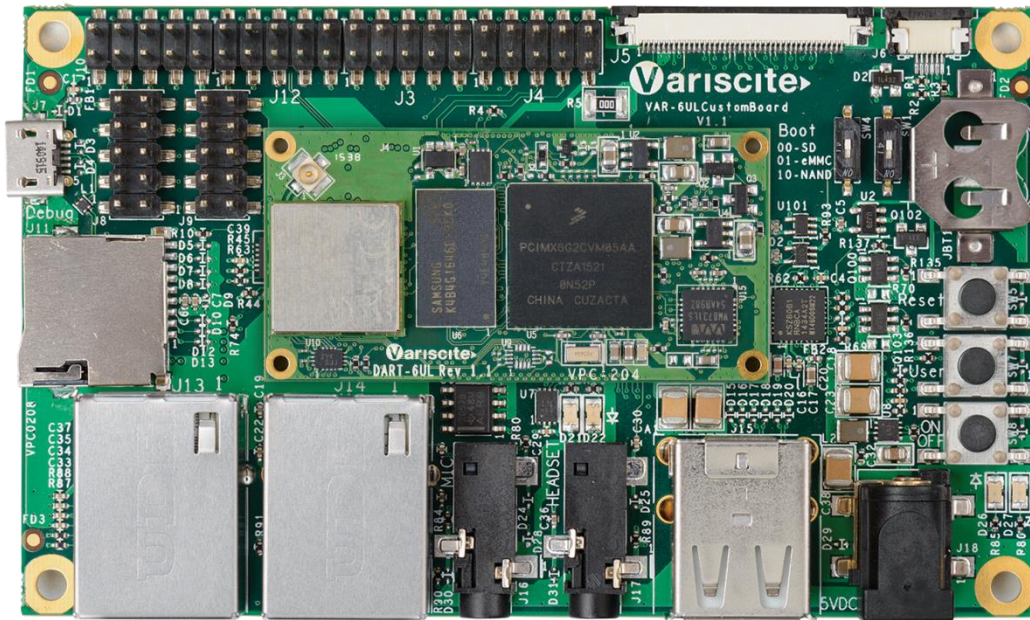




VARISCITE LTD

# VAR-6UL CustomBoard Datasheet

Carrier-board for the DART-6UL  
V 1.x



© 2015 Variscite Ltd.

All Rights Reserved. No part of this document may be photocopied, reproduced, stored in a retrieval system, or transmitted, in any form or by any means whether, electronic, Mechanical, or otherwise without the prior written permission of Variscite Ltd.

No warranty of accuracy is given concerning the contents of the information contained in this publication. To the extent permitted by law no liability (including liability to any person by reason of negligence) will be accepted by Variscite Ltd., its subsidiaries or employees for any direct or indirect loss or damage caused by omissions from or inaccuracies in this document.

Variscite Ltd. reserves the right to change details in this publication without notice. Product and company names herein may be the trademarks of their respective owners.

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	29/11/2015	Initial

# Table of Contents

Revision History.....	iii
Table of Contents .....	iv
List of Tables .....	6
1 Overview .....	7
1.1 General Information .....	7
1.1.1 Supporting Variscite products.....	7
1.1.2 Supporting O.S .....	7
1.1.3 Additional information .....	7
1.2 VAR-6ULCustomBoard features summary .....	8
1.3 Block Diagram.....	9
1.4 Board Layout.....	10
1.5 VAR-6ULCustomBoard connectors.....	11
2 Detailed Description .....	12
2.1 Overview .....	12
2.2 VAR-6ULCustomBoard Interfaces .....	13
2.3.1 DART-6UL .....	13
2.3 Standard External Interfaces.....	13
2.3.1 USB HOST & OTG .....	13
2.3.2 uSD Card .....	14
2.3.3 Ethernet .....	15
2.3.4 AUDIO.....	16
2.3.5 LCD.....	16
2.3.6 Capacitive Touch .....	18
2.3.7 Resistive Touch .....	18
2.3.8 USB - Debug.....	18
2.3.9 Extension Headers .....	19
2.4 User Interfaces.....	22
2.4.1 LED Indications.....	22

2.4.2	Control Buttons .....	22
2.4.3	Power Input.....	23
2.5	Assembly Options .....	24
2.5.1	Power On/Off using On/Off Button .....	24
2.5.2	Wi-Fi module improved 32.768 KHz input.....	24
2.5.3	Power consumption testing.....	24
2.5.4	CSI Parallel camera.....	25
3	Electrical Environmental Specifications .....	26
3.1	Absolute maximum electrical specifications .....	26
3.2	Operational electrical specifications .....	26
3.3	Environmental specifications.....	26
4	Legal notice .....	27
5	Warranty terms.....	28
6	Contact information .....	29

## List of Tables

Table 1-1 VAR-6ULCustomBoard connectors .....	11
Table 2-1 USB Host Connector Connector Pin-out (J20).....	13
Table 2-2 USB OTG to Host Connector Connector Pin-out (J23) .....	13
Table 2-3 uSD Card slot Connector Pin-out (J15) .....	14
Table 2-4 10/100BaseT RJ45 Connector Pin-out (J16, J17).....	15
Table 2-5 Headphone Jack Connector Pin-out (J19) .....	16
Table 2-6 Line In Jack Connector Pin-out (J18).....	16
Table 2-7 LVDS1 (Clock & Data Pairs 0-2) Connector Pin-out (J7) .....	17
Table 2-8 RGB LCD Connector Pin-out (J4).....	18
Table 2-9 Capacitive Touch Panel Connector Pin-out (J5) .....	18
Table 2-10 Resistive Touch Connector Pin-out (J3) .....	18
Table 2-11 USB Debug Connector Pin-out (J14).....	19
Table 2-12 I2C, CAN and GPIO Connector Pin-out (J12).....	19
Table 2-13 BT UART and GPIO Connector Pin-out (J6).....	19
Table 2-14 GPIO Connector Pin-out (J8).....	20
Table 2-15 UART3 and GPIO Connector Pin-out (J9) .....	20
Table 2-16 Ethernet Interface 1 Connector Pin-out (J10).....	20
Table 2-17 Digital Audio Connector Pin-out (J11).....	21
Table 2-18 GPIO Connector Pin-out (J13).....	21
Table 2-19 Boot Select modes (SW1, SW2).....	23
Table 2-20 DC-in Jack Pin-out (J22) .....	23
Table 2-21 DC-in 2 pin Terminal Block Pin-out (J21).....	23
Table 2-22 CSI Parallel camera connection .....	25
Table 3-1 Absolute maximum electrical specifications.....	26
Table 3-2 Operational electrical specifications.....	26
Table 3-3 Environmental specifications .....	26

# 1 Overview

This chapter gives an overview of the VAR-6ULCustomBoard.

## 1.1 General Information

The VAR-6ULCustomBoard is a complete development board, utilizing all of the DART-6UL 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

- DART-6UL
- 7" Capacitive touch LCD with RGB interface
- 7" Capacitive touch LCD with LVDS interface
- Parallel camera extension board

### 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](http://www.variscite.com),

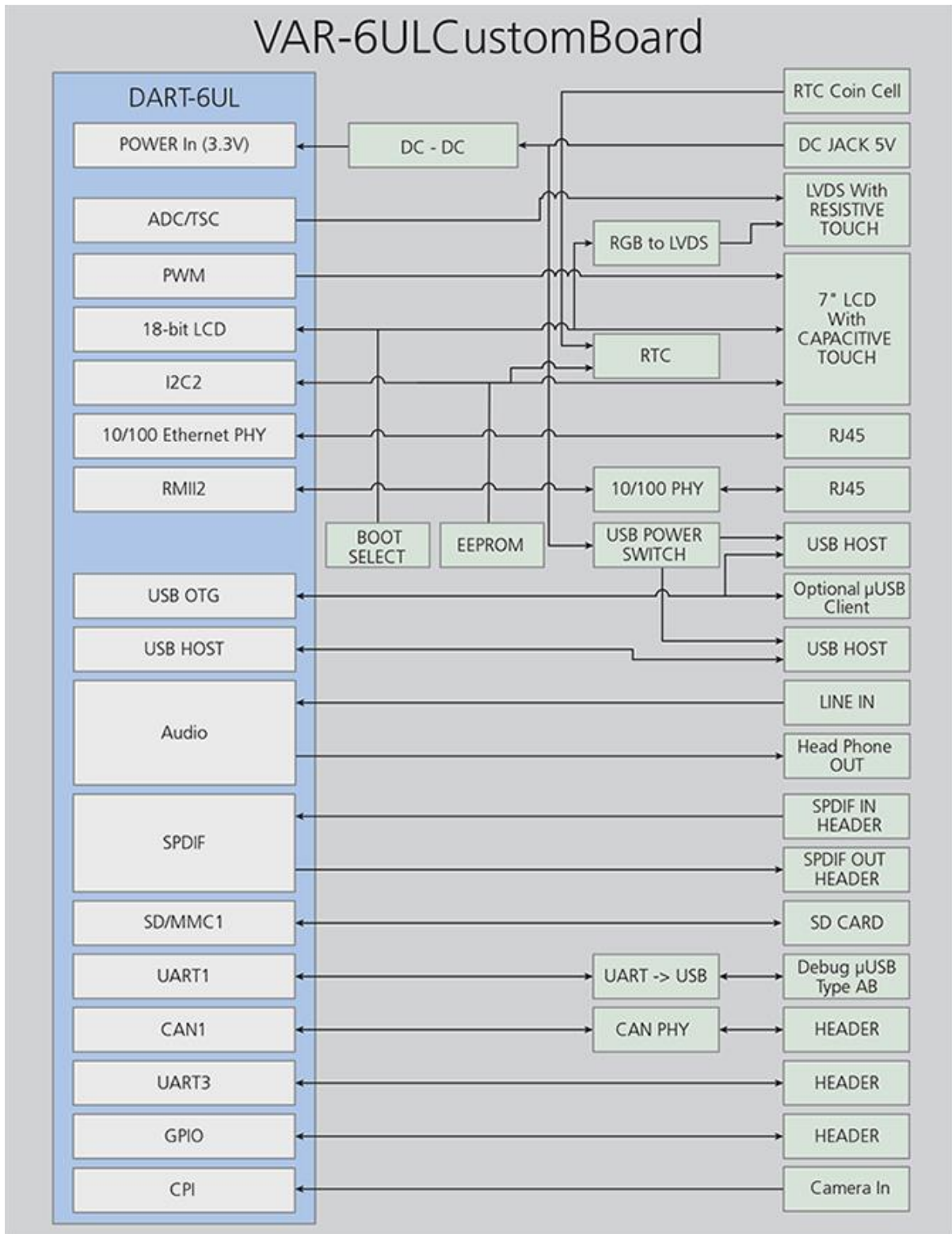
For further information contact Variscite support at <mailto:support@variscite.com>.

## 1.2 VAR-6UL CustomBoard features summary

- 2 x 90 Pin Board to Board connectors compatible with the DART-6UL
- Display
  - 18 bit LVDS Interface supporting Variscite's 7" TFT capacitive touch LCD
  - 18 bit RGB Interface supporting Variscite's 7" TFT capacitive touch LCD
- Touch panel interface
  - Capacitive - I2C based
  - Resistive
- Ethernet
  - 2 x 10/100BaseT – RJ45
- USB
  - 2 x USB2.0 Host Type A
  - USB2.0 ,Type Micro AB (optional for Device only)
- AUDIO
  - 3.5mm Headphones jack
  - 3.5mm Line in jack
- µSD-Card slot
- RS232 (UART3) Header
- CAN Bus
  - 1Mbit CAN bus Header
- Debug
  - USB debug (UART1) - Type Micro AB
- ISL12057 RTC
- Parallel camera interface header (optional: camera extension board)
- Additional
  - Miscellaneous Header
  - Digital Audio Header
  - SPI, I2C Header
  - General purpose LEDs, Buttons
- Power
  - 5V DC Input. - 2.0mm DC jack / 2 pin Terminal Block
  - RTC Backup battery - CR1225 Battery Holder

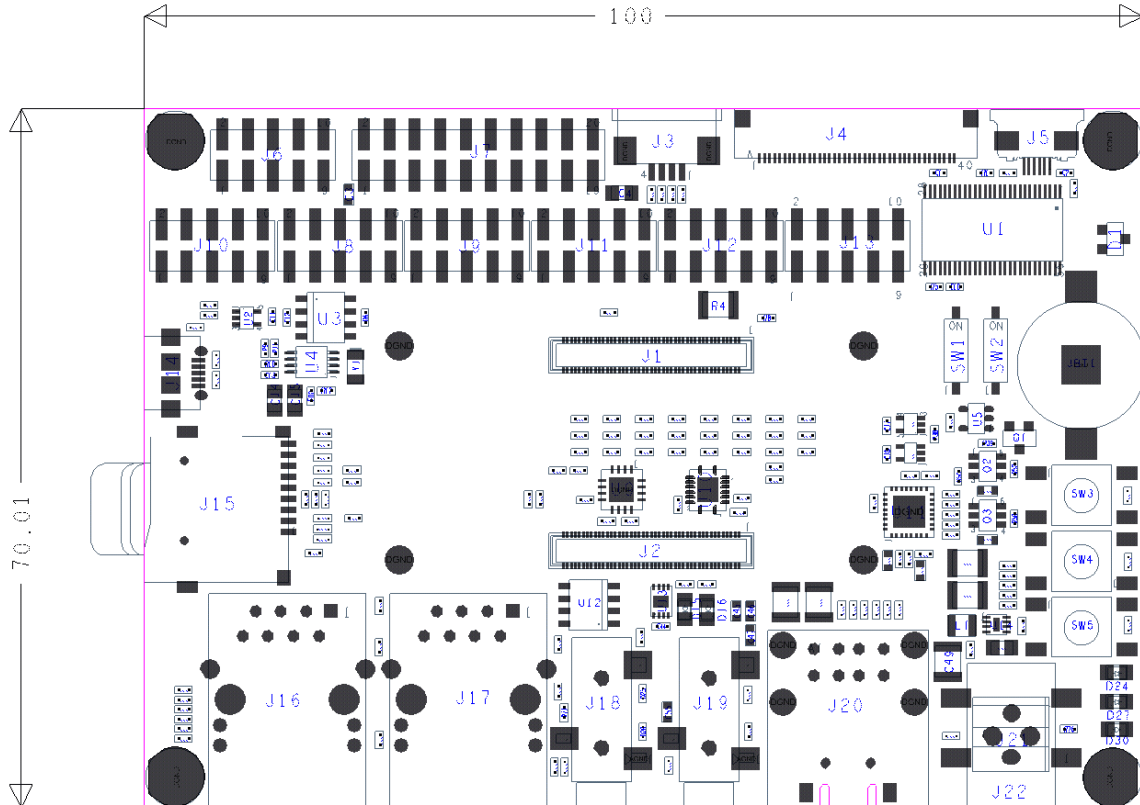


### 1.3 Block Diagram



## 1.4 Board Layout

The VAR-6ULCustomBoard's physical dimensions are 100 x 70 mm.



Detailed CAD files are available for download at [www.variscite.com](http://www.variscite.com).

## 1.5 VAR-6ULCustomBoard connectors

The below table lists all available connectors on the VAR-6ULCustomBoard, refer to chapter 2 for a more detailed description and Pin-out of each connector.

Reference	Function	Type
J1	DART-6UL SoM J1 Connector	Board to Board, 90Pos, 0.4mm
J2	DART-6UL SoM J2 Connector	Board to Board, 90Pos, 0.4mm
J3	Resistive touch Connector	FFC/FPC 4-pin
J4	RGB LCD Connector	FFC/FPC 40-pin
J5	Capacitive touch Connector	FFC/FPC 6-pin
J6	BT UART and GPIO Connector	Header SMT 5x2, 2.54mm
J7	LVDS LCD Connector	Header SMT 10x2, 2.54mm
J8	GPIO Connector	Header SMT 5x2, 2.54mm
J9	UART3 and GPIO Connector	Header SMT 5x2, 2.54mm
J10	Ethernet Interface 1 Connector	Header SMT 5x2, 2.54mm
J11	Digital Audio Connector	Header SMT 5x2, 2.54mm
J12	I2C, CAN and GPIO Connector	Header SMT 5x2, 2.54mm
J13	GPIO Connector	Header SMT 5x2, 2.54mm
J14	Debug UART Connector	USB Type micro AB
J15	Micro SD Card Socket	uSD socket
J16	Ethernet 1 Connector (internal PHY)	RJ45
J17	Ethernet 1 Connector (external PHY)	RJ45
J18	Line In Connector	Audio Jack 3.5 mm
J19	Head Phones Connector	Audio Jack 3.5 mm
J20	USB Host Connector	USB Type A Stacked
J21	5V DC In Connector (Optional)	2 Pin Terminal Block
J22	5V DC In Connector	DC In Jack 2.0 mm
J23	USB Client Connector (Optional)	USB Type micro AB
JBT1	RTC Battery Holder	CR1225 Battery Holder

Table 1-1 VAR-6ULCustomBoard connectors

## 2 Detailed Description

### 2.1 Overview

This chapter details the VAR-6ULCustomBoard's features and external interfaces, some of which are driven directly by the DART-6UL.

Please refer to the DART-6UL 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-6ULCustomBoard Signal:

VAR-6ULCustomBoard 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-6ULCustomBoard Interfaces

### 2.3.1 DART-6UL

The DART-6UL features two, low profile, Board to Board connectors to connect with the DART-6UL System-on-Module. Please refer to the DART-6UL module data sheet for a complete signal description and pin-out.

## 2.3 Standard External Interfaces

### 2.3.1 USB HOST & OTG

The DART-6UL drives USB Host to a Host Connector, USB OTG to both Host and Client connectors. Client Connector J23 placed on the Bottom of the PCB and is not assembled. The PN used for PCB Footprint is: Molex 47590-1001.

#### 2.3.1.1 USB HOST Connector Pin-out (J20)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
A1	USB1_VBUS	P	+5V power supply. 500ma max
A2	USB1_DN	DSI/O	USB Data Negative
A3	USB1_DP	DSI/O	USB Data Positive
A4	DGND	P	Digital ground
B1	USB2_VBUS	P	+5V power supply. 500ma max
B2	USB2_DN	DSI/O	USB Data Negative
B3	USB2_DP	DSI/O	USB Data Positive
B4	DGND	P	Digital ground

Table 2-1 USB Host Connector Connector Pin-out (J20)

#### 2.3.1.2 USB Client Connector Pin-out (J23)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	NC		
2	USB1_DM	DSI/O	USB Data Negative
3	USB1_DP	DSI/O	USB Data Positive
4	DGND	P	Digital ground

Table 2-2 USB OTG to Host Connector Connector Pin-out (J23)

### 2.3.2 uSD Card

uSD Card interface is driven by the SD1 interface of the of the DART-6UL.

This interface used by on SoM Wi-Fi module, so it is accessible only when the Wi-Fi module is disabled. This connector mainly used for development and program update of the SoM internal storage.

#### 2.3.2.1 uSD card slot Connector Pin-out (J15)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	SD1_DAT2	IO	MMC Parallel Data2
2	SD1_DAT3	IO	MMC Parallel Data3
3	SD1_CMD	IO	MMC command
4	VCC_3V3	P	3.3V Power supply
5	SD1_CLK	O	MMC Clock
6	DGND	P	Digital ground
7	SD1_DAT0	IO	MMC Parallel Data0
8	SD1_DAT1	IO	MMC Parallel Data1
9	SD1_CD	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 2-3 uSD Card slot Connector Pin-out (J15)

### 2.3.3 Ethernet

The VAR-6ULCustomBoard exposes a two 10/100Base-T Ethernet interfaces to a standard RJ45 Ethernet jack connectors with integrated magnetics using one on SoM and one On-Board Ethernet PHY driven by the RMII interface exposed by the DART-6UL. Please refer to the DART-6UL datasheet for more information.

#### 2.3.3.1 10/100/Base-T RJ45 Connector Pin-out (J16, J17)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
L1	Yellow LED Anode	I	Yellow LED Anode
L2	Yellow LED Cathode	O	Yellow LED Cathode
L3	Green LED Anode	I	Green LED Anode
L4	Green LED Cathode	O	Green LED Cathode
R1	TX Differential Pair Positive	DSO	TX Differential Pair Positive
R2	TX Differential Pair Negative	DSO	TX Differential Pair Negative
R3	RX Differential Pair Positive	DSI	RX Differential Pair Positive
R4	Bias Capacitor for TX Pair	O	Bias Capacitor for TX Pair
R5	NC		NC
R6	RX Differential Pair Negative	DSI	RX Differential Pair Negative
R7	Bias Capacitor for RX Pair	O	Bias Capacitor for RX Pair
R8	NC		
S1	Shield	P	Shield
S2	Shield	P	Shield

Table 2-4 10/100BaseT RJ45 Connector Pin-out (J16, J17)

## 2.3.4 AUDIO

The VAR-6ULCustomBoard features two 3.5mm jacks for audio interfaces.

- Headphone
- Line in

The Headphones signals are driven by the DART-6UL, while the Line in signals are driven to the DART-6UL.

Please refer to the DART-6UL data sheet for complete audio codec information.

### 2.3.4.1 Headphone jack Connector Pin-out (J19)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	DGND	AP	Audio Ground
2	HPLOUT	AO	Headphone out left
3	HPROUT	AO	Headphone out right

Table 2-5 Headphone Jack Connector Pin-out (J19)

### 2.3.4.2 Line In jack Connector Pin-out (J18)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	DGND	AP	Audio Ground
2	LINEIN_LP	AI	Line in Left input
3	LINEIN_RP	AI	Line in Right input

Table 2-6 Line In Jack Connector Pin-out (J18)

## 2.3.5 LCD

The VAR-6ULCustomBoard exposes a 3 data lane LVDS interface driven by RGB to LVDS converter assembled on the Custom Board.

Variscite's standard 7" LVDS LCD screen connects to Header J7.

Variscite's standard 7" RGB LCD screen connects to FFC connector J4.

### 2.3.5.1 LVDS LCD Connector Pin-out (J7)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	VCC_3V3	P	3.3V Power supply
2	VCC_3V3	P	3.3V Power supply
3	DGND	P	Digital ground
4	DGND	P	Digital ground
5	LVDS_TX0_N	DSO	LVDS lane 0, negative signal
6	LVDS_TX0_P	DSO	LVDS lane 0, positive signal
7	DGND	P	Digital ground
8	LVDS_TX1_N	DSO	LVDS lane 1, negative signal
9	LVDS_TX1_P	DSO	LVDS lane 1, positive signal
10	DGND	P	Digital ground
11	LVDS_TX2_N	DSO	LVDS lane 2, negative signal
12	LVDS_TX2_P	DSO	LVDS lane 2, positive signal



13	DGND	P	Digital ground
14	LVDS_CLK_N	DSO	LVDS clock, negative signal
15	LVDS_CLK_P	DSO	LVDS clock, positive signal
16	DGND	P	Digital ground
17	VCC_5V	P	VLED +5V Power supply
18	VCC_5V	P	VLED +5V Power supply
19	PWM_BACKLIGHT	O	Backlight brightness control
20	DGND	P	Digital ground

Table 2-7 LVDS1 (Clock & Data Pairs 0-2) Connector Pin-out (J7)

### 2.3.5.2 RGB LCD Connector Pin-out (J4)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	DGND	P	Digital ground
2	DGND	P	Digital ground
3	LCD_DATA0	O	Backlight PWM Signal
4	VCC_5V	P	5V Power Supply
5	VCC_5V	P	5V Power Supply
6	VCC_5V	P	5V Power Supply
7	VCC_3V3	P	3.3V Power Supply
8	VCC_3V3	P	3.3V Power Supply
9	LCD_ENABLE	O	LCD DE Signal
10	DGND	P	Digital ground
11	DGND	P	Digital ground
12	DGND	P	Digital ground
13	LCD_DATA7	O	LCD Blue bit 5
14	LCD_DATA6	O	LCD Blue bit 4
15	LCD_DATA5	O	LCD Blue bit 3
16	DGND	P	Digital ground
17	LCD_DATA4	O	LCD Blue bit 2
18	LCD_DATA3	O	LCD Blue bit 1
19	LCD_DATA2	O	LCD Blue bit 0 (LSB)
20	DGND	P	Digital ground
21	LCD_DATA15	O	LCD Green bit 5
22	LCD_DATA14	O	LCD Green bit 4
23	LCD_DATA13	O	LCD Green bit 3
24	DGND	P	Digital ground
25	LCD_DATA12	O	LCD Green bit 2
26	LCD_DATA11	O	LCD Green bit 1
27	LCD_DATA10	O	LCD Green bit 0 (LSB)
28	DGND	P	Digital ground
29	LCD_DATA23	O	LCD Red bit 5
30	LCD_DATA22	O	LCD Red bit 4
31	LCD_DATA21	O	LCD Red bit 3
32	DGND	P	Digital ground
33	LCD_DATA20	O	LCD Red bit 2
34	LCD_DATA19	O	LCD Red bit 1
35	LCD_DATA18	O	LCD Red bit 0 (LSB)
36	DGND	P	Digital ground
37	DGND	P	Digital ground

Pin #	VAR-6ULCustomBoard Signal	Type	Description
38	LCD_CLK	O	LCD Pixel Clock
39	DGND	P	Digital ground
40	DGND	P	Digital ground

Table 2-8 RGB LCD Connector Pin-out (J4)

### 2.3.6 Capacitive Touch

The DART-6UL provides a capacitive touch interface exposed to a FFC/FPC connector for connecting to Variscite's standard 7" Capacitive touch LCD screen. Both RGB and LVDS type LCDs use the same connector.

#### 2.3.6.1 Capacitive Touch Connector Pin-out (J5)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	RESET	O	Reset signal
2	I2C2_SDA	IO	I2C3 data signal
3	I2C2_SCL	O	I2C3 clock signal
4	GPIO_3_4	I	Interrupt signal connected to GPIO3[4]
5	VCC_3V3	P	3.3V Power supply
6	DGND	P	Digital ground
7	DGND	P	Digital ground
8	DGND	P	Digital ground

Table 2-9 Capacitive Touch Panel Connector Pin-out (J5)

### 2.3.7 Resistive Touch

The VAR-6ULCustomBoard provides a resistive interface exposed to a FFC/FPC connector for connecting to resistive touch LCD screen. The touch interface connected directly to DART-6UL TSC/ADC interface.

#### 2.3.7.1 Resistive Touch Connector Pin-out (J3)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	GPIO1_1	AI	Y negative side plate connection
2	OSC_32K_OUT	AI	X negative side plate connection
3	GPIO1_2	AI	Y positive side plate connection
4	GPIO1_4	AI	X positive side plate connection
5	DGND	P	Digital Ground
6	DGND	P	Digital Ground

Table 2-10 Resistive Touch Connector Pin-out (J3)

### 2.3.8 USB - Debug

The DART-6UL exposed the debug UART1 interface to the VAR-6ULCustomBoard. The signals are driven by an on-board UART-to-USB Bridge and exposed to a Micro USB connector.

### 2.3.8.1 USB Debug Connector Pin-out (J14)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	DEBUG_VBUS_C	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 2-11 USB Debug Connector Pin-out (J14)

### 2.3.9 Extension Headers

The DART-6UL SoM exports most of the iMX6UL chip pins to the user. Part of them is used by on SoM peripherals such as Ethernet PHY, Audio Codec, Wi-Fi and Bluetooth module. To allow maximum flexibility all the pins that are not used by base board are driven to the Extension Headers for user accessibility. Please pay attention that part of pins is used on SoM so they are useful only on specific subsets of the SoM.

#### 2.3.9.1 I2C, CAN and GPIO Connector Pin- out (J12)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	I2C2_SCL	O	I2C Bus 2 Clock
2	GPIO5_5	IO	GPIO5[5]
3	I2C2_SDA	IO	I2C Bus 2 Data
4	GPIO5_8	IO	GPIO5[8]
5	I2C1_SCL	O	I2C Bus 1 Clock
6	GPIO5_9	IO	GPIO5[9]
7	I2C1_SDA	IO	I2C Bus 1 Data
8	GPIO4_17	IO	GPIO4[17]
9	CANH0	DSI/O	CAN Bus High
10	CANL0	DSI/O	CAN Bus Low

Table 2-12 I2C, CAN and GPIO Connector Pin-out (J12)

#### 2.3.9.2 BT UART and GPIO Connector (J6)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	BT_UART_CTS_B	IO	UART2 CTS (used by on SoM Bluetooth module)
2	BT_UART_TX	IO	UART2 TX (used by on SoM Bluetooth module)
3	BT_UART_RTS_B	IO	UART2 RTS (used by on SoM Bluetooth module)
4	BT_UART_RX	IO	UART2 RX (used by on SoM Bluetooth module)
5	GPIO4_22	IO	GPIO4[22]
6	GPIO5_1	IO	GPIO5[1]
7	GPIO4_23	IO	GPIO4[23]
8	DGND	P	Digital ground
9	VCC_3V3	P	3.3V power supply
10	WLAN_FORCE_DIS	I	Wi-Fi disable input. Assembly a jumper between pin 9 & 10 to route SDI signals to external SD card connector.

Table 2-13 BT UART and GPIO Connector Pin-out (J6)

### 2.3.9.3 GPIO Connector (J8)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	GPIO1_5	IO	GPIO1[5]
2	NAND_CLE	IO	NAND CLE (used by on SoM NAND)
3	GPIO1_8	IO	GPIO1[8]
4	NAND_WP_B	IO	NAND Write Protect (used by on SoM NAND)
5	GPIO1_9	IO	GPIO1[9]
6	NAND_READY_B	IO	NAND Ready (used by on SoM NAND)
7	GPIO1_4	IO	GPIO1[4]
8	NAND_DQS	P	NAND DQS (used by on SoM NAND)
9	LCD_DATA21	IO	LCD Data bit 21
10	NAND_CE1_B	IO	NAND CE1

Table 2-14 GPIO Connector Pin-out (J8)

### 2.3.9.4 UART3 and GPIO Connector (J9)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	UART3_CTS_B	IO	UART3 CTS
2	OSC_32K_OUT	IO	32.768Khz Oscillator Out
3	UART3_RTS_B	IO	UART3 RTS
4	GPIO1_1	IO	GPIO1[1]
5	UART3_RX	IO	UART3 RX
6	GPIO1_2	IO	GPIO1[2]
7	UART3_TX	IO	UART3 TX
8	MICBIAS	P	Microphone Bias
9	LCD_DATA20	IO	LCD Data bit 20
10	MICIN	AI	Analog Microphone In

Table 2-15 UART3 and GPIO Connector Pin-out (J9)

### 2.3.9.5 Ethernet Interface 1 Connector (J10)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	ETH1_RX_EN	IO	Ethernet 1 RX EN (used by on SoM Ethernet PHY)
2	ETH1_TX_CLK	IO	Ethernet 1 TX CLK (used by on SoM Ethernet PHY)
3	ETH1_TDATA0	IO	Ethernet 1 TX Data 0 (used by on SoM Ethernet PHY)
4	ETH1_RDATA0	IO	Ethernet 1 RX Data 0 (used by on SoM Ethernet PHY)
5	ETH1_TDATA1	IO	Ethernet 1 TX Data 1 (used by on SoM Ethernet PHY)
6	ETH1_RDATA1	IO	Ethernet 1 RX Data 1 (used by on SoM Ethernet PHY)
7	ETH1_RX_ER	IO	Ethernet 1 RX ER (used by on SoM Ethernet PHY)
8	ETH1_TX_EN	IO	Ethernet 1 TX EN (used by on SoM Ethernet PHY)
9	LCD_DATA22	IO	LCD Data bit 22
10	USB_OTG1_CHD_B	I	USB OTG Charger detect

Table 2-16 Ethernet Interface 1 Connector Pin-out (J10)

## 2.3.9.6 Digital Audio Connector (J11)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	BT_AUD_TX_SYNC	IO	SAI2 TX Sync (used by on SoM Bluetooth audio)
2	AUD_TX_SYNC	IO	SAI1 TX Sync (used by on SoM Audio Codec)
3	BT_AUD_TX_BCLK	IO	SAI2 TX BCLK (used by on SoM Bluetooth audio)
4	AUD_TX_BCLK	IO	SAI1 TX BCLK (used by on SoM Audio Codec)
5	BT_AUD_RX_DATA	IO	SAI2 RX Data (used by on SoM Bluetooth audio)
6	AUD_TX_DATA	IO	SAI1 TX Data (used by on SoM Audio Codec)
7	BT_AUD_TX_DATA	IO	SAI2 TX Data (used by on SoM Bluetooth audio)
8	AUD_RX_DATA	IO	SAI1 RX Data (used by on SoM Audio Codec)
9	GPIO4_21	IO	GPIO4[21]
10	AUD_MCLK	IO	SAI2 MCLK (used by on SoM Audio Codec)

Table 2-17 Digital Audio Connector Pin-out (J11)

## 2.3.9.7 GPIO Connector (J13)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	CCM_CLK1_N	DSO	SAI2 TX Sync (used by on SoM Bluetooth audio)
2	GPIO4_24	IO	GPIO4[24]
3	CCM_CLK1_P	DSO	SAI2 TX BCLK (used by on SoM Bluetooth audio)
4	GPIO4_18	IO	GPIO4[18]
5	LCD_DATA16	IO	GPIO3[21]
6	BOOT1	IO	GPIO5[11] (Boot strap pin)
7	LCD_DATA17	IO	GPIO3[22]
8	BOOT0	IO	GPIO5[10] (Boot strap pin)
9	LCD_DATA1	IO	GPIO3[6]
10	LCD_DATA23	IO	LCD Data bit 23

Table 2-18 GPIO Connector Pin-out (J13)

## 2.4 User Interfaces

### 2.4.1 LED Indications

#### 2.4.1.1 Power-On LED (D24)

Led D24 indicates that the SoM 3.3V power supply is ON and supplies the voltage to the SoM.

#### 2.4.1.2 Peripheral 3.3V Power LED (D30)

Led D30 indicates that the Custom Board peripheral devices 3.3V power supply is ON. This LED will be turned off in the deep sleep mode.

#### 2.4.1.3 Peripheral 5V Power LED (D27)

Led D27 indicates that the Custom Board peripheral devices 5V power supply is ON. This LED will be turned off in the deep sleep mode.

#### 2.4.1.4 GP LED (D16)

LED D16 is General purpose functionality LEDs controlled by GPIO4[20].

### 2.4.2 Control Buttons

#### 2.4.2.1 User Button (SW4)

SW4 is User Button connected to the GPIO1[0] for general purpose.

#### 2.4.2.2 Reset Button (SW3)

SW3 is Reset Button connected to the Reset Line of the SoM.

#### 2.4.2.3 On/Off Button (SW5)

SW5 is On/Off Button connected to the On/Off Line of the SoM.

#### 2.4.2.4 Boot Select (SW1, SW2)

The Boot select switches SW1, SW2 sets the DART-6UL's boot source & sequence. Refer to the DART-6UL module data sheet for detailed Boot description.

SW1	SW2	Boot Source
OFF	OFF	External (MMC)
OFF	ON	Internal (eMMC)
ON	---	Internal (NAND)

Table 2-19 Boot Select modes (SW1, SW2)

#### 2.4.3 Power Input

The VAR-6ULCustomBoard is powered by a +5V power supply, connected either through a 2.0 mm power plug or alternatively through a 2 pin Terminal block.

##### 2.4.3.1 DC-in Jack Pin-out (J22)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	DGND	P	Digital ground
2	DGND	P	Digital ground
3	PWR_IN	P	+5V power input
4	PWR_IN	P	+5V power input

Table 2-20 DC-in Jack Pin-out (J22)

##### 2.4.3.2 DC-in 2 pin Terminal Block Pin-out (J21)

Pin #	VAR-6ULCustomBoard Signal	Type	Description
1	DGND	P	Digital ground
2	PWR_IN	P	+5V power input

Table 2-21 DC-in 2 pin Terminal Block Pin-out (J21)

##### 2.4.3.3 RTC Backup Battery (JBT1)

The VAR-6ULCustomBoard features JBT1, a CR1225 battery holder for powering the On board ISL12057IUZ RTC Module.

## 2.5 Assembly Options

### 2.5.1 Power On/Off using On/Off Button

The On/Off button is connected to the On/Off signal of the iMX6UL CPU. Long press on this button will reset the system and reboot. There is an option to power off the module by long press of On/Off Button. In order to achieve this, the following changes should be done on the VAR-6UL Custom Board:

- Allow PMIC\_ON\_REQ to shut down the main power supply.  
Move the assembled resistor R69 to R62 place. It will allow the CPU to shut down the main SoM power supply.
- Connect VCC\_COIN to battery.  
Move the assembled resistor R47 to R46 place. It will supply the CPU power for RTC domain. On/Off signal and PMIC\_ON\_REQ signal are part of the RTC domain. This domain should be powered all the time.
- Battery.  
Do not forget to insert the coin cell battery into JBT1.

### 2.5.2 Wi-Fi module improved 32.768 KHz input.

The On SoM Wi-Fi module needs 32.768 KHz signal to be supplied for proper operation. There are three options to choose for a correct operation of the Wi-Fi module.

- Use Wi-Fi's internal clock source and it gives approximate signal near 32.768Khz.  
The Wi-Fi is fully working in this mode, but the power performance is decreased.  
In this option the OSC\_32K\_IN should be tied to ground.
- Use OSC\_32K\_OUT signal of the SoM. This is the best option, but this pin is also used by the Resistive Touch Controller interface, so if both Resistive touch and Wi-Fi are needed this option is not available. Assemble resistor R45 with 0Ω resistor to achieve this option.
- Use RTC output to drive the Wi-Fi input. In case both Resistive Touch controller and Wi-Fi are needed, resistor R44 can be assembled this will connect 32.768 KHz clock of the RTC chip to the Wi-Fi module.

### 2.5.3 Power consumption testing.

Disassemble resistor R4 and measure the current flow using DVM.



### 2.5.4 CSI Parallel camera.

Parallel camera connection to the board is achieved by using Extension headers to route all needed signals to one camera module.

- 8 Bit CSI Parallel camera connects to the headers with no influence on other board interfaces. The connection is done to CSI\_DATA[2] .. CSI\_DATA[9].
- 10 Bit CSI Parallel camera connects to the headers with no influence on other board interfaces. The connection is done to CSI\_DATA[0] .. CSI\_DATA[9].
- 16 Bit CSI Parallel camera connects to the headers and it interfere with LCD Red Data lines. The connection is done to CSI\_DATA[0] .. CSI\_DATA[15].

Pin#	Function
J9.5	CSI_DATA0
J9.7	CSI_DATA1
J11.9	CSI_DATA2
J6.5	CSI_DATA3
J6.7	CSI_DATA4
J13.2	CSI_DATA5
J11.2	CSI_DATA6
J11.4	CSI_DATA7
J11.8	CSI_DATA8
J11.6	CSI_DATA9
J9.1	CSI_DATA10
J9.3	CSI_DATA11
J12.5	CSI_DATA12
J12.7	CSI_DATA13
J10.9	CSI_DATA14
J13.10	CSI_DATA15
J12.8	CSI_MCLK
J13.4	CSI_PIXCLK
J8.1	CSI_FIELD
J8.3	CSI_VSYNC
J8.5	CSI_HSYNC

Table 2-22 CSI Parallel camera connection

## 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

### 3.3 Environmental specifications

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

Table 3-3 Environmental specifications

## 4 Legal notice

Variscite LTD (“Variscite”) products and services are sold subject to Variscite’s terms and conditions of sale, delivery and payment supplied at the time of order acknowledgement.

Variscite warrants performance of its products to the specifications in effect at the date of shipment. Variscite reserves the right to make changes to its products and specifications or to discontinue any product or service without notice. Customers should therefore obtain the latest version of relevant information from Variscite to verify that the information is current.

Testing and other quality control techniques are utilized to the extent Variscite deems necessary to support its warranty.

Specific testing of all parameters of each device is not necessarily performed unless required by law or regulation.

In order to minimize risks associated with customer applications, the customer must use adequate design and operating safeguards to minimize inherent or procedural hazards. Variscite is not liable for applications assistance or customer product design. The customer is solely responsible for its selection and use of Variscite products. Variscite is not liable for such selection or use nor for use of any circuitry other than circuitry entirely embodied in a Variscite product.

Variscite products are not intended for use in life support systems, appliances, nuclear systems or systems where malfunction can reasonably be expected to result in personal injury, death or severe property or environmental damage. Any use of products by the customer for such purposes is at the customer’s own risk.

Variscite does not grant any license (express or implied) under any patent right, copyright, mask work right or other intellectual property right of Variscite covering or relating to any combination, machine, or process in which its products or services might be or are used. Any provision or publication of any third party’s products or services does not constitute Variscite’s approval, license, warranty or endorsement thereof. Any third party trademarks contained in this document belong to the respective third party owner.

Reproduction of information from Variscite datasheets is permissible only if reproduction is without alteration and is accompanied by all associated copyright, proprietary and other notices (including this notice) and conditions. Variscite is not liable for any un-authorized alteration of such information or for any reliance placed thereon.

Any representations made, warranties given, and/or liabilities accepted by any person which differ from those contained in this datasheet or in Variscite’s standard terms and conditions of sale, delivery and payment are made, given and/or accepted at that person’s own risk. Variscite is not liable for any such representations, warranties or liabilities or for any reliance placed thereon by any person.

## 5 Warranty terms

Variscite guarantees hardware products against defects in workmanship and material for a period of one (1) year from the date of shipment. Your sole remedy and Variscite's sole liability shall be for Variscite, at its sole discretion, to either repair or replace the defective hardware product at no charge or to refund the purchase price. Shipment costs in both directions are the responsibility of the customer. This warranty is void if the hardware product has been altered or damaged by accident, misuse or abuse.

### Disclaimer of Warranty

THIS WARRANTY IS MADE IN LIEU OF ANY OTHER WARRANTY, WHETHER EXPRESSED, OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A SPECIFIC PURPOSE, NON-INFRINGEMENT OR THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION, EXCEPT THE WARRANTY EXPRESSLY STATED HEREIN. THE REMEDIES SET FORTH HEREIN SHALL BE THE SOLE AND EXCLUSIVE REMEDIES OF ANY PURCHASER WITH RESPECT TO ANY DEFECTIVE PRODUCT.

### Limitation on Liability

UNDER NO CIRCUMSTANCES SHALL VARISCITE BE LIABLE FOR ANY LOSS, DAMAGE OR EXPENSE SUFFERED OR INCURRED WITH RESPECT TO ANY DEFECTIVE PRODUCT. IN NO EVENT SHALL VARISCITE BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES THAT YOU MAY SUFFER DIRECTLY OR INDIRECTLY FROM USE OF ANY PRODUCT.

## 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](mailto:sales@variscite.com)  
Technical support: [support@variscite.com](mailto:support@variscite.com)

Website: [www.variscite.com](http://www.variscite.com)

