



VARISCITE LTD

VAR-SD410CustomBoard Datasheet

Carrier-board for the DART-SD410 Rev 1.x

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Revision History

Revision	Date	Notes
1.0	10/11/2015	Initial

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1 Overview

This chapter gives an overview of the VAR-SD410CustomBoard.

1.1 General Information

The VAR-SD410CustomBoard is a complete development board, utilizing all of the DART-SD410 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-SD410
- 7" Capacitive touch LCD

1.1.2 Supporting O.S

- Linux BSP
- Android
- Windows TBD

1.1.3 Additional information

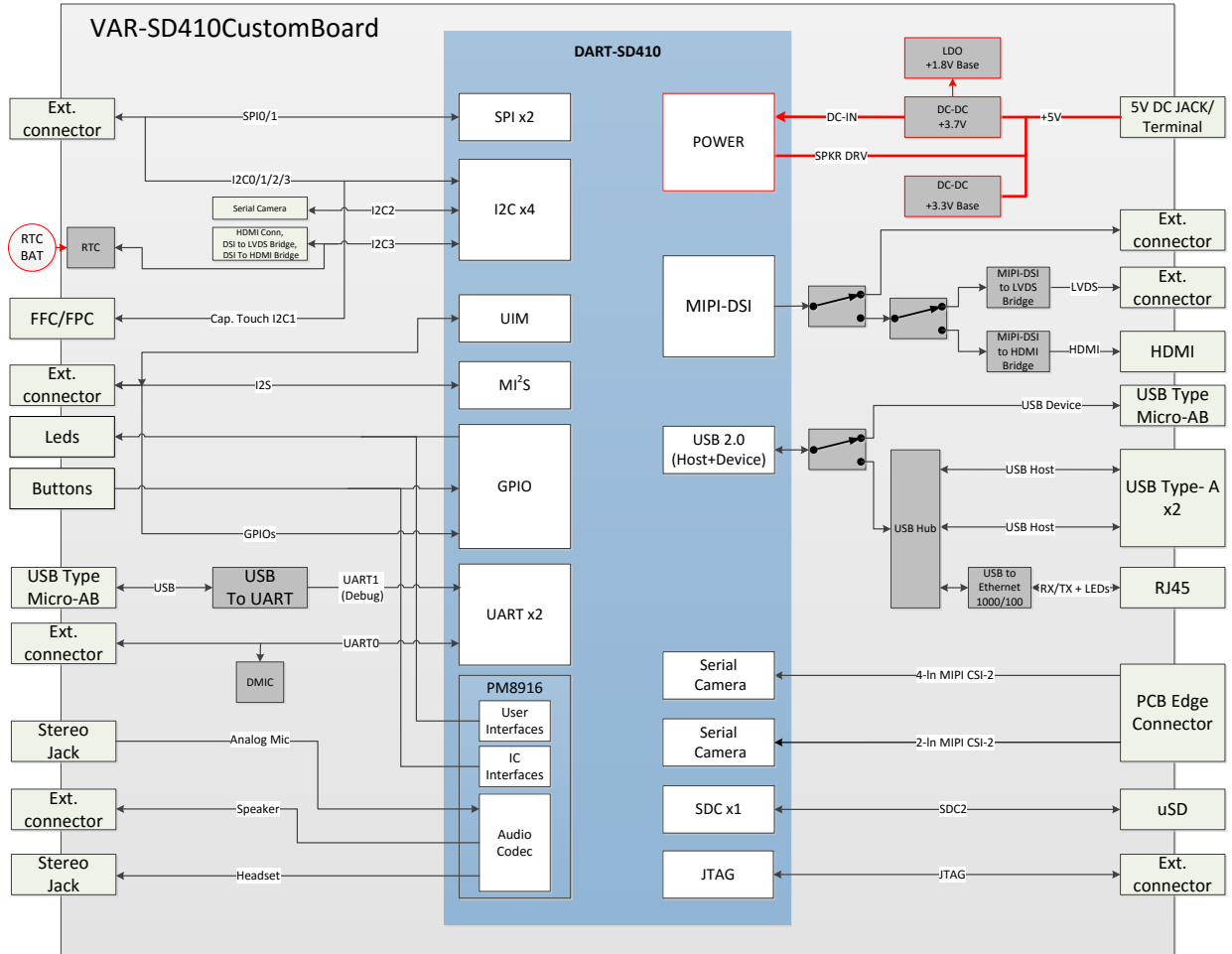
Board schematics as well as mechanical CAD data base is available to download at www.variscite.com,

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

1.2 VAR-SD410CustomBoard features summary

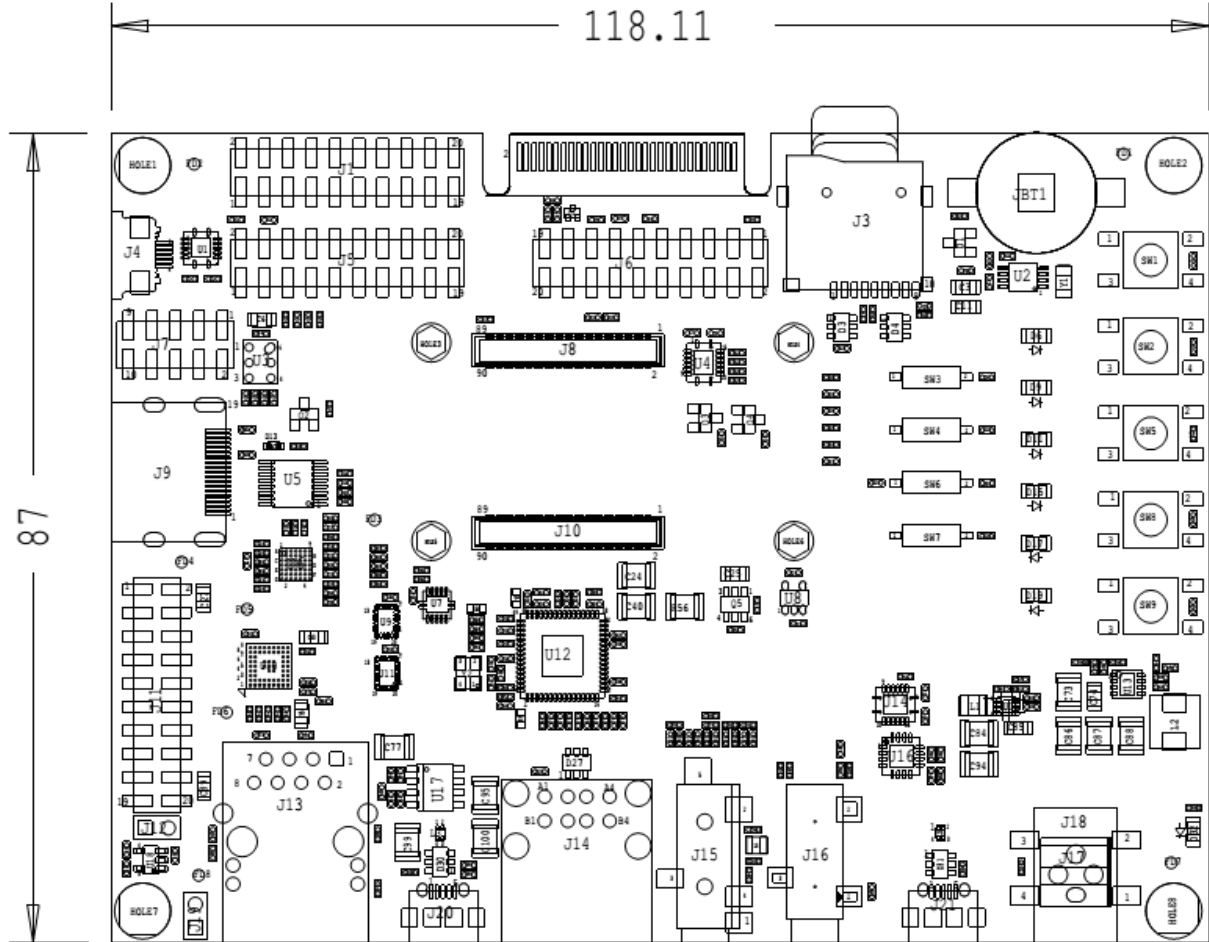
- 2 x 90 PIN board to board connectors compatible with the DART-SD410
- Display
 - 24 bit LVDS Interface supporting Variscite's 7" TFT capacitive touch LCD
 - HDMI Type A
- Touch panel interface
 - Capacitive - I2C based
- Ethernet
 - 1000/100/10 Base-T – RJ45
- USB
 - 1 x USB2.0 Device, Type Micro AB
 - 2 x USB2.0 Host Type A
- AUDIO
 - 3.5mm Headset jack
 - 3.5mm Analog Microphone jack
 - Speaker Header
 - Digital Microphone
- μ SD-Card slot
- Camera PCB edge connector
 - MIPI-CSI 4 lane Serial interface
 - MIPI-CSI 2 lane Serial interface
- RS232 (UART0) Header
- USB debug (UART1) - Type Micro AB
- JTAG Header
- ISL12057 RTC
- Additional
 - SPI, I2C Header
 - I2S, UIM, GPIOs Header
 - LEDS (General purpose +Notification), Buttons (General Purpose + control)
- 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-SD410CustomBoard's physical dimensions are 118 x 87 mm.



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

1.5 VAR-SD410CustomBoard connectors

The below table lists all available connectors on the VAR-SD410CustomBoard, refer to chapter 2 for a more detailed description and Pin-out of each connector.

Reference	Function	Type
J1	DART-SD410 Connector J1	Board to Board, 90Pos, 0.4mm
J2	DART-SD410 Connector J2	Board to Board, 90Pos, 0.4mm
J3	SD-MMC	uSD Connector
J4	Capacitive Touch Panel I/F	FFC/FPC 6-pin
J5	SPI,I2C	Header SMT, 5x2, 2.54mm
J6	JTAG	Header SMT, 10x2, 2.54mm
J7	UART0	Header SMT, 5x2, 2.54mm
J8	GPIO/I2S	Header SMT, 5x2, 2.54mm
J9	HDMI	HDMI Type A Conn
J10	Dual Serial Camera I/F	PCB Edge connector
J11	LVDS (Clock & Data pairs 0-2)	Header SMT, 10x2, 2.54mm
J12	LVDS (Data pair 3)	Header TH, 1x2, 2.54mm
J13	EEPROM Write Protect Disable	Header TH, 1x2, 2.54mm
J14	Dual USB Host	USB Type A Dual Stacked
J15	Headset	Audio Jack 3.5 mm
J16	Microphone	Audio Jack 3.5 mm
J17	Power In	2 Pin Terminal Block
J18	Power In	DC In Jack 2.0 mm
J19	Speaker	Header TH, 1x2, 2.54mm
J20	USB Device	USB Type micro AB
J21	USB Debug	USB Type micro AB
J22	1000/ 100/10 Ethernet Port	RJ-45
J23	DSI	Header SMT, 10x2, 2.54mm
JBT1	RTC Battery Holder	CR1225 Battery Holder

Table 1-1 VAR-SD410CustomBoard connectors

2 Detailed Description

2.1 Overview

This chapter details the VAR-SD410CustomBoard's features and external interfaces, some of which are driven directly by the DART-SD410.

Please refer to the DART-SD410 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-SD410CustomBoard Signal:

VAR-SD410CustomBoard 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-SD410CustomBoard Interfaces

2.2.1 DART-SD410

The DART-SD410 features two 90 pin, low profile, Board to Board connectors to connect with the DART-SD410 System-on-module. Please refer to the DART-SD410 module data sheet for a complete signal description and pin-out.

2.3 Standard External Interfaces

2.3.1 USB Device/ USB HOST + Ethernet

The DART-SD410 drives a USB OTG Interface to a USB switch on the VARSD410CustomBoard. The switch, routes this single USB channel to a USB2514 chip (USB HUB) or to a μ USB connector. The switch is software controlled. One of the USB HUB ports is connected to LAN7500 chip (USB to Ethernet) and it provides 1000/100/10 Base-T Ethernet connection.

Note: the board can work in one mode at a time, Host mode or Device mode, not both.

2.3.1.1 USB Device Connector Pin-out (J20)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	USB_OTG_VBUS	P	5V in
2	USB_HS_D_M_DEVICE_C	DSI/O	USB Data Negative
3	USB_HS_D_P_DEVICE_C	DSI/O	USB Data Positive
4			
5	DGND	P	Digital ground

Table 2-1 USB Device connector Pin-out (J20)

2.3.1.2 Dual USB HOST Connector Pin-out (J14)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
A1	USB_H2_VBUS	P	+5V power supply. 500ma max
A2	USB_HS_D_M_HOST2	DSI/O	USB HOST2 Data Negative
A3	USB_HS_D_P_HOST2	DSI/O	USB HOST2 Data Positive
A4	DGND	P	Digital ground
B1	USB_H1_VBUS	P	+5V power supply. 500ma max
B2	USB_HS_D_M_HOST1	DSI/O	USB HOST1 Data Negative
B3	USB_HS_D_P_HOST1	DSI/O	USB HOST1 Data Positive
B4	DGND	P	Digital ground

Table 2-2 Dual USB HOST Connector Pin-out (J14)

2.3.1.3 1000/100/10BASE-TX RJ45 Connector Pin-out (J22)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
L1	LED2	Cathode	Link LED Cathode
L2	BASE_PER_3V3	Anode	Link LED Anode
L3	LED1	Cathode	Speed LED Cathode
L4	BASE_PER_3V3	Anode	Speed LED Anode
R1	ETH_TRP0	DSO	Ethernet Pair 0 Out Positive
R2	ETH_TRN0	DSO	Ethernet Pair 0 Out Negative
R3	ETH_TRP1	DSO	Ethernet Pair 1 Out Positive
R4	ETH_TRN1	DSO	Ethernet Pair 1 Out Negative
R5	BASE_PER_3V3	O	Bias voltage
R6	BASE_PER_3V3	O	Bias voltage
R7	ETH_TRP2	DSO	Ethernet Pair 2 Out Positive
R8	ETH_TRN2	DSO	Ethernet Pair 2 Out Negative
R9	ETH_TRP3	DSO	Ethernet Pair 3 Out Positive
R10	ETH_TRN3	DSO	Ethernet Pair 3 Out Negative

Table 2-3 1000/100/10BASE-TX RJ45 Connector Pin-out (J22)

2.3.2 uSD Card

uSD Card interface is driven by the SDC2 interface of the of the DART-SD410.

2.3.2.1 uSD card slot Connector Pin-out (J3)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	SDC2_DATA_2	IO	MMC Parallel Data2
2	SDC2_DATA_3	IO	MMC Parallel Data3
3	SDC2_CMD	IO	MMC command
4	VREG_L11_SDC	P	SDC Power supply 2.95V
5	SDC2_CLK	O	MMC Clock
6	DGND	P	Digital ground
7	SDC2_DATA_0	IO	MMC Parallel Data0
8	SDC2_DATA_1	IO	MMC Parallel Data1
9	SD_CARD_DET_N	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 (J3)

2.3.3 AUDIO

The VAR-SD410CustomBoard features three audio interfaces:

- Headset 3.5mm jack
- Microphone 3.5mm jack
- Speaker Header

The signals are driven by the PM8196 (Power & Audio codec IC) on board the DART-SD410. The VAR-SD410CustomBoard also features an on-board stereo Digital Microphone (Section [2.4.1](#)) driven by the APQ8016.

Please refer to the DART-SD410 data sheet for complete audio codec information.

2.3.3.1 Headset jack Connector Pin-out (J15)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	CDC_MIC2_P	AO	Headset microphone
2	CDC_HPH_L	AO	Headset out left
3	CDC_HPH_R	AO	Headset out right
4	CDC_HPH_REF & FM_RX_ANT	AI	Headset ground sensing & DART-SD410 FM antenna Input
5	CDC_HS_DET	AI	Headset detection

Table 2-5 Headset Jack Connector Pin-out (J15)

2.3.3.2 Microphone jack Connector Pin-out (J16)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	GND_CFLT	AP	Audio Ground
2	CDC_MIC1_P	AI	Microphone input
3	CDC_MIC_BIAS1	AO	Microphone bias

Table 2-6 Microphone In Jack Connector Pin-out (J16)

2.3.3.3 Speaker Header Connector Pin-out (J19)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	SPKR_OUT_P	AO	Class-D speaker amp + output
2	SPKR_OUT_M	AO	Class-D speaker amp - output

Table 2-7 Speaker Header Connector Pin-out (J19)

2.3.4 UART0

The DART-SD410 exports the 4 line UART0 interface with additional supply rails, to a standard 10 pin Header on the VAR-SD410CustomBoard.

Note: UART0 lines are multiplexed with the On Board digital Microphone (DMIC) lines Interface is available only when the On Board digital Microphone (DMIC) is not assembled.

2.3.4.1 UART0 Connector Pin- out (J7)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1			
2	UART0_RX_CONN	I	UART0 Receive
3	UART0_TX_CONN	O	UART0 Transmit
4			
5	DGND	P	Digital Ground
6	VCC_5V		DC-in Power supply 5V
7	UART0_CTS_N	I	UART0 CTS
8	UART0_RTS_N	O	UART0 RTS
9	BASE_PER_3V3	P	Peripherals Power supply 3.3V
10	BASE_PER_1V8	P	Peripherals Power supply 1.8V

Table 2-8 UART0 Connector Pin-out (J7)

2.3.5 Camera Board PCB connector

The VAR-SD410CustomBoard exports the DART-SD410 2-lane MIPI CSI & a 4-lane MIPI CSI serial camera interfaces to a 60POS 0.8mm PCB connector. Mating Edge connector is Samtec P/N: HSEC8-130-01-SM-DV-A

Variscite's a complimentary Dual Camera sensor board with an integrated Omnivision 5MP OV5645 CMOS image sensor & Sony IMX135 13MP CMOS image sensor is available For utilizing the DART-SD410 advanced multimedia capabilities for both evaluation and application development

2.3.5.1 PCB Connector Pin-out (J10)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	CAM_VCC_3V3	P	Camera Power supply 3.3V
2	CAM_DGND	P	Camera Digital Ground
3	CAM_VCC_3V3	P	Camera Power supply 3.3V
4	CAM_I2C3_SDA	IO	Camera 0 I2C3 Data
5	CAM_VCC_1V8	P	Camera Power supply 1.8V
6	CAM_I2C3_SCL	O	Camera 0 I2C3 Clock
7	CAM_VCC_1V8	P	Camera Power supply 1.8V
8	CAM_DGND	P	Camera Digital Ground
9	CAM_DGND	P	Camera Digital Ground
10	CAM_CSI1_PWDN	O	Camera 1 Power Down
11	CAM_MIPI_CSI0_DATA0_P	DSI	Camera 0 Data 0 Positive
12	CAM_CSI1_RST	O	Camera 1 Reset
13	CAM_MIPI_CSI0_DATA0_M	DSI	Camera 0 Data 0 Negative
14			
15	CAM_DGND	P	Camera Digital Ground
16			
17	CAM_MIPI_CSI0_DATA1_P	DSI	Camera 0 Data 1 Positive
18	CAM_DGND	P	Camera Digital Ground
19	CAM_MIPI_CSI0_DATA1_M	DSI	Camera 0 Data 1 Negative
20	CAM_CSI1_MCLK	O	Camera 1 Clock
21	CAM_DGND	P	Camera Digital Ground
22	CAM_DGND	P	Camera Digital Ground
23	CAM_MIPI_CSI0_DATA2_P	DSI	Camera 0 Data 2 Positive
24			
25	CAM_MIPI_CSI0_DATA2_M	DSI	Camera 0 Data 2 Negative
26			
27	CAM_DGND	P	Camera Digital Ground
28	CAM_DGND	P	Camera Digital Ground
29	CAM_MIPI_CSI0_DATA3_P	DSI	Camera 0 Data 3 Positive
30			
31	CAM_MIPI_CSI0_DATA3_M	DSI	Camera 0 Data 3 Negative
32			

Pin #	VAR-SD410CustomBoard Signal	Type	Description
33	CAM_DGND	P	Camera Digital Ground
34	CAM_DGND	P	Camera Digital Ground
35	CAM_MIPI_CSI0_DATA4_P	DSI	Camera 0 Data 4 Positive
36	CAM_MIPI_CSI1_DATA2_M	DSI	Camera 1 Data 2 Negative
37	CAM_MIPI_CSI0_DATA4_M	DSI	Camera 0 Data 4 Negative
38	CAM_MIPI_CSI1_DATA2_P	DSI	Camera 1 Data 2 Positive
39	CAM_DGND	P	Camera Digital Ground
40	CAM_DGND	P	Camera Digital Ground
41	CAM_CSI0_MCLK	O	Camera 0 Clock
42	CAM_MIPI_CSI1_DATA1_M	DSI	Camera 1 Data 1 Negative
43	CAM_DGND	P	Camera Digital Ground
44	CAM_MIPI_CSI1_DATA1_P		Camera 1 Data 1 Positive
45			
46	CAM_DGND	P	Camera Digital Ground
47			
48	CAM_MIPI_CSI1_DATA0_M	DSI	Camera 1 Data 0 Negative
49	CAM_CSI0_RST	O	Camera 0 Reset
50	CAM_MIPI_CSI1_DATA0_P	DSI	Camera 1 Data 0 Positive
51	CAM_CSI0_PWDN		Camera 0 Power Down
52	CAM_DGND	P	Camera Digital Ground
53	CAM_DGND	P	Camera Digital Ground
54	CAM_VCC_1V8	P	Camera Power supply 1.8V
55	CAM_I2C2_SCL		Camera 1 I2C2 Clock
56	CAM_VCC_1V8	P	Camera Power supply 1.8V
57	CAM_I2C2_SDA		Camera 1 I2C2 Data
58	CAM_VCC_3V3	P	Camera Power supply 3.3V
59	CAM_DGND	P	Camera Digital Ground
60	CAM_VCC_3V3	P	Camera Power supply 3.3V

Table 2-9 PCB Camera Connector Pin-out (J10)

2.3.6 Display Interfaces – HDMI & LVDS

The DART-SD10 exposes a 4-lane MIPI DSI Interface. The Interface is routed to either DSI external connector J23, or to HDMI Bridge (Analog Devices ADV7533), or to a DSI to LVDS Bridge (TI SN65DSI84). The switch can be controlled by software controlling GPIO. Only one interface, DSI, HDMI, or LVDS can be active at a given time.

2.3.6.1 HDMI Connector Pin-out (J9)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	HDMI_D2P	DSO	HDMI Data 2 positive
2	DGND	P	Digital ground
3	HDMI_D2M	DSO	HDMI Data 2 negative
4	HDMI_D1P	DSO	HDMI Data 1 positive
5	DGND	P	Digital ground
6	HDMI_D1M	DSO	HDMI Data 1 negative
7	HDMI_D0P	DSO	HDMI Data 0 positive
8	DGND	P	Digital ground
9	HDMI_D0M	DSO	HDMI Data 0 negative
10	HDMI_CLKP	DSO	HDMI Clock positive
11	DGND	P	Digital ground
12	HDMI_CLKM	DSO	HDMI Clock negative
13	HDMICONN_CEC	IO	CEC signal
14			
15	HDMICONN_SCL	O	HDMI I2C Data
16	HDMICONN_SDA	IO	HDMI I2C Clock
17	DGND	P	Digital ground
18	5V_HDMI	P	+5V Power supply
19	HDMICONN_HPD	I	Hot Plug detect signal

Table 2-10 HDMI Connector Pin-out (J9)

2.3.6.2 LVDS (Clock & Data pairs 0-2) Connector Pin-out (J11)

LVDS Interface: balanced Clock and Data pairs 0-2 are routed to a standard 20 pin Header While Data pair 3 is routed to a 2 pin Header for Optional connection.
Variscite's standard 7" Capacitive touch LCD screen connects to the LVDS 20 Pin Header

Pin #	VAR-SD410CustomBoard 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	LVDS1_TX0_N	DSO	LVDS lane 0, negative signal
6	LVDS1_TX0_P	DSO	LVDS lane 0, positive signal
7	DGND	P	Digital ground
8	LVDS1_TX1_N	DSO	LVDS lane 1, negative signal
9	LVDS1_TX1_P	DSO	LVDS lane 1, positive signal
10	DGND	P	Digital ground
11	LVDS1_TX2_N	DSO	LVDS lane 2, negative signal
12	LVDS1_TX2_P	DSO	LVDS lane 2, positive signal
13	DGND	P	Digital ground
14	LVDS1_CLK_N	DSO	LVDS clock, negative signal
15	LVDS1_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	PM_MPP4_3V3	O	Backlight brightness control
20	DGND	P	Digital ground

Table 2-11 LVDS (Clock & Data Pairs 0-2) Connector Pin-out (J11)

2.3.6.3 LVDS (Data pair 3) Connector Pin-out (J12)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	LVDS1_TX3_N	DSO	LVDS lane 3, negative signal
2	LVDS1_TX3_P	DSO	LVDS lane 3, positive signal

Table 2-12 LVDS (Data Pair 3) Connector Pin-out (J12)

2.3.6.4 DSI Connector Pin-out (J23)

Note: The J23 Connector is optional, usually it is not assembled and it is located on the bottom side of the PCB board.

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	BASE_PER_1V8	P	Peripherals Power supply 1.8V
2	DSI_CLK_P_EXT	DSO	DSI Clock Positive signal
3	BASE_PER_3V3	P	Peripherals Power supply 3.3V
4	DSI_CLK_M_EXT	DSO	DSI Clock Negative signal
5	VCC_5V	P	Peripherals Power supply 5.0V
6	DSI_DATA0_P_EXT	DSO	DSI Data 0 Positive signal
7	BASE_PER_1V2	P	Peripherals Power supply 1.2V
8	DSI_DATA0_M_EXT	DSO	DSI Data 0 Negative signal
9	GPIO_108	IO	GPIO 108 signal
10	DSI_DATA1_P_EXT	DSO	DSI Data 1 Positive signal
11	DGND	P	Digital ground
12	DSI_DATA1_M_EXT	DSO	DSI Data 1 Negative signal
13	DGND	P	Digital ground
14	DSI_DATA2_P_EXT	DSO	DSI Data 2 Positive signal
15	DGND	P	Digital ground
16	DSI_DATA2_M_EXT	DSO	DSI Data 2 Negative signal
17	DGND	P	Digital ground
18	DSI_DATA3_P_EXT	DSO	DSI Data 3 Positive signal
19	DGND	P	Digital ground
20	DSI_DATA3_M_EXT	DSO	DSI Data 3 Negative signal

Table 2-13 LVDS (Data Pair 3) Connector Pin-out (J23)

2.3.7 Capacitive Touch

The DART-SD410 provides a capacitive Touch interface exposed to a FFC/FPC connector for connecting to Variscite's standard 7" Capacitive touch LCD screen.

2.3.7.1 Capacitive Touch Panel Connector Pin-out (J4)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	TOUCH_RST	O	Reset signal
2	TOUCH_DTA	IO	I2C3 data signal
3	TOUCH_CLK	O	I2C3 clock signal
4	TOUCH_INT	I	Interrupt signal connected to GPIO1[4]
5	BASE_PER_3V3	P	Peripherals Power supply 3.3V
6	DGND	P	Digital ground

Pin #	VAR-SD410CustomBoard Signal	Type	Description
7	DGND	P	Digital ground
8	DGND	P	Digital ground

Table 2-14 Capacitive Touch Panel Connector Pin-out (J4)

2.3.8 USB - Debug

The DART-SD410 exports the debug UART1 interface to the VAR-SD410CustomBoard. 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 (J21)

Pin #	VAR-SD410CustomBoard 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 2-15 USB Debug Connector Pin-out (J21)

2.3.9 I2C/SPI

The VAR-SD410CustomBoard exports the DART-SD410 BAM-enabled low-speed peripheral lines (BLSP) configured as I2C/SPI signals through a standard 20 pin Header. Please refer to DART-SD410 Datasheet for complete interface description.

2.3.9.1 I2C/SPI Header Pin-out (J5)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	I2C1_SCL	O	I2C1 Clock signal
2	I2C2_SCL	O	I2C2 Clock signal
3	I2C1_SDA	IO	I2C1 Data signal
4	I2C2_SDA	IO	I2C2 Data signal
5	I2C0_SCL	O	I2C0 Clock signal
6	I2C3_SCL	O	I2C3 Clock signal
7	I2C0_SDA	IO	I2C0 Data signal
8	I2C3_SDA	IO	I2C3 Data signal
9	SPI1_CLK	O	SPI1 Clock signal
10	SPI0_CLK	O	SPI0 Clock signal
11	SPI1_CS_N	O	SPI1 Chip Select signal
12	SPI0_CS_N	O	SPI0 Chip Select signal
13	SPI1_MOSI	O	SPI1 SIMO signal
14	SPI0_MOSI	O	SP0 SIMO signal
15	SPI1_MISO	I	SPI1 SOMI signal

Pin #	VAR-SD410CustomBoard Signal	Type	Description
16	SPIO_MISO	I	SPIO SOMI signal
17	DGND	P	Digital Ground
18	DGND	P	Digital Ground
19	DGND	P	Digital Ground
20	DGND	P	Digital Ground

Table 2-16 I2C/SPI Header Pin-out (J5)

2.3.10 Digital Audio (MI2S) /GPIOs

The VAR-SD410CustomBoard exports the DART-SD410 MI2S Digital audio interface signals and many more configurable GPIOs to a standard 20 pin Header.

Please refer to DART-SD410 Datasheet for complete interface description and GPIO configuration options.

2.3.10.1 Digital Audio (MI2S)/ GPIOs Header Pin-out (J8)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	GPIO_105	IO	General Purpose IO
2	BASE_PER_1V8	P	Peripherals Power supply 1.8V
3	GPIO_106	IO	General Purpose IO
4	GPIO_25	IO	General Purpose IO
5	GPIO_96	IO	General Purpose IO
6	GPIO_24	IO	General Purpose IO
7	GPIO_62	IO	General Purpose IO
8	GPIO_36	IO	General Purpose IO
9	GPIO_69	IO	General Purpose IO
10	GPIO_98	IO	General Purpose IO
11	GPIO_115	IO	General Purpose IO
12	GPIO_49	IO	General Purpose IO
13	GPIO_116	IO	General Purpose IO
14	GPIO_50	IO	General Purpose IO
15	MI2S_WS	IO	Word Select signal
16	GPIO_51	IO	General Purpose IO
17	MI2S_SCK	IO	MI2S SCLK signal
18	GPIO_52	IO	General Purpose IO
19	MI2S_DATA0	IO	MI2S Data0 signal
20	DGND	P	Digital Ground

Table 2-17 Digital Audio (MI2S)/ GPIOs Header Pin-out (J8)

2.3.11 JTAG

The VAR-SD410CustomBoard exposes an ARM JTAG interface to through a standard 20 pin Header.

2.3.11.1 JTAG Connector Pin-out (J6)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	JTAG_VREF	P	JTAG Voltage reference
2	BASE_PER_3V3	P	Peripherals Power supply 3.3V
3	JTAG_TRST_N	I	JTAG Test Reset
4	DGND	P	Digital ground
5	JTAG_TDI	I	JTAG Test Data In
6	DGND	P	Digital ground
7	JTAG_TMS	I	JTAG Test Mode Select
8	DGND	P	Digital ground
9	JTAG_TCK	I	JTAG Test Clock
10	DGND	P	Digital ground
11	JTAG_RTCK	O	JTAG Return Test Clock
12	DGND	P	Digital ground
13	JTAG_TDO	O	JTAG Test Data Out
14	DGND	P	Digital ground
15	JTAG_SRST_N	I	JTAG System Reset
16	DGND	P	Digital ground
17	JTAG_DET_N	I	JTAG Debug Request
18	DGND	P	Digital ground
19			
20	DGND	P	Digital ground

Table 2-18 JTAG Connector Pin-out (J6)

2.3.12 EEPROM Write Protect Disable

The DART-SD410 internal EEPROM is protected from writing by default. The protection can be removed by shorting pins 1 & 2 of J13 connector. Please use with care erasing or writing wrong values into the internal EEPROM will damage the DART-SD410.

2.3.12.1 EEPROM WP Disable Connector Pin-out (J13)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	EEPROM_WP_	I	EEPROM Write Protect signal
2	DGND	P	Digital ground

Table 2-19 EEPROM WP Disable Connector Pin-out (J13)

2.4 User Interfaces

2.4.1 Digital Microphone

Optional U3 is an on board Digital Microphone (DMIC) connected to the DART-SD410 Digital Audio interface lines. Note: DMIC lined are multiplexed with UART0 lines and cannot be used simultaneously.

2.4.2 LED Indications

2.4.2.1 Power-On LED (D32)

Led D32 indicates that the VCC_5V DC IN power rail of the VAR-SD410CustomBoard is on.

2.4.2.2 GP LEDs (D6, D9, D11, D15)

LEDs D6, D9, D11, D15 are General purpose LEDs controlled by DART-SD410's GPIOs.

2.4.2.3 Status LEDs (D17, D19)

LEDs D17, D19 are LEDs controlled by DART-SD410's GPIOs reflecting the BT/ Wi-Fi status. D17 - BT status LED, D19 – Wi-Fi status LED

2.4.3 Control Buttons

2.4.3.1 Reset Button (SW1)

SW1 is Reset button connected directly to RESET_N chip of the processor. It is designed to ease the programming of the board.

2.4.3.2 User Button (SW5)

SW5 is User Button connected to the DART-SD410' GPIOs for general purpose. In Android release it serves as Home button.

2.4.3.3 Boot Select (SW3, SW7)

The Boot select switch SW3 sets the DART-SD410's boot source & sequence

Position	Logic Level	boot source & sequence
ON	'1'	External (SD Card) → Internal (eMMC) → USB 2.0
OFF	'0'	Internal (eMMC) → External (SD Card) → USB 2.0

Table 2-20 Boot Source & sequence (SW3)

In addition, an option for forced USB Boot is available through SW7. When High '1' the boot source will be from USB regardless of SW3's state.

Position	Logic Level	boot source & sequence
ON	'1'	USB 2.0
OFF	'0'	According to SW3 position

Table 2-21 Forced USB Boot (SW3)

2.4.3.4 ON/OFF Button (SW9)

Upon applying power the board, the boot process will start. Once the board is running:

- 1) A reset will occur when this button is pressed for more than 10 seconds.
- 2) In a sleep mode, pressing the button will wake up the board.

2.4.3.5 Back and Reset Button (SW8)

SW8 has several functions; it serves as a reset button, as Fast Boot request button, and as a Back button:

- 1) Pressing this button on power up will force the system to enter Fast Boot mode.
- 2) Button presses shorter than 10 second will be interpreted by software as a Back button.
- 3) Presses longer than 10 second will cause a System hardware-reset.

2.4.4 Power Input

The VAR-SD410CustomBoard is powered by a +5V power supply, connected either through a 2.0 mm power plug or alternatively through a 2 pin Terminal block.

2.4.4.1 DC-in Jack Pin-out (J18)

Pin #	VAR-SD410CustomBoard 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 2-22 DC-in Jack Pin-out (J18)

2.4.4.2 DC-in 2 pin Terminal Block Pin-out (J17)

Pin #	VAR-SD410CustomBoard Signal	Type	Description
1	DGND	P	Digital ground
2	PWR_IN	P	+5V power input

Table 2-23 DC-in 2 pin Terminal Block Pin-out (J17)

2.4.4.3 RTC Backup Battery (JBT1)

The VAR-SD410CustomBoard features JBT1, a CR1225 battery holder for powering the On board ISL12057IUZ RTC Module.

Note: The on board ISL1205IUZ RTC chip is assembled as a reference for I2C connection. The DART-SD410 has internal RTC that is fully working and useable.

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°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 4-1 Environmental specifications

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