

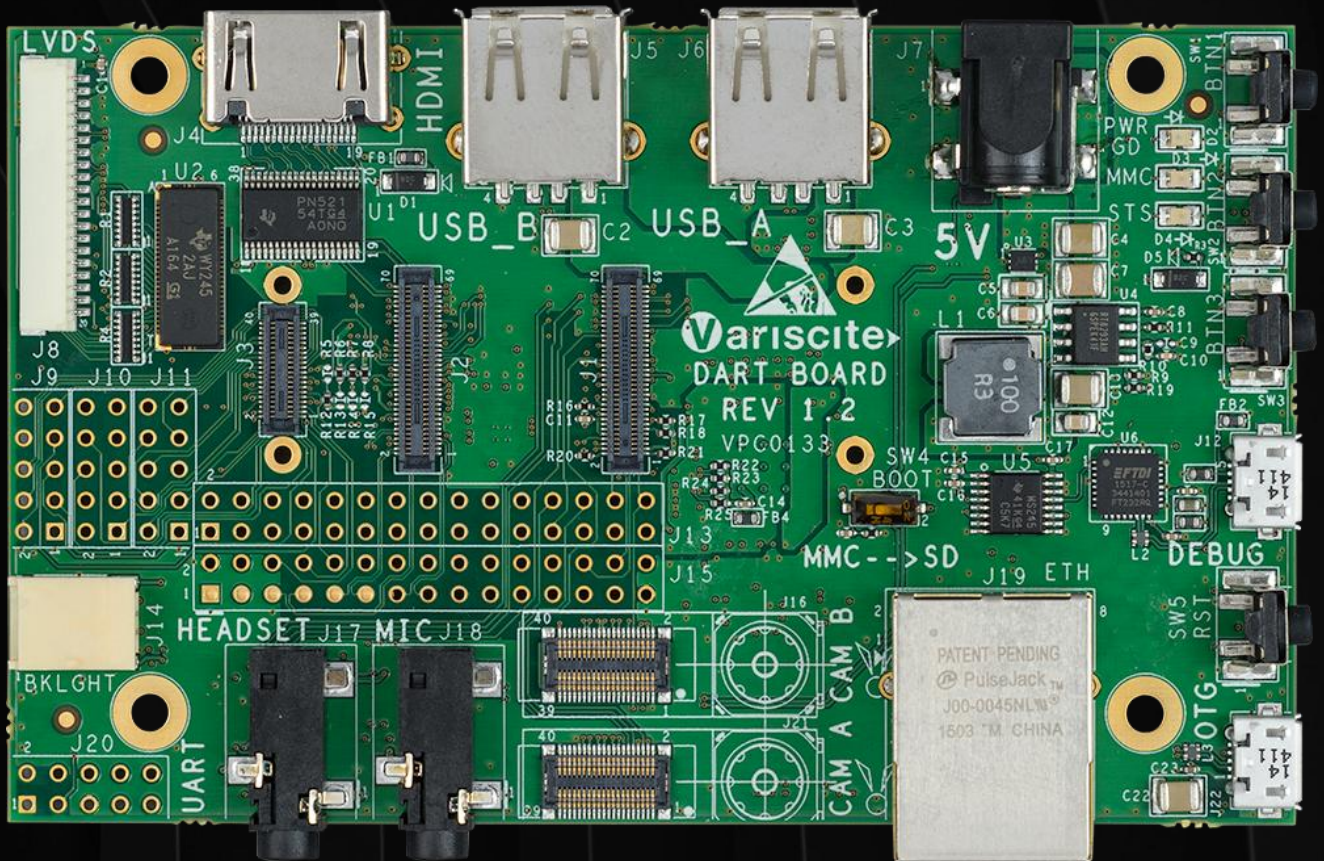


Rev. 1.2, 12/2015

VARISCITE LTD.

DART-BOARD Datasheet V1.2

Carrier-board for DART-4460



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Revision History

Revision	Date	Notes
0.1	22/07/2013	Preliminary
1.0	16/09/2013	Initial publish revision
1.1	21/12/2014	CSI2 signals description corrected
1.2	07/12/2015	Section 2.3.8- Camera P/N corrected

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1 Overview

This chapter gives an overview of the DART-Board.

1.1 General Information

The DART BOARD is a complete development board, utilizing all DART-4460 System-on-Module features. It is assembled with large variety of debug & testing means as an OTG interface, two MIPI-CS2 cameras, 10/100BaseT Ethernet, Parallel LCD FFC/FPC connector, serial interfaces and GPIO expansion connectors enables full DART-4460 testing ,evaluating ,and interfacing to custom hardware or a third part evaluation kit.

1.1.1 Supporting Variscite products

- DART-4460 SOM
- MIPICSI-2 Camera
- Capacitive touch LCD screen

1.1.2 Supporting O.S

- Linux BSP
- Android

1.1.3 Additional information

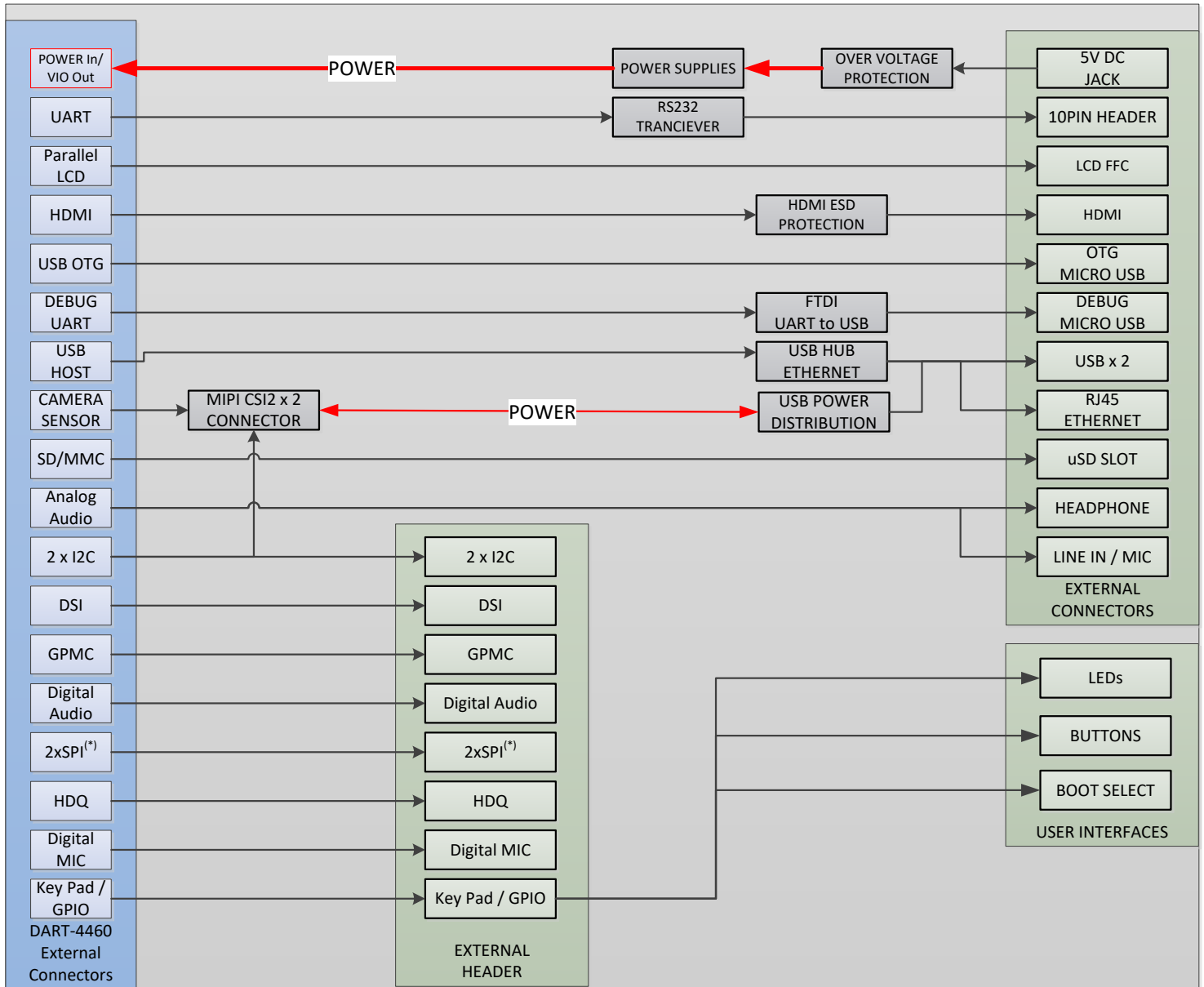
Board schematics as well as mechanical CAD data base is available to download at www.variscite.com,

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

1.2 DART BOARD features summary:

- DART-4460 socket
- Dual Display
 - HDMI
 - Parallel interface 7" TFT LCD
- Touch panel interface
 - Capacitive - I2C based
- Ethernet
 - 10/100BaseT – RJ45
- USB
 - USB2.0 OTG ,Micro AB type
 - 2 x USB2.0 Host Type A
- AUDIO
 - 3.5mm Headphones jack.
 - 3.5mm Line in jack.
- μ SD-Card slot
- UART (RS232 levels)
 - Standard 10pin header
- Expansion connectors:
 - GPMC - Local Bus interface
 - SD/MMC interface
 - RAW image-sensor module interface
 - SPI
 - I2C
 - MSBSP/I2S
 - UART
 - GPIOs
- Power
 - 2.5mm DC jack
 - 5V DC Input.

1.3 Block Diagram

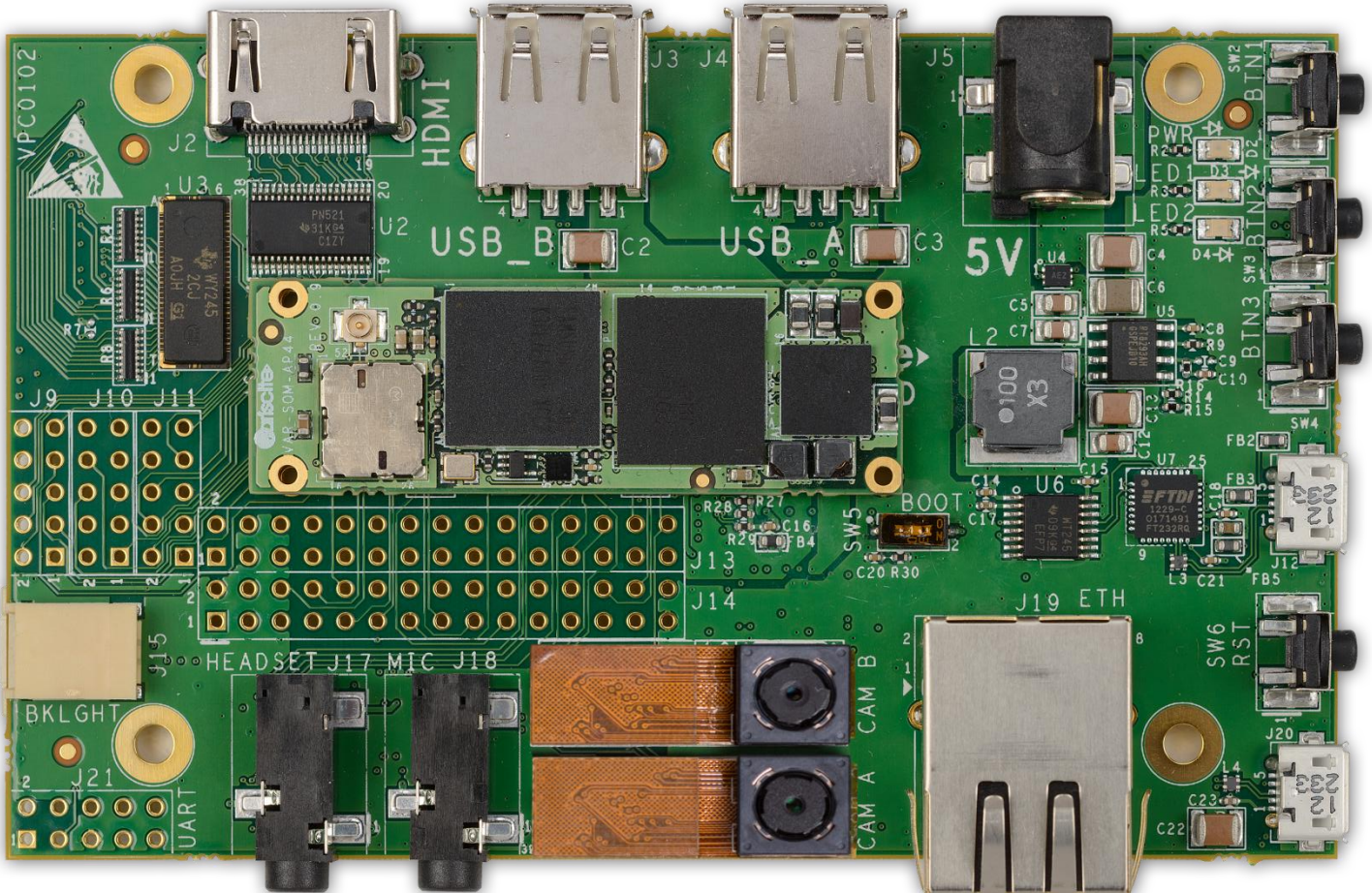


1.4 Board Layout

The DART BOARD physical dimensions are 105x65 mm.

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

Top side - Detailed View



1.5 DART BOARD connectors

The below table lists the available connectors on the DART-BOARD, refer to chapter 2 for detailed description and pinout of each connector.

Reference	Function	Type
J2	HDMI	FCI:10029449-001RLF
J3	USB Host	FCI:87583-2010BLF
J4	USB Host	FCI:87583-2010BLF
J5	DC Jack	KOBI CONN:163-0180-EX
J6	40 Pin DART connector J3	HIROSE:DF40C-40DS-0.4V(51)
J7	70 Pin DART connector J2	HIROSE:DF40C-70DS-0.4V(51)
J8	70 Pin DART connector J1	HIROSE:DF40C-70DS-0.4V(51)
J9	GPMC Expansion Header	AMP:87227-5
J10	GPMC Expansion Header	AMP:87227-5
J11	GPMC Expansion Header	AMP:87227-5
J12	Debug	Molex:47589-0001
J13	GPIO Expansion Header	AMP:1-87227-5
J14	GPIO Expansion Header	AMP:1-87227-5
J15	LCD Backlight	JST:SM02B-BHSS-1-TB(LF)(SN)
J16	MIPI CSI-2 Camera interface	Hirose:FX12B-40P-0.4SV
J17	Headphone	CUI INC:SJ-3523-SMT-1
J18	Microphone/Line in	CUI INC:SJ-3523-SMT-1
J19	Ethernet	PULSE:J00-0065NL
J20	OTG	Molex:47589-0001
J21	UART1	AMP:87227-5
J22	MIPI CSI-2 Camera interface	Hirose:FX12B-40P-0.4SV
J23	Capacitive LCD Connector	Molex:54104-4096
J24	LCD Touch Screen	TE:1-1734592-0
J25	Micro SD card slot	Molex:5033980891

Table 1-1 DART BOARD connectors

2 Detailed Description

2.1 Overview

This chapter details the DART BOARD features and external interfaces, most are driven directly by the DART-4460. Please refer to the DART-4460 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

DART BOARD Signal:

DART BOARD schematic signal name

Description:

Short Pin functionality description

2.2 DART BOARD Interfaces

2.2.1 DART-4460

The DART BOARD features three fine pitch connectors (J6, J7, and J8) to connect with the DART-4460 SOM. Please refer to the DART-4460 module data sheet for a complete signal description.

2.3 Standard External Interfaces

2.3.1 HOST USB

The DART BOARD supports two USB 2.0 Type A Host ports. The USB host connectors are driven by an on-board USB hub.

2.3.1.1 HOST USB Pin-out (J3, J4)

Pin #	DART BOARD Signal	Type	Description
1	VCC_USB	O	5V power supply. 500ma max
2	USB_HUB_DN	IO	USB Data Negative
3	USB_HUB_DP	IO	USB Data Positive
4	GND	P	Digital ground

Table 2-1 USB Host1/2 Connector Connector Pin-out (J3, J4)

2.3.2 USB OTG Connector Pin-out

The DART BOARD OTG, MICRO AB type connector is driven by the DART-4460 OTG interface.

2.3.2.1 USB OTG Connector Pin-out (J20)

Pin #	DART BOARD Signal	Type	Description
1	USB_OTG_VBUS	IO	5V in/out (Client/host)
2	USB_OTG_DN	IO	USB Data Negative
3	USB_OTG_DP	IO	USB Data Positive
4	USB_OTG_ID	I	USB OTG ID signal ('1' - Device mode)
5	GND	P	Digital ground

Table 2-2 USB OTG connector Pin-out (J20)

2.3.3 SD Card

SD-Card interface is based on the SD/MMC1 interface of the OMAP4 of the DART-4460. It supports 3.3V IO interface, so a bidirectional buffer should not be used.

2.3.3.1 SD card slot Connector Pin-out (J25)

Pin #	DART BOARD Signal	Type	Description
1	DAT2	IO	MMC Parallel Data2
2	CD/DAT3	IO	MMC Parallel Data3
3	CMD	IO	MMC command
4	VCC_3V3	P	SD Card VCC 3.3v
5	CLK	O	MMC Clock
6	GND	P	GND
7	DAT0	IO	MMC Parallel Data0
8	DAT1	IO	MMC Parallel Data1
A	CD A	IO	MMC Card Detect
B	CD B	IO	MMC Card Detect

Table 2-3 SD Card slot Connector Pin-out (J25)

2.3.4 Ethernet

Ethernet interface is exposed by a standard RJ45 Ethernet jack with an integrated magnetics. The fast Ethernet port is driven by on-board USB-to-fast-Ethernet Bridge IC.

2.3.4.1 10/100BaseT Connector Pin-out (J19)

Pin #	DART BOARD Signal	Type	Description
1	ETH_TXP	DO	Tx Pair- Positive
2	ETH_TXN	DO	Tx Pair- Negative
3	ETH_RXP	DI	Rx Pair- Positive
4	VCC_3V3	AP	3.3V Power Supply
5	VCC_3V3	AP	3.3V Power Supply
6	ETH_RXN	DI	Rx Pair- Negative
7			
8	GND	P	Digital ground

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

Table 2-4 10/100/100BaseT RJ45 Connector Pin-out (J19)

2.3.5 HDMI

The DART BOARD features an HDMI connector to interface with an external monitor. HDMI signals are driven natively by OMAP4 on the DART-4460

2.3.5.1 HDMI Connector Pin-out (J2)

Pin #	DART BOARD Signal	Type	Description
1	DAT2+	DO	HDMI Data 2 positive
2	DAT2_S	P	Digital ground
3	DAT2-	DO	HDMI Data 2 negative
4	DAT1+	DO	HDMI Data 1 positive
5	DAT1_S	P	Digital ground
6	DAT1-	DO	HDMI Data 1 negative
7	DAT0+	DO	HDMI Data 0 positive
8	DAT0_S	P	Digital ground
9	DAT0-	DO	HDMI Data 0 negative
10	CLK+	DO	HDMI Clock positive
11	CLK_S	P	Digital ground
12	CLK 0-	DO	HDMI Clock negative
13	CEC	IO	CEC signal
14			
15	SCL	IO	HDMI I2C Data
16	SDA	IO	HDMI I2C Clock
17	DDC/CEC GND	P	Digital ground
18	+5V	P	5V Output

Table 2-5 HDMI Connector Pin-out (J2)

2.3.6 AUDIO

The DART BOARD feature two 3.5mm jacks for audio interfaces, all are directly driven by DART-4460

- Headphone Jack
- Microphone/Line in

2.3.6.1 Headphone jack Connector Pin-out (J17)

Pin #	DART BOARD Signal	Type	Description
1	GND	AP	Audio Ground
2	AUD_OUT_L	AO	Pre-amped audio signal

3	AUD_OUT_R	AO	Pre-amped audio signal
---	-----------	----	------------------------

Table 2-6 Headphone Jack Connector Pin-out (J17)

2.3.6.2 Line In jack Connector Pin-out (J18)

Pin #	DART BOARD Signal	Type	Description
1	GND	AP	Audio Ground
2	AUD_IN_R	AI	Microphone/Line in Right input ⁽¹⁾
3	AUD_IN_L	AI	Microphone/Line in Left input ⁽¹⁾

Table 2-7 Line In Jack Connector Pin-out (J18)

⁽¹⁾ – The inputs are biased for microphone usage. Disconnect R64, R65 for disable the bias or use serial capacitors for DC block.

2.3.7 RS232

The RS232 DTE interface is driven by DART-4460 UART1 interface and a RS232 transceiver.

2.3.7.1 RS232 -DTE Connector Pin- out (J21)

Pin #	DART BOARD Signal	Type	Description
1			
2	UART1_RX_C	I	UART1 Receive
3	UART1_TX_C	O	UART1 Transmit
4			
5	DGND	P	Digital Ground
6			
7			
8	UART1_RTS_C	O	UART`1 RTS
9	UART1_CTS_C	I	UART1CTS
10			

Table 2-8 RS232 DTE Connector Pin-out (J21)

2.3.8 Camera

The DART BOARD hosts two MIPI CSI2 cameras, both are directly driven by OMAP4 on the DART-4460 .The on board camera connectors are Panasonic conn socket 40POS 0.4mm, AXK7L40227G suggest camera mating connector is Panasonic conn header, AXK8L40125BG.

2.3.8.1 Camera Connector Pin-out (J22, J16)

Pin #	DART BOARD Signal	Type	Description
1	GND	P	Digital Ground
2	GND	P	Digital Ground
3			
4	VCC_2V8	P	Camera 2.8V power supply
5	I2C_A_SDA	IO	Sensor SDA
6	MIPI_CSI-2_A_PDWN	O	Auto Focus Power down
7	I2C_A_SCL	IO	Sensor SCL
8	VCC_2V8	P	Camera 2.8V power supply

Pin #	DART BOARD Signal	Type	Description
9	RESET	O	Reset signal
10	I2C_A_SDA	IO	Auto Focus SDA
11			
12	I2C_A_SCL	IO	Auto Focus SCL
13			
14	GND	P	Digital Ground
15			
16	MIPI_CSI-2_A_DX2	DI	Camera Data 2 Positive
17	SNS_PWDN	O	Sensor Power Down
18	MIPI_CSI-2_A_DY2	DI	Camera Data 2 Negative
19			
20	GND	P	Digital Ground
21			
22	MIPI_CSI-2_A_DX0	DI	Camera Clock Positive
23			
24	MIPI_CSI-2_A_DY0	DI	Camera Clock Negative
25			
26	GND	P	Digital Ground
27			
28	MIPI_CSI-2_A_DX1	DI	Camera Data 1 Positive
29			
30	MIPI_CSI-2_A_DY1	DI	Camera Data 1 Negative
31			
32	GND	P	Digital Ground
33			
34	MIPI_CSI-2_CLK_OUT	O	Camera Clock
35			
36			
37			
38	VIO	P	Camera 1.8V power supply
39			
40	GND	P	Digital Ground

Table 2-9 Camera Interface Connector Pin-out (J22, J16)

2.3.9 LCD

The DART BOARD exposes the OMAP4's parallel LCD interface through three connectors:

2.3.9.1 Capacitive LCD Connector Pin-out (J23)

Pin #	DART BOARD Signal	Type	Description
1	UD	O	Up/down select
2	LR	O	Left/right select
3			
4	VCC_3v3	P	Mx6CustomBoard peripherals VCC
5	VCC_3v3	P	Mx6CustomBoard peripherals VCC
6	VCC_3v3	P	Mx6CustomBoard peripherals VCC
7	VCC_3v3	P	Mx6CustomBoard peripherals VCC
8	NC		
9	ACBIAS	O	Data enable
10	DGND	P	Digital ground

Pin #	DART BOARD Signal	Type	Description
11	DGND	P	Digital ground
12	DGND	P	Digital ground
13	DB7	O	Blue bit 7
14	DB6	O	Blue bit 6
15	DB5	O	Blue bit 5
16	GND	P	Digital ground
17	DB4	O	Blue bit 4
18	DB3	O	Blue bit 3
19	DB2	O	Blue bit 2
20	GND	P	Digital ground
21	DG7	O	Green bit 7
22	DG6	O	Green bit 6
23	DG5	O	Green bit 5
24	GND	P	Digital ground
25	DG4	O	Green bit 4
26	DG3	O	Green bit 3
27	DG2	O	Green bit 2
28	GND	P	Digital ground
29	DR7	O	Red bit 7
30	DR6	O	Red bit 6
31	DR5	O	Red bit 5
32	GND	P	Digital ground
33	DR4	O	Red bit 4
34	DR3	O	Red bit 3
35	DR2	O	Red bit 2
36	GND	P	Digital ground
37			
38	DCLK	P	DCLK
39	HSYNC	O	Horizontal sync
40	VSYNC	O	Vertical sync

Table 2 –10 Capacitive LCD Connector Pin-out (J23)

2.3.9.2 Capacitive Touch Panel Connector Pin-out (J24)

Pin #	DART BOARD Signal	Type	Description
1	GND	P	Digital ground
2	VCC_3V3	P	Power supply 3.3 V
3	I2C_SCL	IO	I2C3 clock signal
4			
5	I2C_SDA	IO	I2C3 data signal
6			
7	RESET	DI	Reset signal
8			
9	CPT_INT	DI	Interrupt signal connected to GPIO3[7]
10	GND	P	Digital ground

Table 2 - 11 Capacitive Touch Panel Connector Pin-out (J24)

2.3.9.3 Backlight Power Supply Connector Pin-out (J15)

Pin #	DART BOARD Signal	Type	Description
-------	-------------------	------	-------------

Pin #	DART BOARD Signal	Type	Description
1	LED_BL_K	Power	Power supply for backlight LED minus
2	GND	P	Digital ground
3	LED_BL_A	Power	Power supply for backlight LED plus
4	GND	P	Digital ground

Table 2 –12 Backlight Power Supply Connector Pin-out (J15)

2.3.10 USB - Debug

RS232 Debug port is driven by OMAP4/DART-4460 UART3 interface via UART-to-USB bridge and exposed as MICRO USB connector.

2.3.10.1 USB -Debug Connector Pin-out (J12)

Pin #	DART BOARD Signal	Type	Description
1	VCC_USB	i	5V power input
2	USB_HUB_DN	IO	USB Data Negative
3	USB_HUB_DP	IO	USB Data Positive
4	GND	P	Digital ground

Table 2-13 USB – Debug Connector Pin-out (J12)

2.3.11 DC-in Jack

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

2.3.11.1 DC-in Jack Pin-out (J5)

Pin #	DART BOARD Signal	Type	Description
1	GND	P	Digital ground
2	GND	P	Digital ground
3	5V IN	P	5V power input
4	5V IN	P	5V power input

Table 2 - 14 DC-in Jack Pin-out (J5)

2.3.12 GPMC Extension Headers

GPMC expansion connectors pins are directly connected to the OMAP4/DART-4460 pins, refer to DART-4460 data sheet for more details.

2.3.12.1 GPMC Extension Header Pin-out (J11)

Pin #	DART BOARD Signal	Type
-------	-------------------	------

1	GPMC_AD0	IO
2	GPMC_AD5	IO
3	GPMC_AD1	IO
4	GPMC_AD6	IO
5	GPMC_AD2	IO
6	GPMC_AD7	IO
7	GPMC_AD3	IO
8	GPMC_AD8	IO
9	GPMC_AD4	IO
10	GND	P

Table 2-15 GPMC Extension Header Pin-out (J11)

2.3.12.2 GPMC Extension Header Pin-out (J10)

Pin #	DART BOARD Signal	Type
1	GPMC_AD9	IO
2	GPMC_AD14	IO
3	GPMC_AD10	IO
4	GPMC_AD15	IO
5	GPMC_AD11	IO
6	GPMC_A20	IO
7	GPMC_AD12	IO
8	GPMC_A21	IO
9	GPMC_AD13	IO
10	GND	P

Table 2-16 GPMC Extension Header Pin-out (J10)

2.3.12.3 GPMC Extension Header Pin-out (J9)

Pin #	DART BOARD Signal	Type
1	GPMC_A22	IO
2	GPMC_nADV_ALE	IO
3	GPMC_nCS0	IO
4	GPMC_CLK	IO
5	GPMC_NBE0_CLE	IO
6	GPMC_nWP	IO
7	GPMC_nWE	IO
8	VCC_1V8	P
9	GPMC_nOE	IO
10	GND	P

Table 2-17 GPMC Extension Header Pin-out (J9)

2.3.13 Miscellaneous Interfaces Extension Headers

All unused interfaces that are available on DART-4460 module exposed through two 30 pin Miscellaneous Interfaces Extension Headers (J13, J14)

2.3.13.1 Miscellaneous Interfaces Extension Header Pin-out (J13)

Pin #	DART BOARD Signal	Type
1	VCC_5V	P
2	VCC_3V3	P
3	GND	P
4	VIO	P
5	MCBSP_B_FSX	IO
6	MCBSP_B_DX	IO
7	MCBSP_B_CLK	IO
8	MCBSP_B_DR	IO
9	GND	P
10	GND	P
11	MCSPI_A_CS0	IO
12	MCSPI_A_SIMO	IO
13	MCSPI_A_SCLK	IO
14	MCSPI_A_SOMI	IO
15	GND	P
16	GND	P
17	UART_B_RX	IO
18	UART_B_RTS	IO
19	UART_B_TX	IO
20	UART_B_CTS	IO
21	GND	P
22	GND	P
23	DMIC_CLK	IO
24	I2C_A_SCL	IO
25	DMIC_DAT	IO
26	I2C_A_SDA	IO
27		
28	I2C_B_SCL	IO
29		
30	I2C_B_SDA	IO

Table 2-18 Miscellaneous Interfaces Extension Header Pin-out (J13)

2.3.13.2 Miscellaneous Interfaces Extension Header Pin-out (J14)

Pin #	DART BOARD Signal	Type
1	VCC_5V	P
2	VCC_3V3	P
3	GND	P
4	VIO	P
5	DSI1_DX0	DO
6	KPD_COLO	IO
7	DSI1_DY0	DO
8	KPD_COL1	IO
9	DSI1_DX1	DO
10	KPD_COL2	IO
11	DSI1_DY1	DO
12	KPD_COL3	IO
13	DSI1_DX2	DO
14	KPD_COL4	IO

Pin #	DART BOARD Signal	Type
15	DSI1_DY2	DO
16	KPD_ROW1	IO
17	DSI1_DX3	DO
18	HDQ_A	IO
19	DSI1_DY3	DO
20	GPIO_17	IO
21	DSI1_DX4	DO
22	GPIO_101	IO
23	DSI1_DY4	DO
24	GPIO_102	IO
25	GND	P
26	GPIO_141	IO
27	GND	P
28	GPIO_142	IO
29	GND	P
30	GPIO_146	IO

Table 2-19 Miscellaneous Interfaces Extension Header Pin-out (J14)

2.4 User Interfaces

2.4.1 LED Indications

2.4.1.1 Power-On LED (D2)

D5 is indicating that 5V power rail of the DART BOARD is on.

2.4.1.2 GP LEDs (D3, D4)

General purpose functionality LEDs are controlled by DART-4460 pins through level shifter.

2.4.2 Control Buttons

2.4.2.1 User Buttons (SW2, SW3, and SW4)

User Button (SW2, SW3, and SW4) connected directly to the DART-4460.

2.4.2.2 Boot Select (SW5)

Boot select switch (SW5) sets the DART-4460 boot source & sequence.

2.4.2.3 Reset Button (SW6)

System hardware-reset button (SW6)

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	4.5V	5.5V

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

5 Legal notice

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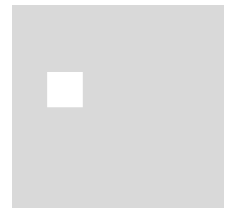
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