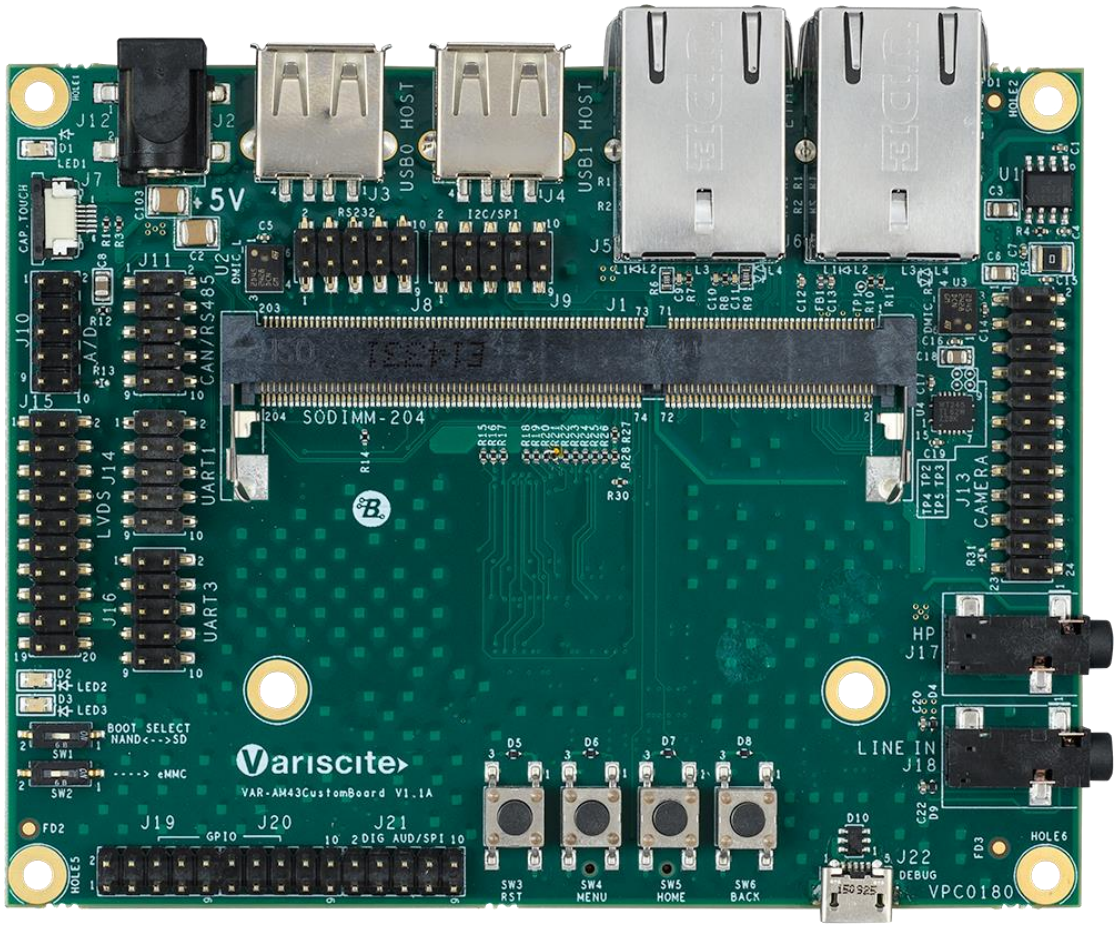
VARISCITE LTD

VAR-AM43CustomBoard Datasheet

Carrier-board for the VAR-SOM-AM43

V 1.1



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

Revision History

Revision	Date	Notes
1.0	20/01/2015	Initial
1.1	28/03/2018	Updated notes sections 2.3.4.3, 2.3.15, 2.4.3.2

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1 Overview

This chapter gives an overview of the VAR-AM43CustomBoard.

1.1 General Information

The VAR-AM43CustomBoard is a complete development board, utilizing the VAR-SOM-AM43 System-on-Module's features. It includes a large variety of interfaces and connectivity including a USB HOST& OTG, Dual 10/100/1000BaseT Ethernet, uSD slot,18 bit LVDS and HDMI Interface, Audio IN/OUT, Dual CAN Bus interface, serial interfaces and expansion connectors. The VAR-AM43CUstomBoard can be used not only as an evaluation and reference platform for the VAR-SOM-AM43, but also as a custom board for mass production.

1.1.1 Supporting Variscite Products

- VAR-SOM-AM43
- Capacitive touch LCD screen

1.1.2 Supporting O.S

- Linux BSP

1.1.3 Additional information

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

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

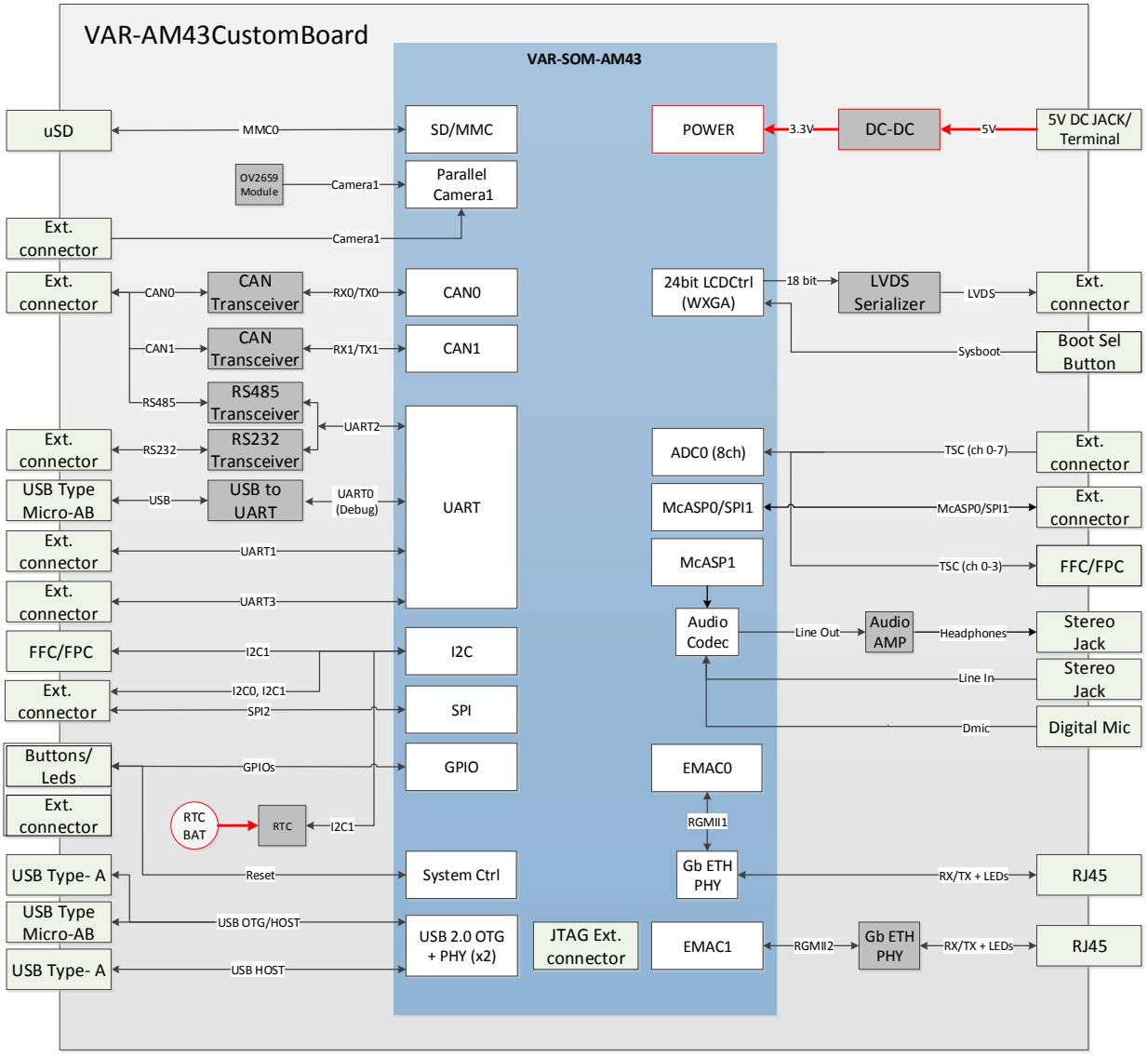
1.2 VAR-AM43CustomBoard features summary

- SODIMM DDR3 204PIN socket
- Display
  - 18 bit LVDS Header supporting Variscite's 7" TFT capacitive touch LCD
- Touch panel interface
  - Capacitive - I2C based
  - Resistive 4-wIre
- Dual Ethernet
  - 2x 10/100/1000BaseT – RJ45
- USB
  - USB2.0 OTG ,Micro AB type + Type A (for Host only option)
  - USB2.0 Host Type A
- AUDIO
  - 3.5mm Headphones jack
  - 3.5mm Line in jack
  - Stereo Digital Microphone
- µSD-Card slot
- UART
  - RS232 levels- Standard 10 pin Header
  - RS485 levels- Standard 10 pin Header
- Dual CAN Bus
  - 2x 1Mbit CAN bus interface - Standard 10 pin Header
- Debug
  - USB debug (UART0) - Micro AB type
- Camera
  - 12 bit Camera Header
  - OV2659 Image-sensor Interface
- Expansion connectors:
  - UART
  - I2C
  - SPI
  - A/D (8-channel)

- McASP
- GPIOs

- Additional
  - General purpose LEDS, Buttons
- Power
  - 5V DC Input. - 2.0mm DC jack
  - RTC Backup battery - CR1225 Battery Holder

1.3 Block Diagram

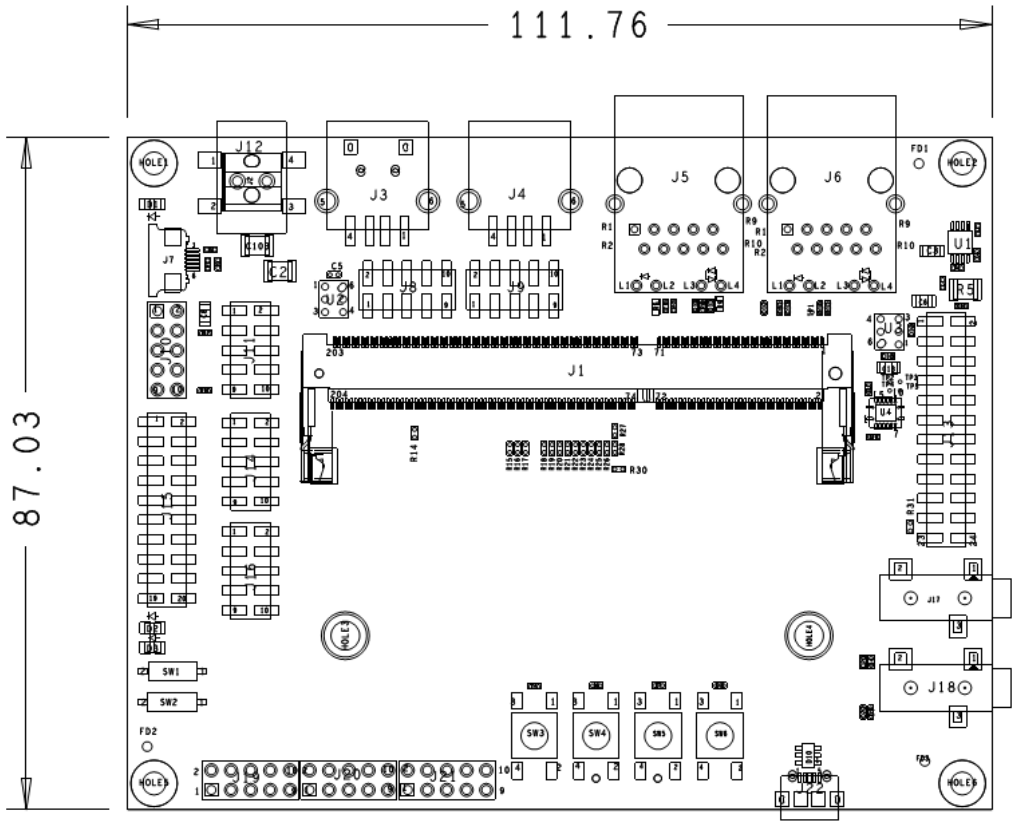


1.4 Board Layout

The VAR-AM43CustomBoard physical dimensions are 111x87 mm.

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

Top side - Detailed View



1.5 VAR-AM43CustomBoard connectors

The below table lists all available connectors on the VAR-AM43CustomBoard, refer to chapter 2 for a more detailed description and Pin-out of each connector.

Reference	Function	Type
J1	VAR-SOM-AM43 Connector	SODIMM DDR3 204 Pin Socket
J2	Power In	2 Pin Terminal Block
J3	USB0 Host	USB Type A
J4	USB1 Host	USB Type A
J5	10/100/1000Mbps Port	RJ-45
J6	10/100/1000Mbps Port	RJ-45
J7	Capacitive Touch Panel I/F	FFC/FPC 6-pin
J8	RS232	Header SMT, 5x2, 2.54mm
J9	I2C/SPI	Header SMT, 5x2, 2.54mm
J10	Analog Inputs	Header, 5x2, 2.54mm
J11	RS485, Dual CAN Bus	Header SMT, 5x2, 2.54mm
J12	Power In	DC In Jack 2.0 mm
J13	Camera Board Header	Header SMT, 12x2, 2.54mm
J14	UART1	Header SMT, 5x2, 2.54mm
J15	LVDS Header	Header SMT, 10x2, 2.54mm
J16	UART3	Header SMT, 5x2, 2.54mm
J17	Headphones	Audio Jack 3.5 mm
J18	Line In	Audio Jack 3.5 mm
J19	GPIOs	Header, 5x2, 2.54mm
J20	GPIOs	Header, 5x2, 2.54mm
J21	Digital Audio/SPI	Header, 5x2, 2.54mm
J22	USB Debug	USB Type micro AB
J100	USB0 OTG	USB Type micro AB
J101	Resistive Touch Panel I/F	FFC/FPC 4-pin
J102	OV2659 mage sensor I/F	FFC/FPC 24-pin
J103	SD/MMC	uSD Connector
JBT100	RTC Battery Holder	CR1225

Table 1-1 VAR-AM43CustomBoard connectors

2 Detailed Description

2.1 Overview

This chapter details the VAR-AM43CustomBoard features and external interfaces, some of which are driven directly by the VAR-SOM-AM43. Please refer to the VAR-SOM-AM43 data sheet for more information regarding those interfaces.

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

Pin#:
Pin Number of the specific connector

VAR-AM43CustomBoard Signal:
VAR-AM43CustomBoard schematic signal name

Type:
Pin Type & Direction:

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

Description:
Short Pin functionality description

2.2 VAR-AM43CustomBoard Interfaces

2.2.1 VAR-SOM-AM43

The VAR-SOM-AM43 features a standard SODIMM DDR3 204 Pin Socket to connect with the VAR-SOM-AM43 System-om-module. Please refer to the VAR-SOM-AM43 module data sheet for a complete signal description and pin-out.

2.3 Standard External Interfaces

2.3.1 USB HOST & OTG

The VAR-SOM-AM43 drives USB1 driven to a HOST Connector, USB0 is driven to both HOST and OTG connectors. For using USB0 as HOST only via HOST connector configure USB0 to HOST mode by setting resistor R102 value to 0R

2.3.1.1 USB1 HOST Connector Pin-out (J4)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	VCC_USB1	P	5V power supply. 500ma max
2	AM437X_USB1_DM_C	DSI/O	USB Data Negative
3	AM437X_USB1_DP_C	DSI/O	USB Data Positive
4	DGND	P	Digital ground

Table 2-1 USB1 Host Connector Connector Pin-out (J4)

2.3.1.2 USB0 HOST Connector Pin-out (J3)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	OTG_VBUS	P	5V power supply. 500ma max
2	AM437X_USB0_DM_C	DSI/O	USB Data Negative
3	AM437X_USB0_DP_C	DSI/O	USB Data Positive
4	DGND	P	Digital ground

Table 2-2 USB0 Host Connector Connector Pin-out (J3)

2.3.1.3 USB0 OTG Connector Pin-out (J100)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	OTG_VBUS	P	5V in/out (Client/host)
2	AM437X_USB0_DM_C	DSI/O	USB Data Negative
3	AM437X_USB0_DP_C	DSI/O	USB Data Positive
4	AM437X_USB0_ID	I	USB OTG ID signal ('1' - Device mode)
5	DGND	P	Digital ground

Table 2-3 USB0 OTG connector Pin-out (J100)

2.3.2 uSD Card

uSD Card interface is driven by the SD/MMC0 interface of the of the VAR-SOM-AM43. Refer to the VAR-SOM-AM43 module data sheet for a complete interface description.

2.3.2.1 uSD card slot Connector Pin-out (J103)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	AM437X_MMC0_DAT2	IO	MMC Parallel Data2
2	AM437X_MMC0_DAT3	IO	MMC Parallel Data3
3	AM437X_MMC0_CMD	IO	MMC command
4	BASE_PER_3V3	P	Peripherals Power supply 3.3V
5	AM437X_MMC0_CLK	O	MMC Clock
6	DGND	P	Digital ground
7	AM437X_MMC0_DAT0	IO	MMC Parallel Data0
8	AM437X_MMC0_DAT1	IO	MMC Parallel Data1
9	AM437X_MMC0_SDCD	IO	MMC Card Detect
10	DGND	P	Digital ground
11	DGND	P	Digital ground
12	DGND	P	Digital ground
13	DGND	P	Digital ground

Table 2-4 uSD Card slot Connector Pin-out (J103)

2.3.3 Ethernet

Two Gigabit Ethernet interfaces are exposed to two standard RJ45 Ethernet jack connectors with integrated magnetics. One port is driven by an On-SOM Gigabit Ethernet PHY, the other by an On-Carrier Gigabit Ethernet PHY connected to the VAR-SOM-AM43 RGMII2 Interface. The RGMII2 interface is available only when no Wi-Fi module is assembled on the VAR-SOM-AM43. Please refer to the VAR-SOM-AM43 datasheet for more information.

2.3.3.1 10/100/1000BaseT Connector Pin-out (J5)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
R1	MDI_A_P	DSI/O	Bi-directional pair A positive
R2	MDI_A_M	DSI/O	Bi-directional pair A negative
R3	MDI_B_P	DSI/O	Bi-directional pair B positive
R4	MDI_B_M	DSI/O	Bi-directional pair B negative
R5	TRCT1	O	O
R6	TRCT2	O	O
R7	MDI_C_P	DSI/O	Bi-directional pair C positive
R8	MDI_C_M	DSI/O	Bi-directional pair C negative
R9	MDI_D_P	DSI/O	Bi-directional pair D positive
R10	MDI_D_M	DSI/O	Bi-directional pair D negative
L1	DGND	P	Digital ground
L2	LED_ACT	O	Activity LED Anode (see LED Status Table)
L3	LED_LINK_10_100	IO	Link 10/100 LED Anode; Link 1000 LED Cathode (see LED Status Table)
L4	LED_LINK_1000	IO	Link 1000 LED Anode; Link 10/100 LED Cathode (see LED Status Table)
SH1	EARTH	P	EARTH
SH2	EARTH	P	EARTH

Table 2-5 10/100/100BaseT RJ45 Connector Pin-out (J4)

2.3.3.2 10/100/1000BaseT Connector Pin-out (J6)

Note: This interface is available only when no Wi-Fi module is assembled on the VAR-SOM-AM43. Please refer to the VAR-SOM-AM43 datasheet for more information.

Pin #	VAR-AM43CustomBoard Signal	Type	Description
R1	TRXP_0	DSI/O	Bi-directional pair 0 positive
R2	TRXM_0	DSI/O	Bi-directional pair 0 negative
R3	TRXP_1	DSI/O	Bi-directional pair 1 positive
R4	TRXM_1	DSI/O	Bi-directional pair 1 negative
R5	TRCT1	O	O
R6	TRCT2	O	O
R7	MDI_2_P	DSI/O	Bi-directional pair 2 positive
R8	MDI_2_M	DSI/O	Bi-directional pair 2 negative
R9	MDI_3_P	DSI/O	Bi-directional pair 3 positive
R10	MDI_3_M	DSI/O	Bi-directional pair 3 negative
L1	DGND	P	Activity LED Cathode

L2	LED_ACT_PHY2	O	Activity LED Anode (see LED Status Table)
L3	LED_LINK_10_100_PHY2	IO	Link 10/100 LED Anode; Link 1000 LED Cathode (see LED Status Table)
L4	LED_LINK_1000_PHY2	IO	Link 1000 LED Anode; Link 10/100 LED Cathode (see LED Status Table)
SH1	EARTH	P	EARTH
SH2	EARTH	P	EARTH

Table 2-6 10/100/100BaseT RJ45 Connector Pin-out (J6)

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_ACT	ON	BLINK	ON	BLINK	ON	BLINK

Table 2-7 RJ-45 Connector Led status (J5,J6)

2.3.4 AUDIO

The VAR-AM43CustomBoard features two 3.5mm jacks for audio interfaces.

- Headphone
- Line in

The Headphones Jack is driven by an on-board Headphones amplifier using the Line Out signal received by the VAR-SOM-AM43. The Line in Jack is driven directly by the VAR-SOM-AM43. Additional McASP Audio interface signals are exposed through the Digital Audio/SPI Header. (Please refer to the VAR-SOM-AM43 module data sheet for a complete interface description).

The VAR-AM43CustomBoard also features an on-board stereo Digital Microphone, Please refer to Digital Microphone section 2.4.1 for more details.

2.3.4.1 Headphone jack Connector Pin-out (J17)

Pin #	**VAR-AM43CustomBoard Signal**	**Type**	**Description**
1	DGND	P	Digital ground
2	HPOUTL	O	Headphone out left
3	HPOUTR	O	Headphone out right

Table 2-8 Headphone Jack Connector Pin-out (J17)

2.3.4.2 Line In jack Connector Pin-out (J18)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	AGND_AUD	AP	Audio Ground
2	LINEIN_LP_C	AI	Line in Left input
3	LINEIN_RP_C	AI	Line in Right input

Table 2-9 Line In Jack Connector Pin-out (J18)

2.3.4.3 Digital AUDIO/SPI Header (J21)

The McASP Digital audio interface is shared with the WiFi module on SOM and cannot be used simultaneously.

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	BASE_PER_3V3	P	Peripherals Power supply 3.3V
2	MCASP0_ACLKR	IO	McASP0 Receive Bit Clock
3	MCASP0_ACLKX_ SPI1_SCLK	IO	McASP0 Transmit Bit Clock SPI1 Clock see note (*)
4	MCASP0_AHCLKX	IO	McASP0 Transmit Master Clock
5	MCASP0_AHCLKR_ SPI1_CS0	IO	McASP0 Receive Master Clock SPI1 Chip select see note (*)
6	MCASP0_AXR1	IO	McASP0 Serial Data (IN/OUT)
7	MCASP0_AXR0/ SPI1_D1	IO	McASP0 Serial Data (IN/OUT) SPI1 Data 1 see note (*)
8	MCASP0_FSR	IO	McASP0 Receive Frame Sync
9	MCASP0_FSX/ SPI1_D0	IO	McASP0 Transmit Frame Sync SPI1 Data 0 see note (*)
10	DGND	P	Digital ground

Table 2-10 Digital AUDIO/SPI Header Pin-out (J21)

Note:
(*) Pin can be used SPI1 or McASP0 interfaces depending on pinmux selection.
McASP0 function can be used only if not used by SOM WiFi/BT for Audio interface.

2.3.5 RS232 (UART2)

The VAR-SOM-AM43 exports the UART2 interface to the VAR-AM43CustomBoard. UART2 can be selected to drive an on-board RS232 Transceiver exported to a standard 5x2 pin Header or an on-board RS485 Transceiver exported to a standard 5x2 pin Header.

2.3.5.1 RS232 - Connector Pin- out (J8)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1			
2	RS232_RXD	I	UART2 Receive
3	RS232_TXD	O	UART2 Transmit
4	BASE_PER_3V3	P	Peripherals Power supply 3.3V
5	DGND	P	Digital Ground
6			
7			
8			
9			
10			

Table 2-11 RS232 DTE Connector Pin-out (J8)

2.3.6 RS485 (UART2) & Dual CAN Bus

The VAR-SOM-AM43 exports the UART2 interface to the VAR-AM43CustomBoard. UART2 can be selected to drive an on-board RS232 Transceiver exported to a standard 5x2 pin Header or an on-board RS485 Transceiver exported to a standard 5x2 pin Header.

In addition, the VAR-AM43CustomBoard drives two CAN Bus interfaces through two On-board CAN Bus Transceivers.
The RS485 interface and Dual CAN Bus interface are exported to a Header.

2.3.6.1 RS485 & Dual CAN Bus Connector Pin- out (J11)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	B	DSI	Receiver Differential Inverting signal
2	A	DSI	Receiver Differential non Inverting signal
3	Z	DSO	Driver Differential Inverting signal
4	Y	DSO	Driver Differential non Inverting signal
5	DGND	P	Digital Ground
6	DGND	P	Digital Ground
7	CANL0	DSI/O	CAN0 L Differential signal
8	CANH0	DSI/O	CAN0 H Differential signal

9	CANL1	DSI/O	CAN1 L Differential signal
10	CANH1	DSI/O	CAN1 H Differential signal

Table 2-12 RS485 & Dual CAN Bus Connector Pin-out (J11)

2.3.7 Camera

The VAR-AM43CustomBoard has a standard 10x2 2.54mm pitch Header exporting a 12 bit parallel camera interface.

In addition, the camera interface is exported to standard 24-pin FFC/FPC connector for interfacing an 8 bit OV2659 Image-sensor module.

Note: The same camera interface is exported to both connectors therefore they cannot be used simultaneously.

Camera Connector Pin-out (J13)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	BASE_PER_5V	P	Camera 5V power supply
2	CAM1_VSYNC	O	Camera Vertical sync
3	CAM1_DATA0	I	Camera data bit0
4	CAM1_HSYNC	O	Camera Horizontal sync
5	CAM1_DATA1	I	Camera data bit1
6	CAM1_DATA6	I	Camera data bit6
7	CAM1_DATA2	I	Camera data bit2
8	CAM1_DATA7	I	Camera data bit7
9	CAM1_PCLK	I	Camera Pixel clock
10	CAM1_DATA8	I	Camera data bit8
11	DGND	P	Digital ground
12	DGND	P	Digital ground
13	CAM1_DATA3	I	Camera data bit3
14	CAM1_DATA9	I	Camera data bit9
15	CAM1_DATA4	I	Camera data bit4
16	CAM1_FIELD_GPIO4_12	IO	Camera Field Indicator
17	CAM1_DATA5	I	Camera data bit5
18	CAM1_DATA10	I	Camera data bit10
19	CAM1_WEN_GPIO4_13	IO	Camera data Write Enable
20	CAM1_DATA11	I	Camera data bit11
21	DGND	P	Digital ground
22	I2C0_SCL	IO	Camera I2C
23	CAM1_SRCCLK	I	Camera Clock
24	I2C0_SDA	IO	Camera I2C

Table 2-13 Camera Board Connector Pin-out (J13)

2.3.7.1 OV2659 Image-sensor Connector (J102)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1			
2	AGND_SENS	A	Analog Ground
3	SENSOR_SIO_D	IO	Sensor I2C Data
4	BASE_PER_2V8A	P	Sensor Analog Power supply 2.8V
5	SENSOR_SIO_C	O	Sensor I2C Clock
6	SENSOR_RESET	O	Sensor reset
7	SENSOR_VSYNC	I	Sensor Vertical sync
8	SNS PWDN	O	Sensor Power Down
9	SENSOR_HREF	I	Sensor Horizontal sync
10	BASE_PER_1V5	P	Sensor core Power supply 1.5V
11	BASE_PER_2V8	P	Sensor Digital Power supply 2.8V
12	SENSOR_Y9	I	Sensor Data bit9
13	SENSOR_XCLK	O	Camera Clock
14	SENSOR_Y8	I	Sensor Data bit8
15	DGND	P	Digital Ground
16	SENSOR_Y7	I	Sensor Data bit7
17	SENSOR_PCLK	I	Sensor Pixel Clock
18	SENSOR_Y6	I	Sensor Data bit6
19	SENSOR_Y2	I	Sensor Data bit2
20	SENSOR_Y5	I	Sensor Data bit5
21	SENSOR_Y3	I	Sensor Data bit3
22	SENSOR_Y4	I	Sensor Data bit4
23			
24			

Table 2-14 OV2659 Image-sensor Connector (J102)

2.3.8 LCD

The VAR-SOM-AM43 exposed an 18-bit LCD interface to an on Board TI SN75LVDS83B LVDS transmitter. The LVDS interface is exposed through a standard 20 pin Header for connecting to Variscite's 7" Capacitive touch LCD screen.

2.3.8.1 LCD Connector Pin-out (J15)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	BASE_PER_3V3	P	Peripherals Power supply 3.3V
2	BASE_PER_3V3	P	Peripherals Power supply 3.3V
3	DGND	P	Digital ground
4	DGND	P	Digital ground
5	RXIN0-	DSO	LVDS lane 0, negative signal
6	RXIN0+	DSO	LVDS lane 0, positive signal
7	DGND	P	Digital ground
8	RXIN1-	DSO	LVDS lane 1, negative signal
9	RXIN1+	DSO	LVDS lane 1, positive signal
10	DGND	P	Digital ground
11	RXIN2-	DSO	LVDS lane 2, negative signal
12	RXIN2+	DSO	LVDS lane 2, positive signal
13	DGND	P	Digital ground
14	CLKIN-	DSO	LVDS clock, negative signal
15	CLKIN+	DSO	LVDS clock, positive signal
16	DGND	P	Digital ground
17	BASE_PER_5V	P	VLED +5V Power supply
18	BASE_PER_5V	P	VLED +5V Power supply
19	AM437X_LCD_BACKLIGHT	O	Backlight brightness control
20	DGND	P	Digital ground

Table 2-15 Resistive LCD Connector Pin-out (J15)

2.3.9 Resistive/Capacitive Touch

The VAR-SOM-AM43 provides a Capacitive Touch interface I2C based exposed to a FFC/FPC connector for connecting to Variscite's standard 7" Capacitive touch LCD screen.
The VAR-SOM-AM43 also exposes a 4-wire Resistive Touch to a FFC/FPC connector.

2.3.9.1 Capacitive Touch Panel Connector Pin-out (J7)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	RESET	O	Reset signal
2	I2C1_SDA	IO	I2C1 data signal

3	I2C1_SCL	O	I2C1 data clock
4	GPIO4_29	I	Interrupt signal connected to GPIO4[29]
5	BASE_PER_3V3	P	Peripherals Power supply 3.3V
6	DGND	P	Digital ground

Table 2-16 Capacitive Touch Panel Connector Pin-out (J7)

2.3.9.2 Resistive Touch Panel Connector Pin-out (101)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	AM437X_AIN3	AI	Analog In 3
2	AM437X_AIN1	AI	Analog In 1
3	AM437X_AIN2	AI	Analog In 2
4	AM437X_AIN0	AI	Analog In 0
5	DGND	P	Digital ground
6	DGND	P	Digital ground

Table 2-17 Resistive Touch Panel Connector Pin-out (J101)

Note: Touch panel interface can be used only when Analog In signals are not used by the Analog Inputs Header (J10). Please refer to section Analog Inputs section 2.3.12 for more details.

2.3.10 USB - Debug

The debug UART0 interface is driven by the VAR-SOM-AM43 to the VAR-AM43CustomBoard on-board UART-to-USB Bridge and then exposed to a Micro USB connector.

2.3.10.1 USB -Debug Connector Pin-out (J22)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	DEBUG_VBUS	P	5V power input
2	USB_DEBUG_DM_C	DSI/O	USB Data Negative
3	USB_DEBUG_DP_C	DSI/O	USB Data Positive
4	DGND	P	Digital ground
5	DGND	P	Digital ground

Table 2-18 USB – Debug Connector Pin-out (J22)

2.3.11 Analog Inputs

The VAR-AM43CustomBoard consists of an Analog Inputs header connecting 8 Analog inputs directly to the VAR-SOM-AM43's ADC0 analog to digital channel.

2.3.11.1 Analog Inputs Header (J10)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	ADC0_VREFP	P	ADC0 Power Reference
2	AM437X_AIN4	AI	Analog Input 0
3	AM437X_AIN0	AI	Analog Input 4
4	AM437X_AIN5	AI	Analog Input 1
5	AM437X_AIN1	AI	Analog Input 5
6	AM437X_AIN6	AI	Analog Input 2
7	AM437X_AIN2	AI	Analog Input 6
8	AM437X_AIN7	AI	Analog Input 3
9	AM437X_AIN3	AI	Analog Input 7
10	ADC0_VREFN	P	ADC0 ground Reference

Table 2-19 Analog Inputs Header Pin-out (J10)

Note: Analog inputs 0-3 are multiplexed with the Resistive Touch interface and cannot be used simultaneously.

2.3.12 UART1

The VAR-AM43CustomBoard exposes the VAR-SOM-AM43 UART1 interface through a standard 10 pin Header.

2.3.12.1 UART1 Header Pin-out (J14)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1			
2	AM437X_DCAN1_TX/ UART1_RXD	I	UART1 Receive
3	AM437X_DCAN1_RX/ UART1_TXD	O	UART1 Transmit
4	BASE_PER_3V3	P	Peripherals Power supply 3.3V
5	DGND	P	Digital ground
6			
7			
8	AM437X_DCAN0_TX/ UART1_CTS	I	UART1 CTS
9	AM437X_DCAN0_RX/ UART1_RTS	O	UART1 RTS
10			

Table 2-20 UART1 Header Pin-out (J14)

Note: UART1 signals are multiplexed with CAN0 and CAN1 interface and cannot be used simultaneously.

2.3.13 UART3

The VAR-AM43CustomBoard exposes the VAR-SOM-AM43 UART3 interface through a standard 10 pin Header.

2.3.13.1 UART3 Header Pin-out (J16)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1			
2	UART3_RXD_CON	I	UART3 Receive
3	UART3_TXD_CON	O	UART3 Transmit
4	BASE_PER_3V3	P	Peripherals Power supply 3.3V
5	DGND	P	Digital ground
6			
7			
8	UART3_CTS_CON	I	UART3 CTS
9	UART3_RTS_CON	O	UART3 RTS
10			

Table 2-21 UART3 Header Pin-out (J16)

Note: UART3 is available only when no WiFi module is assembled on the VAR-SOM-AM43. Please refer to the VAR-SOM-AM43 datasheet for more information.

2.3.14 I2C/SPI

The VAR-AM43CustomBoard exposes the VAR-SOM-AM43 I2C/SPI interface through a standard 10 pin Header. SPI Interface can be configured to Master/Slave mode Please refer to the VAR-SOM-AM43 datasheet for complete interface description.

2.3.14.1 I2C/SPI Header Pin-out (J9)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	BASE_PER_3V3	P	Peripherals Power supply 3.3V
2	SPI2_SCLK	IO	SPI2 Clock
3	I2C0_SCL	IO	I2C0 Clock
4	SPI2_D0	IO	SPI2 Data 0
5	I2C0_SDA	IO	I2C0 Data
6	SPI2_D1	IO	SPI2 Data 1
7	I2C1_SCL	IO	I2C1 Clock
8	SPI2_CS0	IO	SPI2 Chip select
9	I2C1_SDA	IO	I2C1 Data
10	DGND	P	Digital ground

Table 2-22 I2C/SPI Header Pin-out (J9)

2.3.15 GPIO

The GPIO expansion connector pins are directly connected to the VAR-SOM-AM43.

2.3.15.1 GPIO Extension Header Pin-out (J19)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	BASE_PER_3V3	P	Peripherals Power supply 3.3V
2	GPIO2_3	IO	General Purpose IO, see note (*)
3	GPIO1_13	IO	General Purpose IO, see note (**)
4	GPIO2_4	IO	General Purpose IO, see note (*)
5	GPIO1_12	IO	General Purpose IO, see note (**)
6	GPIO2_5	IO	General Purpose IO, see note (*)
7	GPIO0_31		General Purpose IO, see note (*)(**)
8	GPIO2_2	IO	General Purpose IO, see note (*)
9	GPIO0_30		General Purpose IO, see note (*)(**)
10	DGND	P	Digital ground

Table 2-23 GPIO Header Pin-out (J19)

Note:
(*) Pins is used by on SOM NAND. Pins can be used on SOM without NAND assembled.
(**) Pin is referenced to 1.8V rail.

2.3.15.2 GPIO Expansion Header Pin-out (J20)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	BASE_PER_3V3	P	Peripherals Power supply 3.3V
2	GPIO1_4	IO	General Purpose IO, see note (*)
3	GPIO1_0	IO	General Purpose IO, see note (*)
4	GPIO1_5	IO	General Purpose IO, see note (*)
5	GPIO1_1	IO	General Purpose IO, see note (*)
6	GPIO1_6	IO	General Purpose IO, see note (*)
7	GPIO1_2	IO	General Purpose IO, see note (*)
8	GPIO1_7	IO	General Purpose IO, see note (*)
9	GPIO1_3	IO	General Purpose IO, see note (*)
10	DGND	P	Digital ground

Table 2-24 GPIO Header Pin-out (J20)

Note:
(*) Pin is used by on SOM NAND. Pin can be used on SOM without NAND assembled.

2.4 User Interfaces

2.4.1 Digital Microphone

U2, U3 are on board Digital Microphones L/R connected directly to VAR-SOM-AM43 Digital Audio lines.

2.4.2 LED Indications

2.4.2.1 Power-On LED (D1)

D1 indicates that the 5V DC_IN power rail of the VAR-AM43CustomBoard is on.

2.4.2.2 GP LEDs (D2, D3)

D5, D6 are General purpose functionality LEDs controlled by VAR-SOM-AM43 GPIOs.

2.4.3 Control Buttons

2.4.3.1 User Buttons (SW4, SW5, and SW6)

SW4, SW5, and SW6 are User Buttons connected to the VAR-SOM-AM43 GPIOs for general purpose. In android release they can be used for: Menu, Home & Back Buttons respectively.

2.4.3.2 Boot Select (SW1, SW2)

The Boot select switch SW1, SW2 set the VAR-SOM-AM43's boot source & sequence. Refer to the VAR-SOM-AM43 module data sheet for a detailed description.

SW1 Position	SW2 Position	Boot Source
OFF	OFF	Boot from Internal NAND
ON	OFF	External MMC
OFF	ON	Internal eMMC
ON	ON	Internal eMMC

Table 2-25 Boot Select modes (SW1,SW2)

2.4.3.3 Reset Button (SW3)

SW3 is the System hardware-reset button.

2.4.4 Power Input

The VAR-AM43CustomBoard is powered by a +5 V power supply, using a DC-in power jack compatible with a standard 2.0 mm power plug or a 2-Pin Terminal Block.

2.4.4.1 DC-in Jack Pin-out (J9)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	DGND	P	Digital ground
2	DGND	P	Digital ground
3	DC_IN	P	5V power input
4	DC_IN	P	5V power input

Table 2-26 DC-in Jack Pin-out (J9)

2.4.4.2 2 Pin Terminal Block (J2)

Pin #	VAR-AM43CustomBoard Signal	Type	Description
1	DGND	P	Digital ground
2	DC_IN	P	5V power input

Table 2-27 Pin Terminal Block (J2)

2.4.4.3 RTC Backup Battery (JBT100)

The VAR-AM43CustomBoard features a CR1225 battery holder for powering an on board RTC communicating with the VAR-SOM-AM43 via I2C.

3 Electrical Environmental Specifications

3.1 Absolute maximum electrical specifications

	Min	Max
Main Power supply, DC-IN	-0.3V	6

Table 3-1 Absolute maximum electrical specifications

3.2 Operational electrical specifications

	Min	Max
Main Power supply, DC-IN	4.8V	5.2V

Table 3-2 Operational electrical specifications

4 Environmental specifications

	Min	Max
Commercial operating temperature range	0^0C	+70^0C
MTBF	> 10000hrs	
Shock resistance	50G / 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
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