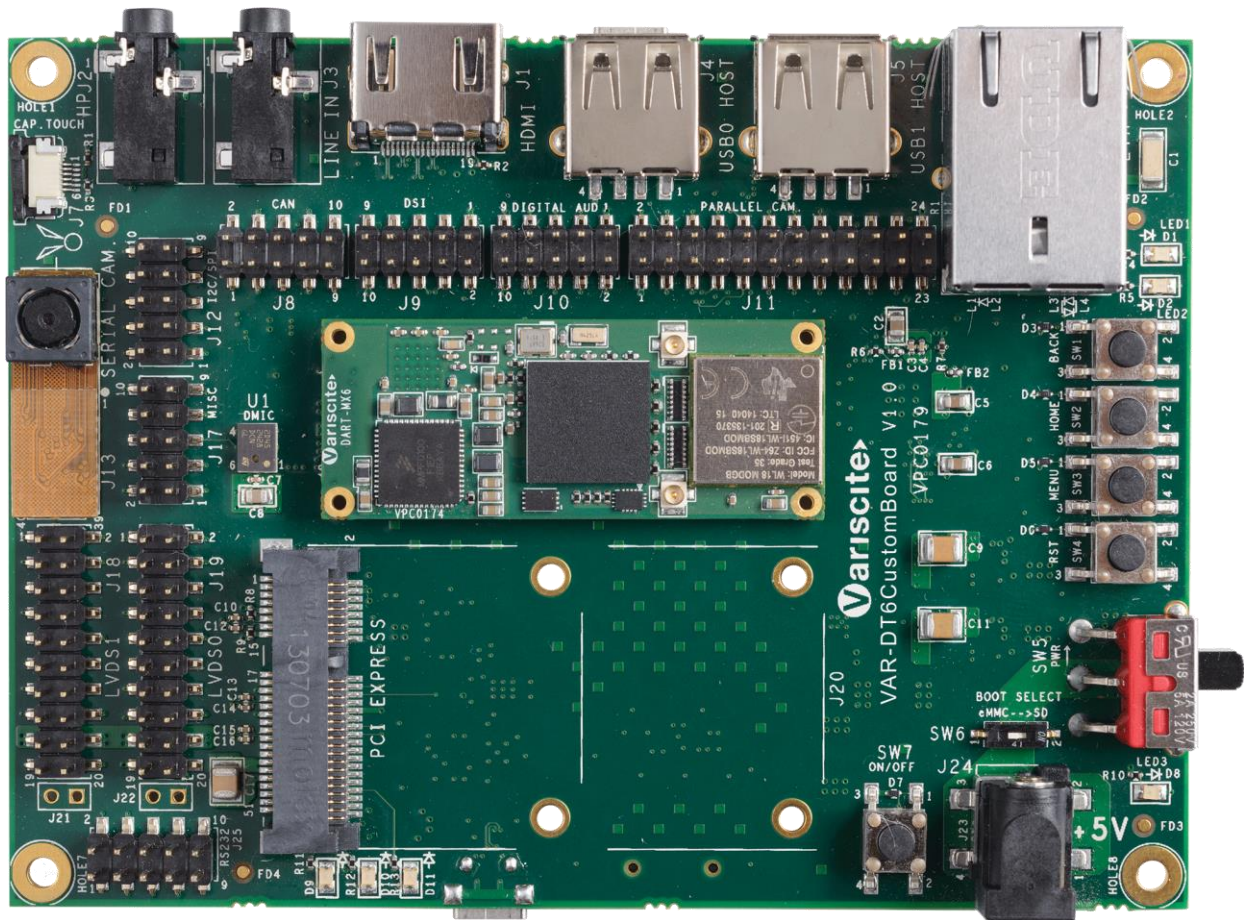




VARISCITE LTD

# VAR-DT6CustomBoard Datasheet

Carrier-board for the DART-MX6  
V 1.1



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# Revision History

| Revision | Date       | Notes   |
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# 1 Overview

This chapter gives an overview of the VAR-DT6CustomBoard.

## 1.1 General Information

The VAR-DT6CustomBoard is a complete development board, utilizing all of the DART-MX6 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-MX6
- 7" Capacitive touch LCD

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

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

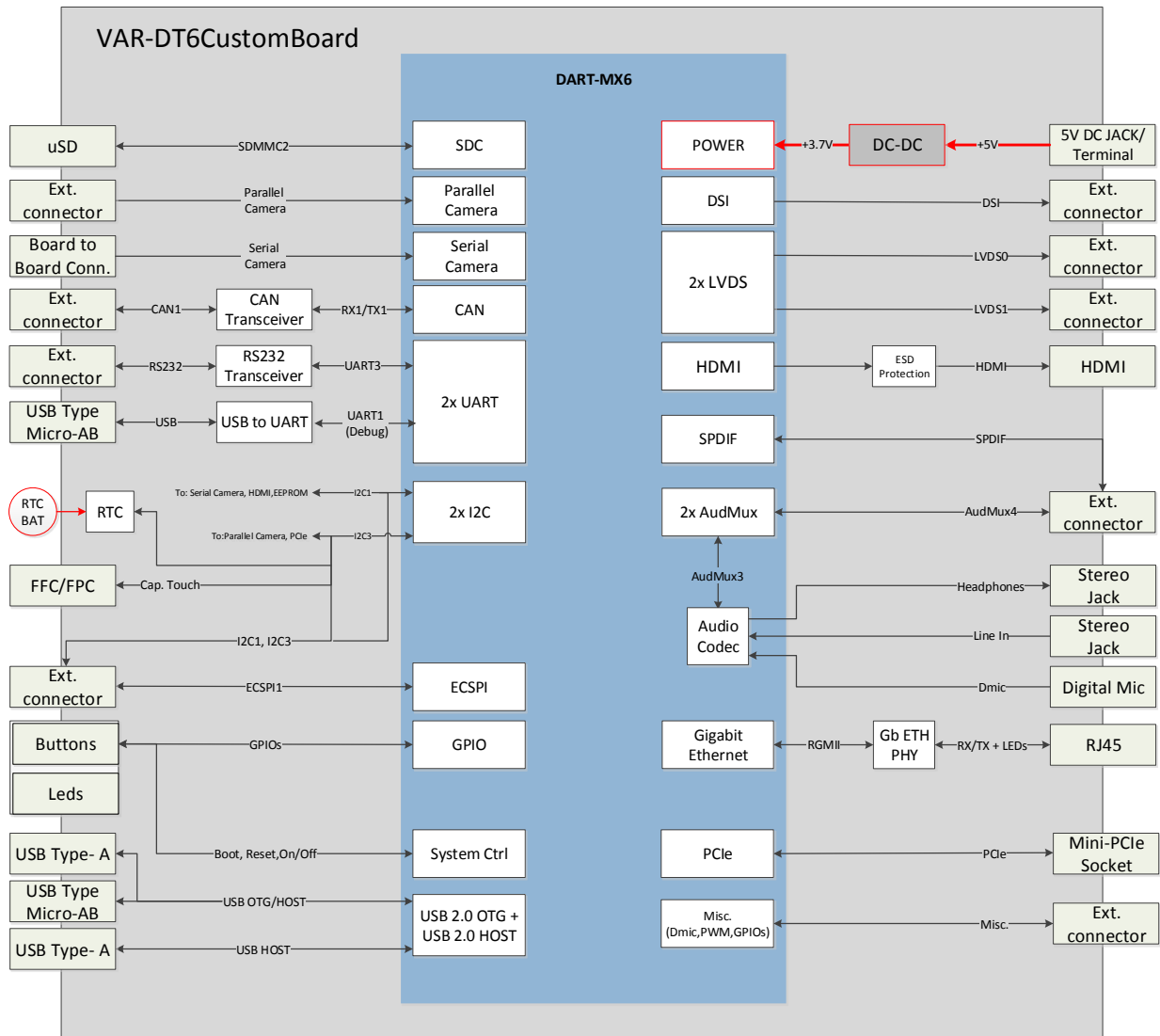
## 1.2 VAR-DT6CustomBoard features summary

- SO-DIMM 200 PIN socket compatible with the DART-MX6
- Display
  - Dual 24 bit LVDS Interface supporting Variscite's 7" TFT capacitive touch LCD
  - DSI Header
  - HDMI Type A
- Touch panel interface
  - Capacitive - I2C based
- Ethernet
  - 10/100/1000BaseT – RJ45
- Mini PCIe Connector
- USB
  - USB2.0 OTG ,Type Micro AB + Type A (for Host only option)
  - USB2.0 Host Type A
- AUDIO
  - 3.5mm Headphones jack
  - 3.5mm Line in jack
  - Digital Microphone
- $\mu$ SD-Card slot
- Camera
  - Serial interface - OV5640 MIPI CSI sensor
  - Parallel interface Header
- RS232 (UART3) Header
- CAN Bus
  - 1Mbit CAN bus Header
- Debug
  - USB debug (UART1) - Type Micro AB
- ISL12057 RTC
- Additional
  - Miscellaneous Header
  - Digital Audio Header
  - SPI, I2C Header



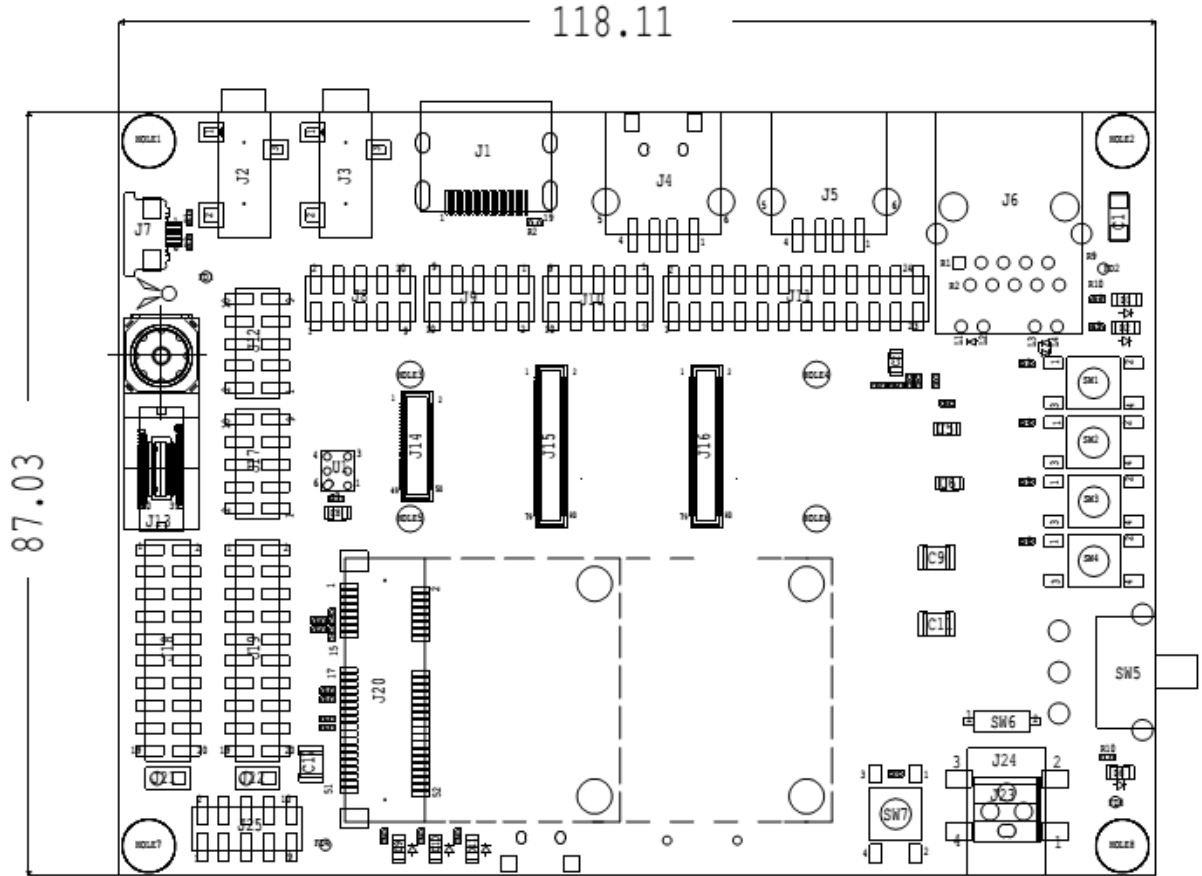
- General purpose LEDS, Buttons
- Power
  - 5V DC Input. - 2.0mm DC jack / 2 pin Terminal Block
  - RTC Backup battery - CR1225 Battery Holder

### 1.3 Block Diagram



## 1.4 Board Layout

The VAR-DT6CustomBoard's physical dimensions are 118 x 87 mm.



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

## 1.5 VAR-DT6CustomBoard connectors

The below table lists all available connectors on the VAR-DT6CustomBoard, refer to chapter 2 for a more detailed description and Pin-out of each connector.

| Reference | Function                         | Type                         |
|-----------|----------------------------------|------------------------------|
| J1        | HDMI                             | HDMI Type A Conn             |
| J2        | Headphones                       | Audio Jack 3.5 mm            |
| J3        | Line In                          | Audio Jack 3.5 mm            |
| J4        | USB Host                         | USB Type A                   |
| J5        | USB Host                         | USB Type A                   |
| J6        | 10/100/1000Mbps Port             | RJ-45                        |
| J7        | Capacitive Touch Panel I/F       | FFC/FPC 6-pin                |
| J8        | CAN Bus                          | Header SMT 5x2, 2.54mm       |
| J9        | DSI                              | Header SMT 5x2, 2.54mm       |
| J10       | Digital Audio                    | Header SMT 5x2, 2.54mm       |
| J11       | Parallel Camera I/F              | Header SMT 12x2, 2.54mm      |
| J12       | SPI,I2C                          | Header SMT, 5x2, 2.54mm      |
| J13       | Serial Camera sensor OV5640 Conn | Board to Board, 40Pos, 0.5mm |
| J14       | DART-MX6 Connector J1            | Board to Board, 50Pos, 0.4mm |
| J15       | DART-MX6 Connector J2            | Board to Board, 80Pos, 0.4mm |
| J16       | DART-MX6 Connector J3            | Board to Board, 80Pos, 0.4mm |
| J17       | Miscellaneous                    | Header SMT, 5x2, 2.54mm      |
| J18       | LVDS1 (Clock & Data pairs 0-2)   | Header SMT, 10x2, 2.54mm     |
| J19       | LVDS0 (Clock & Data pairs 0-2)   | Header SMT, 10x2, 2.54mm     |
| J20       | Mini PCIe Conn                   | Mini PCIe Conn, 2x26 0.8mm   |
| J21       | LVDS1 (Data pair 3)              | Header TH, 1x2, 2.54mm       |
| J22       | LVDS0 (Data pair 3)              | Header TH, 1x2, 2.54mm       |
| J23       | Power In                         | 2 Pin Terminal Block         |
| J24       | Power In                         | DC In Jack 2.0 mm            |
| J25       | RS232                            | Header SMT, 5x2, 2.54mm      |
| J100      | USB OTG                          | USB Type micro AB            |
| J101      | SD-MMC                           | uSD Connector                |
| J102      | USB Debug                        | USB Type micro AB            |
| JBT100    | RTC Battery Holder               | CR1225 Battery Holder        |

Table 1-1 VAR-DT6CustomBoard connectors

## 2 Detailed Description

### 2.1 Overview

This chapter details the VAR-DT6CustomBoard's features and external interfaces, some of which are driven directly by the DART-MX6.

Please refer to the DART-MX6 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-DT6CustomBoard Signal:

VAR-DT6CustomBoard 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-DT6CustomBoard Interfaces

### 2.2.1 DART-MX6

The DART-MX6 features three low profile connectors. Two 80 pin and one 50 pin Board to Board connectors to connect with the DART-MX6 System-on-module. Please refer to the DART-MX6 module data sheet for a complete signal description and pin-out.

## 2.3 Standard External Interfaces

### 2.3.1 USB HOST & OTG

The DART-MX6 drives USB Host to a Host Connector and USB OTG to both Host and OTG connectors. For using USB OTG as Host only via Host connector configure it to Host mode by assembling resistor R102 with 0R short resistor.

#### 2.3.1.1 USB HOST Connector Pin-out (J5)

| Pin # | VAR-DT6CustomBoard Signal | Type  | Description                 |
|-------|---------------------------|-------|-----------------------------|
| 1     | USB_H1_VBUS               | P     | +5V power supply. 500ma max |
| 2     | USB_HOST_DN_C             | DSI/O | USB Data Negative           |
| 3     | USB_HOST_DP_C             | DSI/O | USB Data Positive           |
| 4     | DGND                      | P     | Digital ground              |

Table 2-1 USB Host Connector Connector Pin-out (J5)

#### 2.3.1.2 USB OTG to HOST Connector Pin-out (J4)

| Pin # | VAR-DT6CustomBoard Signal | Type  | Description                 |
|-------|---------------------------|-------|-----------------------------|
| 1     | USB_OTG_VBUS              | P     | +5V power supply. 500ma max |
| 2     | USB_OTG_DM_C              | DSI/O | USB Data Negative           |
| 3     | USB_OTG_DP_C              | DSI/O | USB Data Positive           |
| 4     | DGND                      | P     | Digital ground              |

Table 2-2 USB OTG to Host Connector Connector Pin-out (J4)

## USB OTG to OTG Connector Pin-out (J100)

| Pin # | VAR-DT6CustomBoard Signal | Type  | Description                           |
|-------|---------------------------|-------|---------------------------------------|
| 1     | USB_OTG_VBUS              | P     | 5V in/out (Client/host)               |
| 2     | USB_OTG_DM_C              | DSI/O | USB Data Negative                     |
| 3     | USB_OTG_DP_C              | DSI/O | USB Data Positive                     |
| 4     | USB_OTG_ID                | I     | USB OTG ID signal ('1' - Device mode) |
| 5     | DGND                      | P     | Digital ground                        |

Table 2-3 USB OTG to OTG connector Pin-out (J100)

## 2.3.2 uSD Card

uSD Card interface is driven by the SDMMC2 interface of the of the DART-MX6.

## 2.3.2.1 uSD card slot Connector Pin-out (J101)

| Pin # | VAR-DT6CustomBoard Signal | Type | Description                   |
|-------|---------------------------|------|-------------------------------|
| 1     | SDMMC2_DAT2               | IO   | MMC Parallel Data2            |
| 2     | SDMMC2_DAT3               | IO   | MMC Parallel Data3            |
| 3     | SDMMC2_CMD                | IO   | MMC command                   |
| 4     | BASE_PER_3V3              | P    | Peripherals Power supply 3.3V |
| 5     | SDMMC2_CLK                | O    | MMC Clock                     |
| 6     | DGND                      | P    | Digital ground                |
| 7     | SDMMC2_DAT0               | IO   | MMC Parallel Data0            |
| 8     | SDMMC2_DAT1               | IO   | MMC Parallel Data1            |
| 9     | SDMMC2_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 2-4 uSD Card slot Connector Pin-out (J101)

### 2.3.3 Mini PCIe

The DART-MX6 PCI Express interface is exposed by the VAR-DT6CustomBoard through a standard Mini PCI Express connector supporting connection of mini PCI Express expansion cards.

#### 2.3.3.1 Mini PCIe Connector Pin-out (J20)

| Pin # | VAR-DT6CustomBoard Signal | Type | Description                        |
|-------|---------------------------|------|------------------------------------|
| 1     | PCIE_WAKE_B               | I    | PCIe wakeup signal                 |
| 2     | BASE_PER_3V3              | P    | Peripherals Power supply 3.3V      |
| 3     |                           |      |                                    |
| 4     | DGND                      | P    | Digital Ground                     |
| 5     |                           |      |                                    |
| 6     | BASE_PER_1V5              | P    | 1.5V power supply limited to 300mA |
| 7     |                           |      |                                    |
| 8     |                           |      |                                    |
| 9     | DGND                      | P    | Digital Ground                     |
| 10    |                           |      |                                    |
| 11    | PCIE_CREFCLKM             | DSO  | PCIe Clock pair negative           |
| 12    |                           |      |                                    |
| 13    | PCIE_CREFCLKP             | DSO  | PCIe Clock pair positive           |
| 14    |                           |      |                                    |
| 15    | DGND                      | P    | Digital Ground                     |
| 16    |                           |      |                                    |
| 17    |                           |      |                                    |
| 18    | DGND                      | P    | Digital Ground                     |
| 19    |                           |      |                                    |
| 20    | PCIE_DIS_B                | O    | PCIe Disable signal                |
| 21    | DGND                      | P    | Digital Ground                     |
| 22    | PCIE_RESET_B              | O    | PCIe Reset signal                  |
| 23    | PCIE_CRXM                 | DSI  | PCIe Receive pair negative         |
| 24    | BASE_PER_3V3              | P    | Peripherals Power supply 3.3V      |
| 25    | PCIE_CRXP                 | DSI  | PCIe Receive pair positive         |
| 26    | DGND                      | P    | Digital Ground                     |
| 27    | DGND                      | P    | Digital Ground                     |
| 28    | BASE_PER_1V5              | P    | 1.5V power supply limited to 300mA |
| 29    | DGND                      | P    | Digital Ground                     |
| 30    | I2C3_SCL                  | O    | I2C3 clock signal                  |
| 31    | PCIE_CTXM                 | DSO  | PCIe Transmit pair negative        |
| 32    | I2C3_SDA                  | IO   | I2C3 data signal                   |
| 33    | PCIE_CTXP                 | DSO  | PCIe Transmit pair positive        |
| 34    | DGND                      | P    | Digital Ground                     |
| 35    | DGND                      | P    | Digital Ground                     |

|    |              |   |                                    |
|----|--------------|---|------------------------------------|
| 36 |              |   |                                    |
| 37 | DGND         | P | Digital Ground                     |
| 38 |              |   |                                    |
| 39 | BASE_PER_3V3 | P | Peripherals Power supply 3.3V      |
| 40 | DGND         | P | Digital Ground                     |
| 41 | BASE_PER_3V3 | P | Peripherals Power supply 3.3V      |
| 42 | LED_WWAN_B   | I | WWAN LED input                     |
| 43 | DGND         | P | Digital Ground                     |
| 44 | LED_WLAN_B   | I | WLAN LED input                     |
| 45 |              |   |                                    |
| 46 | LED_WPAN_B   | I | WPAN LED input                     |
| 47 |              |   |                                    |
| 48 | BASE_PER_1V5 | P | 1.5V power supply limited to 300mA |
| 49 |              |   |                                    |
| 50 | DGND         | P | Digital Ground                     |
| 51 |              |   |                                    |
| 52 | BASE_PER_3V3 | P | Peripherals Power supply 3.3V      |

Table 2-5 mini PCI Express Connector Pin-out (J20)



### 2.3.4 Ethernet

The VAR-DT6CustomBoard exposes a Gigabit Ethernet interface to a standard RJ45 Ethernet jack connector with integrated magnetics using an On-Board Gigabit Ethernet PHY driven by the RGMII interface exposed by the DART-MX6.

Please refer to the DART-MX6 datasheet for more information.

#### 2.3.4.1 10/100/1000BaseT RJ45 Connector Pin-out (J6)

| Pin # | VAR-DT6CustomBoard Signal | Type    | Description                    |
|-------|---------------------------|---------|--------------------------------|
| R1    | MDI_A+                    | DSI/O   | Bi-directional pair 0 positive |
| R2    | MDI_A-                    | DSI/O   | Bi-directional pair 0 negative |
| R3    | MDI_B+                    | DSI/O   | Bi-directional pair 1 positive |
| R4    | MDI_B-                    | DSI/O   | Bi-directional pair 1 negative |
| R5    | TRCT1                     | O       | Bias capacitor                 |
| R6    | TRCT2                     | O       | Bias capacitor                 |
| R7    | MDI_C+                    | DSI/O   | Bi-directional pair 2 positive |
| R8    | MDI_C-                    | DSI/O   | Bi-directional pair 2 negative |
| R9    | MDI_D+                    | DSI/O   | Bi-directional pair 3 positive |
| R10   | MDI_D-                    | DSI/O   | Bi-directional pair 3 negative |
| L1    | LED2                      | Cathode | PHY LED 2 (see Table 2-6)      |
| L2    | BASE_PER_3V3              | Anode   | Anode of LED 2                 |
| L3    | BASE_PER_3V3              | Anode   | Anode of LED 1                 |
| L4    | LED1                      | Cathode | PHY LED 1 (see Table 2-6)      |
| SH1   | EARTH                     | P       | EARTH                          |
| SH2   | EARTH                     | P       | EARTH                          |

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

| LED1     | LED2     | Status   |
|----------|----------|----------|
| Off      | Off      | Link off |
| Blinking | Off      |          |
| On       | Off      | 1G link  |
| On       | Blinking |          |
| On       | On       | Speed OK |

Table 2-7 RJ-45 Led configuration

### 2.3.5 AUDIO

The VAR-DT6CustomBoard features two 3.5mm jacks for audio interfaces.

- Headphone
- Line in

The Headphones signals are driven by the DART-MX6, while the Line in signals are driven to the DART-MX6. The VAR-DT6CustomBoard also features an on-board stereo Digital Microphone (section [2.4.1](#)).

Please refer to the DART-MX6 data sheet for complete audio codec information.

#### 2.3.5.1 Headphone jack Connector Pin-out (J2)

| Pin # | VAR-DT6CustomBoard Signal | Type | Description         |
|-------|---------------------------|------|---------------------|
| 1     | DGND                      | AP   | Audio Ground        |
| 2     | HPLOUT_C                  | AO   | Headphone out left  |
| 3     | HPROUT_C                  | AO   | Headphone out right |

Table 2-8 Headphone Jack Connector Pin-out (J2)

#### 2.3.5.2 Line In jack Connector Pin-out (J3)

| Pin # | VAR-DT6CustomBoard Signal | Type | Description         |
|-------|---------------------------|------|---------------------|
| 1     | DGND                      | AP   | Audio Ground        |
| 2     | LINEIN1_LP_C              | AI   | Line in Left input  |
| 3     | LINEIN1_RP_C              | AI   | Line in Right input |

Table 2-9 Line In Jack Connector Pin-out (J3)

### 2.3.6 RS232 -DTE

The DART-MX6 exports the 4 line UART3 interface to the VAR-DT6CustomBoard, Which are driven by an on-board RS232 Transceiver and exported to a standard 10 pin Header. This connector serves as a DTE interface for connecting third party DCE devices.

#### 2.3.6.1 RS232 Connector Pin- out (J25)

| Pin # | VAR-DT6CustomBoard Signal | Type | Description                   |
|-------|---------------------------|------|-------------------------------|
| 1     |                           |      |                               |
| 2     | RS232_RX                  | I    | UART3 Receive                 |
| 3     | RS232_TX                  | O    | UART3 Transmit                |
| 4     | BASE_PER_3V3              | P    | Peripherals Power supply 3.3V |
| 5     | DGND                      | P    | Digital Ground                |
| 6     |                           |      |                               |

|    |           |   |           |
|----|-----------|---|-----------|
| 7  | RS232_RTS | O | UART3 CTS |
| 8  | RS232_CTS | I | UART3 RTS |
| 9  |           |   |           |
| 10 |           |   |           |

Table 2-10 RS232 Connector Pin-out (J25)

### 2.3.7 Serial Camera

The VAR-DT6CustomBoard hosts a MIPI CSI camera sensor OmniVision OV5640 driven by the DART-MX6. The on board camera connector is a Panasonic conn socket 40POS 0.4mm, AXK7L40227G suggest camera mating connector is Panasonic conn header, AXK8L40125BG.

#### 2.3.7.1 Serial Camera Connector Pin-out (J13)

| Pin # | VAR-DT6CustomBoard Signal | Type | Description              |
|-------|---------------------------|------|--------------------------|
| 1     | DGND                      | P    | Digital Ground           |
| 2     | DGND                      | P    | Digital Ground           |
| 3     |                           |      |                          |
| 4     | BASE_PER_2V8              | P    | Camera Power supply 2.8V |
| 5     | I2C_A_SDA_18              | IO   | Sensor I2C Data          |
| 6     | VIO_1V8                   | P    | Auto Focus Power down    |
| 7     | I2C_A_SCL_18              | O    | Sensor I2C Clock         |
| 8     | BASE_PER_2V8              | P    | Camera Power supply 2.8V |
| 9     | VIO_1V8                   | P    | Sensor reset             |
| 10    | I2C_A_SDA_18              | IO   | Auto Focus I2C Data      |
| 11    |                           |      |                          |
| 12    | I2C_A_SCL_18              | O    | Auto Focus I2C Clock     |
| 13    |                           |      |                          |
| 14    |                           |      |                          |
| 15    |                           |      |                          |
| 16    | CSI_D1P                   | DSI  | Camera Data 1 Positive   |
| 17    | DGND                      | P    | Sensor Power Down        |
| 18    | CSI_D1M                   | DSI  | Camera Data 1 Negative   |
| 19    |                           |      |                          |
| 20    | DGND                      | P    | Digital Ground           |
| 21    |                           |      |                          |
| 22    | CSI_CLK0P                 | DSI  | Camera Clock Positive    |
| 23    |                           |      |                          |
| 24    | CSI_CLK0M                 | DSI  | Camera Clock Negative    |
| 25    |                           |      |                          |
| 26    | DGND                      | P    | Digital Ground           |
| 27    |                           |      |                          |
| 28    | CSI_D0P                   | DSI  | Camera Data 0 Positive   |
| 29    |                           |      |                          |

| Pin # | VAR-DT6CustomBoard Signal | Type | Description              |
|-------|---------------------------|------|--------------------------|
| 30    | CSI_D0M                   | DSI  | Camera Data 0 Negative   |
| 31    |                           |      |                          |
| 32    | DGND                      | P    | Digital Ground           |
| 33    |                           |      |                          |
| 34    | MIPI_CSI-2_CLK_18         | O    | Camera Clock             |
| 35    |                           |      |                          |
| 36    |                           |      |                          |
| 37    |                           |      |                          |
| 38    | VIO_1V8                   | P    | Camera Power supply 1.8V |
| 39    |                           |      |                          |
| 40    | DGND                      | P    | Digital Ground           |

Table 2-11 Serial Camera Connector Pin-out (J13)

### 2.3.8 Parallel Camera Interface (J11)

The VAR-DT6CustomBoard exposes a 16 bit Parallel camera interface routed directly to the processor's CSI1 pins.

#### 2.3.8.1 Parallel Camera Connector Pin-Out (J11)

| Pin # | VAR-DT6CustomBoard Signal | Type | Description                                    |
|-------|---------------------------|------|--|
| 1     | BASE_PER_3V3              | P    | Peripherals Power supply 3.3V                  |
| 2     | I2C3_SCL                  | O    | I2C3 clock signal                              |
| 3     | CSI1_DATA_EN              | O    | Camera enable                                  |
| 4     | I2C3_SDA                  | IO   | I2C3 data signal                               |
| 5     | CSI1_DATA5                | I    | Camera Data 5 signal                           |
| 6     | CSI1_PIXCLK               | I    | Camera Pixel Clock signal                      |
| 7     | CSI1_DATA6                | I    | Camera Data 6 signal                           |
| 8     | CSI1_DATA15               | I    | Camera Data 15 signal                          |
| 9     | CSI1_DATA7                | I    | Camera Data 7 signal                           |
| 10    | CSI1_DATA16               | I    | Camera Data 16 signal                          |
| 11    | CSI1_DATA8                | I    | Camera Data 8 signal                           |
| 12    | CSI1_DATA17               | I    | Camera Data 17 signal                          |
| 13    | CSI1_DATA9                | I    | Camera Data 9 signal                           |
| 14    | CSI1_DATA18               | I    | Camera Data 18 signal                          |
| 15    | CSI1_DATA10               | I    | Camera Data 10 signal                          |
| 16    | CSI1_DATA19               | I    | Camera Data 19 signal                          |
| 17    | CSI1_DATA11               | I    | Camera Data 11 signal                          |
| 18    | CSI1_DATA4/BT_CFG1_5      | I    | Camera Data 4 signal/ BT_CFG1_5 <sup>[1]</sup> |
| 19    | CSI1_DATA12               | I    | Camera Data 12 signal                          |
| 20    | CSI1_HSYNCH/BT_CFG2_3_3   | I    | Camera Hsync signal/ BT_CFG2_3 <sup>[1]</sup>  |

| Pin # | VAR-DT6CustomBoard Signal | Type | Description                                   |
|-------|---------------------------|------|---|
| 21    | CSI1_DATA13               | I    | Camera Data 13 signal                         |
| 22    | CSI1_VSYNC/BT_CFG2_4      | I    | Camera Vsync signal/ BT_CFG2_4 <sup>[1]</sup> |
| 23    | CSI1_DATA14               | I    | Camera Data 14 signal                         |
| 24    | DGND                      | P    | Digital Ground                                |

Table 2-12 Parallel Camera Connector Pin-out (J11)

**Note:** [1] Pin is being latched at boot to determine boot sequence. Refer to DART-MX6 datasheet for more details.

### 2.3.9 LVDS

The VAR-DT6CustomBoard exposes a dual 4 data lane LVDS interface driven by the DART-MX6. For both LVDS0, LVDS1, 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, by default, connects to LVDS1 20 Pin Header.

#### 2.3.9.1 LVDS1 (Clock & Data pairs 0-2) Connector Pin-out (J18)

| Pin # | VAR-DT6CustomBoard 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    | PWM_BACKLIGHTEN           | O    | Backlight brightness control  |
| 20    | DGND                      | P    | Digital ground                |

Table 2-13 LVDS1 (Clock &amp; Data Pairs 0-2) Connector Pin-out (J18)

## 2.3.9.2 LVDS1 (Data pair 3) Connector Pin-out (J21)

| Pin # | VAR-DT6CustomBoard Signal | Type | Description                  |
|-------|---------------------------|------|------------------------------|
| 1     | LVDS1_TX3_N               | DSO  | LVDS lane 3, negative signal |
| 2     | LVDS1_TX3_P               | DSO  | LVDS lane 3, positive signal |

Table 2-14 LVDS1 (Data Pair 3) Connector Pin-out (J21)

## 2.3.9.3 LVDS0 Connector Pin-out (J19)

| Pin # | VAR-DT6CustomBoard 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     | LVDS0_TX0_N               | DSO  | LVDS lane 0, negative signal  |
| 6     | LVDS0_TX0_P               | DSO  | LVDS lane 0, positive signal  |
| 7     | DGND                      | P    | Digital ground                |
| 8     | LVDS0_TX1_N               | DSO  | LVDS lane 1, negative signal  |
| 9     | LVDS0_TX1_P               | DSO  | LVDS lane 1, positive signal  |
| 10    | DGND                      | P    | Digital ground                |
| 11    | LVDS0_TX2_N               | DSO  | LVDS lane 2, negative signal  |
| 12    | LVDS0_TX2_P               | DSO  | LVDS lane 2, positive signal  |
| 13    | DGND                      | P    | Digital ground                |
| 14    | LVDS0_CLK_N               | DSO  | LVDS clock, negative signal   |
| 15    | LVDS0_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_BACKLIGHTEN           | O    | Backlight brightness control  |
| 20    | DGND                      | P    | Digital ground                |

Table 2-15 LVDS0 (Clock &amp; Data Pairs 0-2) Connector Pin-out (J19)

## 2.3.9.4 LVDS0 (Data pair 3) Connector Pin-out (J22)

| Pin # | VAR-DT6CustomBoard Signal | Type | Description                  |
|-------|---------------------------|------|------------------------------|
| 1     | LVDS0_TX3_N               | DSO  | LVDS lane 3, negative signal |
| 2     | LVDS0_TX3_P               | DSO  | LVDS lane 3, positive signal |

Table 2-16 LVDS0 (Data Pair 3) Connector Pin-out (J22)

### 2.3.10 Capacitive Touch

The DART-MX6 provides a capacitive Touch interface exposed to a FFC/FPC connector for connecting to Variscite's standard 7" Capacitive touch LCD screen.

#### 2.3.10.1 Capacitive Touch Panel Connector Pin-out (J7)

| Pin # | VAR-DT6CustomBoard Signal | Type | Description                            |
|-------|---------------------------|------|--|
| 1     | RESET                     | O    | Reset signal                           |
| 2     | I2C3_SDA                  | IO   | I2C3 data signal                       |
| 3     | I2C3_SCL                  | O    | I2C3 clock signal                      |
| 4     | GPIO_5_17                 | I    | Interrupt signal connected to GPIO1[4] |
| 5     | BASE_PER_3V3              | P    | Peripherals Power supply 3.3V          |
| 6     | DGND                      | P    | Digital ground                         |
| 7     | DGND                      | P    | Digital ground                         |
| 8     | DGND                      | P    | Digital ground                         |

Table 2-17 Capacitive Touch Panel Connector Pin-out (J7)

### 2.3.11 HDMI

The VAR-DT6CustomBoard features an HDMI connector to interface with an external monitor. HDMI signals are driven by the DART-MX6.

#### 2.3.11.1 HDMI Connector Pin-out (J1)

| Pin # | VAR-DT6CustomBoard 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       |

|           |               |   |                        |
|-----------|---------------|---|------------------------|
| <b>18</b> | 5V_HDMI       | P | +5V Power supply       |
| <b>19</b> | HDMICONN_HPDP | I | Hot Plug detect signal |

Table 2-18 HDMI Connector Pin-out (J1)

### 2.3.12 DSI

The DART-MX6 exports the DSI interface a high performance serial interconnect bus for mobile applications connecting display system to the host system.

The signals are exported to a standard 10 pin Header.

#### 2.3.12.1 DSI Connector Pin- out (J9)

| Pin #     | VAR-DT6CustomBoard Signal | Type | Description                      |
|-----------|---------------------------|------|----------------------------------|
| <b>1</b>  | BASE_PER_3V3              | P    | Peripherals Power supply 3.3V    |
| <b>2</b>  |                           |      |                                  |
| <b>3</b>  | DSI_D1M                   | DSO  | Negative DSI data 1 differential |
| <b>4</b>  | DSI_D0M                   | DSO  | Negative DSI data 0 differential |
| <b>5</b>  | DSI_D1P                   | DSO  | Positive DSI data 1 differential |
| <b>6</b>  | DSI_D0P                   | DSO  | Positive DSI data 0 differential |
| <b>7</b>  | DSI_CLK0M                 | DSO  | Negative DSI clock differential  |
| <b>8</b>  |                           |      |                                  |
| <b>9</b>  | DSI_CLK0P                 | DSO  | Positive DSI clock differential  |
| <b>10</b> | DGND                      | P    | Digital Ground                   |

Table 2-19 DSI Connector Pin-out (J9)

### 2.3.13 CAN Bus

The DART-MX6 exports a CAN Bus interface to the VAR-DT6CustomBoard.

The signals are driven by an on-board CAN Bus Transceiver and exported to a standard 10 pin Header.

#### 2.3.13.1 CAN Bus Connector Pin- out (J8)

| Pin #    | VAR-DT6CustomBoard Signal | Type  | Description                |
|----------|---------------------------|-------|----------------------------|
| <b>1</b> | CANL1                     | DSI/O | CAN1 L Differential signal |
| <b>2</b> | CANH1                     | DSI/O | CAN1 H Differential signal |
| <b>3</b> | DGND                      | P     | Digital Ground             |
| <b>4</b> | DGND                      | P     | Digital Ground             |
| <b>5</b> |                           |       |                            |
| <b>6</b> |                           |       |                            |
| <b>7</b> | DGND                      | P     | Digital Ground             |
| <b>8</b> | DGND                      | P     | Digital Ground             |



|           |  |  |  |
|-----------|--|--|--|
| <b>9</b>  |  |  |  |
| <b>10</b> |  |  |  |

Table 2-20 CAN Bus Connector Pin-out (J8)

### 2.3.14 USB - Debug

The DART-MX6 exposed the debug UART1 interface to the VAR-DT6CustomBoard. The signals are driven by an on-board UART-to-USB Bridge and exposed to a Micro USB connector.

#### 2.3.14.1 USB Debug Connector Pin-out (J102)

| Pin #    | VAR-DT6CustomBoard Signal | Type  | Description       |
|----------|---------------------------|-------|-------------------|
| <b>1</b> | DEBUG_VBUS_C              | P     | 5V power input    |
| <b>2</b> | USB_DEBUG_DM_C            | DSI/O | USB Data Negative |
| <b>3</b> | USB_DEBUG_DP_C            | DSI/O | USB Data Positive |
| <b>4</b> | DGND                      | P     | Digital ground    |
| <b>5</b> | DGND                      | P     | Digital ground    |

Table 2-21 USB Debug Connector Pin-out (J102)

### 2.3.15 Miscellaneous

The VAR-DT6CustomBoard exports Additional DART-MX6 signals to a standard 10 pin Header.

#### 2.3.15.1 Miscellaneous Header Pin-out (J17)

| Pin #     | VAR-DT6CustomBoard Signal | Type | Description                                 |
|-----------|---------------------------|------|---|
| <b>1</b>  | BASE_PER_3V3              | P    | Peripherals Power supply 3.3V               |
| <b>2</b>  | PWM_BACKLIGHTEN           | O    | Backlight brightness control                |
| <b>3</b>  | CLKO2                     | O    | Reference Clock 2 signal                    |
| <b>4</b>  | DMIC_CLK                  | O    | Digital microphone Clock                    |
| <b>5</b>  | DMIC_DATA                 | I    | Digital microphone Data                     |
| <b>6</b>  | GPIO1_1                   | IO   | General Purpose Input Output/<br>PWM2       |
| <b>7</b>  |                           |      |   |
| <b>8</b>  |                           |      |   |
| <b>9</b>  | CAM_EN/CSPI1_CS1          | IO   | Serial Camera Enable/<br>ECSPI Chip select1 |
| <b>10</b> | DGND                      | P    | Digital Ground                              |

Table 2-22 Miscellaneous Header Pin-out (J17)

### 2.3.16 I2C/SPI

The VAR-DT6CustomBoard exports the DART-MX6 I2C/SPI signals through a standard 10 pin Header.

#### 2.3.16.1 I2C/SPI Header Pin-out (J12)

| Pin # | VAR-DT6CustomBoard Signal | Type | Description                   |
|-------|---------------------------|------|-------------------------------|
| 1     | BASE_PER_3V3              | P    | Peripherals Power supply 3.3V |
| 2     | CSPI1_SCLK                | O    | SPI Clock signal              |
| 3     | CSPI1_CS0                 | O    | SPI Chip Select 0 signal      |
| 4     | CSPI1_SIMO                | O    | SPI SIMO signal               |
| 5     | I2C3_SCL                  | O    | I2C3 Clock signal             |
| 6     | CSPI1_SOMI                | I    | SPI SOMI signal               |
| 7     | I2C1_SDA                  | IO   | I2C1 Data signal              |
| 8     | I2C3_SDA                  | IO   | I2C3 Data signal              |
| 9     | I2C1_SCL                  | O    | I2C1 Clock signal             |
| 10    | DGND                      | P    | Digital Ground                |

Table 2-23 I2C/SPI Header Pin-out (J12)

### 2.3.17 Digital Audio

The VAR-DT6CustomBoard exports the DART-MX6 AUDMUX4 and SPDIF Digital audio interface signals through a standard 10 pin Header. Please refer to DART-MX6 Datasheet for complete interface description.

#### 2.3.17.1 Digital Audio Header Pin-out (J10)

| Pin # | VAR-DT6CustomBoard Signal | Type | Description                             |
|-------|---------------------------|------|---|
| 1     | BASE_PER_3V3              | P    | Peripherals Power supply 3.3V           |
| 2     | AUDMUX4_RXC               | IO   | Receive clock input/output at pin       |
| 3     | AUDMUX4_TXC               | IO   | Transmit clock input/output at pin      |
| 4     | AUDMUX4_RXFS              | IO   | Receive frame sync input/output at pin  |
| 5     | AUDMUX4_TXD               | IO   | Transmit data from pin                  |
| 6     | SPDIF_OUT                 | O    | SPDIF Out Signal                        |
| 7     | AUDMUX4_TXFS              | IO   | Transmit frame sync input/output at pin |
| 8     | SPDIF_IN                  | I    | SPDIF In Signal                         |
| 9     | AUDMUX4_RXD               | IO   | Receive data at pin                     |
| 10    | DGND                      | P    | Digital Ground                          |

Table 2-24 Digital Audio Header Pin-out (J10)

## 2.4 User Interfaces

### 2.4.1 Digital Microphone

U1 is an on board Digital Microphones connected directly to DART-MX6 Digital Audio lines.

### 2.4.2 LED Indications

#### 2.4.2.1 Power-On LED (D8)

Led D8 indicates that the VCC\_5V DC IN power rail of the VAR-DT6CustomBoard is on.

#### 2.4.2.2 GP LEDs (D1, D2)

LEDs D1, D2 are General purpose functionality LEDs controlled by DART-MX6's GPIOs.

### 2.4.3 Control Buttons

#### 2.4.3.1 User Buttons (SW1, SW2, SW3)

SW1, SW2, and SW3 are User Buttons connected to the DART-MX6' GPIOs for general purpose. In Linux release they serve as Left, Enter, and Right Buttons respectively. In android release they can serve as Back, Home & Menu Buttons respectively.

#### 2.4.3.2 Boot Select (SW6)

The Boot select switch SW6 sets the DART-MX6's boot source & sequence. Refer to the DART-MX6 module data sheet for detailed Boot description.

| Position | Logic Level | Boot Source     |
|----------|-------------|-----------------|
| ON       | '0'         | External (MMC)  |
| OFF      | '1'         | Internal (eMMC) |

Table 2-25 Boot Select modes (SW6)

#### 2.4.3.3 ON/OFF Button (SW7)

The ON/OFF Button can be used for optional support of Entering/Existing Standby mode as well as Power ON/OFF of the DART-MX6.

#### 2.4.3.4 PWR Switch (SW5)

The Power Switch SW5 Enables/Disables the DC Power input to the VAR-DT6CustomBoard.

#### 2.4.3.5 Reset Button (SW4)

SW4 is the System hardware-reset button.

## 2.4.4 Power Input

The VAR-DT6CustomBoard 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 (J24)

| Pin # | VAR-DT6CustomBoard 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 2-26 DC-in Jack Pin-out (J24)

### 2.4.4.2 DC-in 2 pin Terminal Block Pin-out (J23)

| Pin # | VAR-DT6CustomBoard Signal | Type | Description     |
|-------|---------------------------|------|-----------------|
| 1     | DGND                      | P    | Digital ground  |
| 2     | PWR_IN                    | P    | +5V power input |

Table 2-27 DC-in 2 pin Terminal Block Pin-out (J23)

### 2.4.4.3 RTC Backup Battery (JBT100)

The VAR-DT6CustomBoard features JBT100, a CR1225 battery holder for powering the On board ISL12057IUZ RTC Module.

## 3 Electrical Environmental Specifications

### 3.1 Absolute maximum electrical specifications

|                          | <b>Min</b> | <b>Max</b> |
|--------------------------|------------|------------|
| Main Power supply, DC-IN | -0.3V      | 6          |

Table 3-1 Absolute maximum electrical specifications

### 3.2 Operational electrical specifications

|                          | <b>Min</b> | <b>Max</b> |
|--------------------------|------------|------------|
| 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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