signal
1	VCC3_3
2	LB_D1
3	VCC3_3
4	LB_D3
5	VIO
6	LB_D5
7	GND
8	LB_D7
9	GND
10	LB_D8
11	LB_D0
12	LB_D11
13	LB_D2
14	LB_D13
15	LB_D4
16	LB_D15
17	LB_D6
18	LB_A2
19	LB_D12
20	LB_A4
21	LB_D14
22	LB_A6
23	LB_A1
24	N.C.
25	LB_A3
26	LB_nCS3
27	LB_A5
28	LB_nADV_ALE
29	LB_A7
30	LB_CLE
31	LB_D9
32	LB_CLK
33	LB_D8
34	LB_A8
35	LB_D10
36	N.C.
37	LB_RE_OE_N
38	N.C.
39	LB_WE_N
40	N.C.

3-3 Local Bus signals (EXT3)

3.2.4 Serial Interfaces\ GPIO (EXT4) signals

Pin #	VAR- SOM-xM3x Signal
1	MMC1_CD
2	MsSPI2_CLK
3	MMC1_CLKO
4	MsSPI2_SIMO
5	MMC1_CMD
6	MsSPI2_SOMI
7	MMC1_DAT0
8	MsSPI2_CS0
9	MMC1_DAT1
10	GPIO28
11	MMC1_DAT2
12	McBSP1_CLKR
13	MMC1_DAT3
14	McBSP1_FSR
15	KPD.R4
16	McBSP1_DX
17	KPD.R3
18	McBSP1_DR
19	KPD.R2
20	McBSP1_FSX
21	KPD.R1
22	McBSP1_CLKX
23	KPD.R0
24	KPD.R5
25	HP_LOUT
26	KPD.C0
27	HP_ROUT
28	KPD.C1
29	CODEC_AUXADC1
30	KPD.C2
31	CODEC_AUXADC2
32	KPD.C3
33	AUD_GND
34	KPD.C4
35	AUD_GND
36	KPD.C5
37	RESET_OUT_N
38	PWM0
39	GND
40	GND

3-4 Serial Interfaces\ GPIO (EXT4) signals

3.3 Video Output Connectors

This section describes the video-out interfaces of the VAR-3xCustomBoard

3.3.1 LVDS Interface Connector (J9)

The VAR-3xCustomBoard has an on-board TI SN75LVDS83B LVDS transmitter. The LVDS connector is a standard 0.1" pitch 15x2 header.

LVDS connector signals:

Pin #	Signal	Type	Description
1	VCC3_3	POWER	3.3V Output
2	VCC3_3	POWER	3.3V Output
3	GND	POWER	
4	GPIO28	IO	GPIO#28
5	RXIN0-	O	LVDS Channel 0 negative
6	RXIN0+	O	LVDS Channel 0 positive
7	GND	POWER	
8	RXIN1-	O	LVDS Channel 1 negative
9	RXIN1+	O	LVDS Channel 1 positive
10	GND	POWER	
11	RXIN2-	O	LVDS Channel 2 negative
12	RXIN2+	O	LVDS Channel 2 positive
13	GND	POWER	
14	CLKIN-	O	LVDS Clock negative
15	CLKIN+	O	LVDS Clock positive
16	GND	POWER	
17	RXIN3-	O	LVDS Channel 3 negative
18	RXIN3+	O	LVDS Channel 3 positive
19	N.C.		
20	VCC3_3	POWER	3.3V Power supply output

3-5 LVDS connector signals

3.3.2 Parallel LCD Interface Connector (J8)

LCD interface is exposed by a standard FPC, 0.5mm pitch, 40 position connector. Connector pinout is compatible U.R.T , 7" , TFT LCD module (UMSH-8272MD-1T)

LCD connector signals:

Pin #	Signal	Description
1	VLED	Backlight power
2	VLED	Backlight power
3	ADJ	Backlight Brightness
4	GLED	Backlight GND
5	GLED	Backlight GND
6	VCC	LCD VCC
7	VCC	LCD VCC
8	MODE	
9	DE	ACBAIS
10	VS	VSYNC
11	HS	HSYNC
12	Vss	GND
13	LCD_B5	DSS_D7
14	LCD_B4	DSS_D6
15	LCD_B3	DSS_D5
16	Vss	GND
17	LCD_B2	DSS_D4
18	LCD_B1	DSS_D3
19	LCD_B0	DSS_D2
20	Vss	GND
21	LCD_G5	DSS_D15
22	LCD_G4	DSS_D14
23	LCD_G3	DSS_D13
24	VSS	GND
25	LCD_G2	DSS_D12
26	LCD_G1	DSS_D11
27	LCD_G0	DSS_D10
28	VSS	GND
29	LCD_R5	DSS_D23
30	LCD_R4	DSS_D22
31	LCD_R3	DSS_D21
32	Vss	GND
33	LCD_R2	DSS_D20
34	LCD_R1	DSS_D19
35	LCD_R0	DSS_D18
36	Vss	GND
37	DCLK	DSS_PCLK
38	Vss	GND
39	L/R	Left /Right Select
40	U/D	Up/ Down Selec

3-6 LCD connector signals

3.3.3 HDMI Connector (J10)

The VAR-3xCustumBoard has an HDMI connector to interface external monitors / projectors. The VAR-3xCustomBoard uses the TI TFP410 HDMI transmitter.

HDMI connector signals:

Pin #	Signal	Type	Description
1	DAT2+	O	HDMI Data 2 positive
2	DAT2_S	GND	
3	DAT2-	O	HDMI Data 2 negative
4	DAT1+	O	HDMI Data 1 positive
5	DAT1_S	GND	
6	DAT1-	O	HDMI Data 1 negative
7	DAT0+	O	HDMI Data 0 positive
8	DAT0_S	GND	
9	DAT0-	O	HDMI Data 0 negative
10	CLK+	O	HDMI Clock positive
11	CLK _S	GND	
12	CLK 0-	O	HDMI Clock negative
13	CEC	NC	
14	NC	NC	
15	SCL	NC	
16	SDA	NC	
17	DDC/CEC GND	GND	
18	+5V	O	5V Output

3-7 HDMI connector signals

3.3.4 Composite Video (J11)

Composite video out is available via standard RCA connector.

3.4 Touch Panel connectors (J12/J13)

The VAR-3xCustom Board features two touch panel interfaces:

1. 4-wire FCC/FPC connector to interface with resistive touch panels
2. 10 pin Header exposing I2C signals to interface with capacitive touch panel controllers.

3.4.1 Resistive Touch Panel connectors (J12)

Connector P/N: Molex, 52207-0485
Resistive touch panel connector signals:

Pin #	Signal	Type	Description
1	TSMX	I	Touch Screen X Minus
2	TSPY	I	Touch Screen Y Plus
3	TSPX	I	Touch Screen X Plus
4	TSMY	I	Touch Screen Y Minus
5	GND	Power	
6	GND	Power	

3-8 Resistive touch panel connector signals

3.4.2 Capacitive Touch Panel connectors (J13)

Connector P/N: Samtec, FTS-105-01-L-D (5x2 1.27mm Header)
Capacitive touch panel connector signals:

Pin #	Signal	Type	Description
1	VCC3_3	Power	
2	VCC_12	Power	
3	VIO	Power	
4	CPT_INT	I	Capacitive touch panel interrupt
5	I2C3_SDA_3V3	IO	3.3V version of VAR-SOM-xM3x I2C interface.
6	NC		
7	I2C3_SCL_3V3	O	3.3V version of VAR-SOM-xM3x I2C interface.
8	NC		
9	GND	Power	
10	NC		

3-9 Capacitive touch panel connector signals

3.5 Ethernet (J6)

The VAR-3xCustomBoard has a standard 10/100Base-T RJ45 Ethernet jack with integrated magnetics.

3.6 USB

The VAR-3xCustomBoard supports three USB 2.0 Host port and one USB 2.0 OTG port. The two J4's USB HOST connectors are driven by the on-board USB hub, while the J3 Host USB connector is driven either by the on-board hub or directly by the additional USB interface available on VAR-SOM-AM35xx 200 pin interface.

USB Host Connector (J4)

Pin #	Signal	Type	Description
A1	VCC_USB1	O	5V power supply. 500ma max
A2	USB_HUB_DN1	IO	USB Data Negative
A3	USB_HUB_DP1	IO	USB Data Positive
A4	GND	Power	
B1	VCC_USB2	O	5V power supply. 500ma max
B2	USB_HUB_DN2	IO	USB Data Negative
B3	USB_HUB_DP2	IO	USB Data Positive
B4	GND		

3-10 USB Host Connector (Dual)

3.6.1 USB Host Connector (J3)

Pin #	Signal	Type	Description
1	VCC_USB3	O	5V power supply. 500ma max
2	USB_HUB_DN3/USBHOST2_DM	IO	USB Data Negative
3	USB_HUB_DP3/USBHOST2_DP	IO	USB Data Positive
4	GND	Power	

3-11 USB Host Connector (Single)

Note

On VAR-AM3xxCustomBoard, J3 is directly connected to VAR-SOM- AM35xx USB HOST 2 interface. USB 1.1 devices (i.e. mouse / Keyboard) are not supported by processor directly. Use of such device requires an external HUB.

3.6.2 USB OTG connector (J5)

Pin #	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
5	GND	Power	

3-12 USB OTG connector

3.7 UART (J16)

The VAR-3xCustomBoard supports one RS-232 level UART interface (in addition to two additional UART interfaces available on extension connector) :

3.7.1 RS232 connector (J16) pin out

Pin #	VAR- SOM-xM3x Signal	Type	Description
1	NC		
2	UART3_RX_C	I	UART#3/#1 Receive
3	UART3_TX_C	O	UART#3/#1 Transmit
4	NC		
5	GND		
6	NC		
7	UART3_RTS_C	O	UART#3/#1 RTS
8	UART3_CTS_C	I	UART#3 #1CTS
9	NC		
10	NC		

3-13 RS232 connector

3.8 SD Card slot (J7)

Pin #	Signal	Type	Description
1	MMC1_DAT3	IO	MMC Parallel Data
2	MMC1_CMD	IO	MMC command
3	GND		
4	VCC_SD		SD Card VCC
5	MMC1_CKO	O	MMC Clock
6	GND		
7	MMC1_DAT0	IO	MMC Parallel Data
8	MMC1_DAT1	IO	MMC Parallel Data
9	MMC1_DAT2	IO	MMC Parallel Data
10	MMC1_CD	I	MMC Card Detect
11	GND		
12	SD_WP	I	MMC Write Protected

3-14 SD Card slot

3.9 AUDIO

3.9.1 Line-in Jack (J14)

The VAR-3xCustomBoard has a 3.5mm Headphones jack.

Pin #	Signal	Type	Description
1	AUD_GND	Power	Audio Ground
2	Codec Line In L	Analog In	VAR-SOM-x3Mx left line input
3	Codec Line In R	Analog In	VAR-SOM-x3Mx right line input

3-15 Line In Jack

3.9.2 Headphones Jack (J15)

The VAR-3xCustomBoard has a 3.5mm Headphones jack. The HP LOUT / HP ROUT pre-amped audio signals from the VAR-SOM-xM3x are driven using TI TPA6111A2 audio amplifier device.

Headphones jack signals:

Pin #	Signal	Type	Description
1	AUD_GND	Power	Audio Ground
2	HP – ROut	Analog In	Headphones out right
3	HP – LOut	Analog In	Headphones out left

3-16 Headphones jack signals

3.10 Main Power Input (J2/J22)

3.10.1 Terminal Block (J2)

Terminal Connector P/N: Phoenix Contact, 1727010

Pin #	Signal
1	GND
2	VCC IN

3-17 Terminal Block Signals

3.10.2 DC-IN Jack (J22)

Dc-In power jack is compatible with standard 2.5mm power plug

3.10.3 Power Options

The Power subsystem of the VAR-3xCustomBoard supports 2 options for main board power supply:

- 5VDC
- 6-48VDC

3.11 12v output connector, for CCFL inverter (J2)

The VAR-3xCustomBoard supplies 12V DC, 0.5A for CCFL inverters (LCD backlight power).
Connector P/N: JST, S6B-PH-K-S(LF)(SN).

Inverter connector signals:

Pin #	Signal
1	GND
2	GND
3	5V output, 100ma max
4	5V output, 100ma max
5	12V output, 0,5A max in total
5	12V output, 0.5A max in total

3-18 Inverter connector signals

3.12 Control Buttons

3.12.1 Boot Select (SW1)

Released – Boot
Pressed - Burn

For UART/USB/MMC boot, press and hold Boot select button and Reset / Power-on board.

3.12.2 User button (SW2)

User application button

3.12.3 Cold Reset Button (SW3)

System hardware-reset

4 Electrical Environmental Specifications

4.1 Absolute maximum electrical specifications

Power supplies	**Min**	**Max**
Main Power supply, DC-IN VAR-xM3xCustomBoard_PA	-0.3V	5.5V
Main Power supply, DC-IN VAR-xM3xCustomBoard_PB	-0.3V	48V

4-1 Absolute maximum electrical specifications

4.2 Operational electrical specifications

Power supplies	Min	Max
Main Power supply, DC-IN VAR-35xxCustomBoard_PA	5V	5V
Main Power supply, DC-IN VAR-35xxCustomBoard_PB	6V	48V
LCD interface output I/O levels	VAR-SOM- xxx VCC_IO	

4-2 Operational electrical specifications

5 Environmental specifications

	Min	Max
Commercial operating temperature range	0^{0}C	$+70^{0}$C
Extended operating temperature range	-25^{0}C	$+85^{0}$C
MTBF	10000hrs >	
Shock resistance	50G / 20 ms	
Relative humidity, Operational	10%	90%
Relative humidity, Storage	5%	95%
Vibration	20G / 0 - 600 Hz	

5-1 Environmental specifications

6 Legal notice

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8 Contact information

Headquarters
Variscite LTD
60 Medinat Hayehudim st. Hertzelia
P.O.B 12598
46722, Israel

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

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

Website: www.variscite.com