

Evaluation Board User Manual



REV 1.0.3

| DATE | REVISION | CHANGE DESCRIPTION |
|----------|----------|---|
| 07/01/13 | 1.0.0 | Release |
| 04/03/13 | 1.0.1 | Added GEAM6425 on module's interface tables |
| 20/03/13 | 1.0.2 | Added i.Core Solo's Interfaces |
| 11/06/13 | 1.0.3 | General Enhancement |

Summary

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Modules' Interfaces

Communications

| | RS232 | RS485 | USB | ETH | CAN |
|-------------------|-------|-------|-----|----------|----------|
| GEAM6425 | Yes | Yes | Yes | Yes | Yes |
| GEAM6428(3) Basic | Yes | Yes | Yes | Yes | No |
| GEAM6428(7) Auto | Yes | Yes | Yes | Yes | Yes (x2) |
| GEAM6428(7) Full | Yes | Yes | Yes | Yes (x2) | Yes (x2) |
| i.CoreM53 | Yes | Yes | Yes | Yes | Yes |
| i.CoreM6S | Yes | Yes | Yes | Yes | Yes |
| i.CoreM6D/Q | Yes | Yes | Yes | Yes | Yes |

Multimedia

| | Audio | Parallel RGB | LVDS | VGA | HDMI |
|-------------------|-----------------|--------------|------|-----|------|
| GEAM6425 | No linux driver | Yes | No | No | No |
| GEAM6428(3) Basic | Yes | Yes | No | No | No |
| GEAM6428(7) Auto | Yes | Yes | No | No | No |
| GEAM6428(7) Full | Yes | Yes | No | No | No |
| i.CoreM53 | Yes | Yes | Yes | Yes | No |
| i.CoreM6S | Yes | Yes | Yes | No | Yes |
| i.CoreM6D/Q | Yes | Yes | Yes | No | Yes |

Other Peripherals

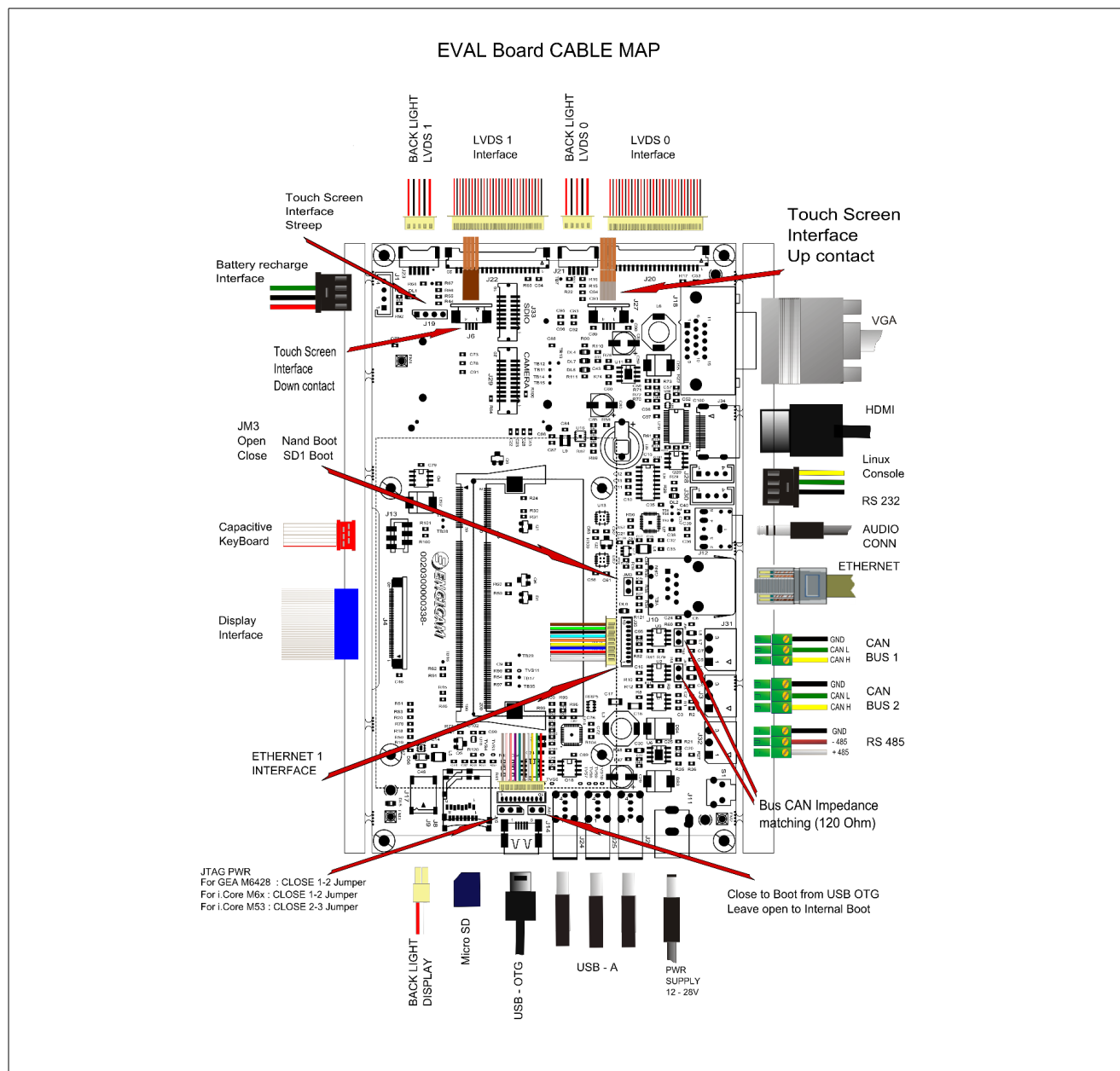
| | uSD | Rechargeable Batery | Expansion Connectors | SATA | Mini PCIe |
|-------------------|-----|---------------------|---------------------------|------|------------|
| GEAM6425 | Yes | No | Not all signals compliant | No | USB ONLY |
| GEAM6428(3) Basic | Yes | Yes | Not all signals compliant | No | USB ONLY |
| GEAM6428(7) Auto | Yes | Yes | Not all signals compliant | No | USB ONLY |
| GEAM6428(7) Full | Yes | Yes | Not all signals compliant | No | USB ONLY |
| i.CoreM53 | Yes | Yes | Yes | Yes | USB ONLY |
| i.CoreM6S | Yes | No | Yes | No | USB + PCIe |
| i.CoreM6D/Q | Yes | No | Yes | Yes | USB + PCIe |

WARNING!

Not all the drivers are available for all operative system

Cable Map Overview

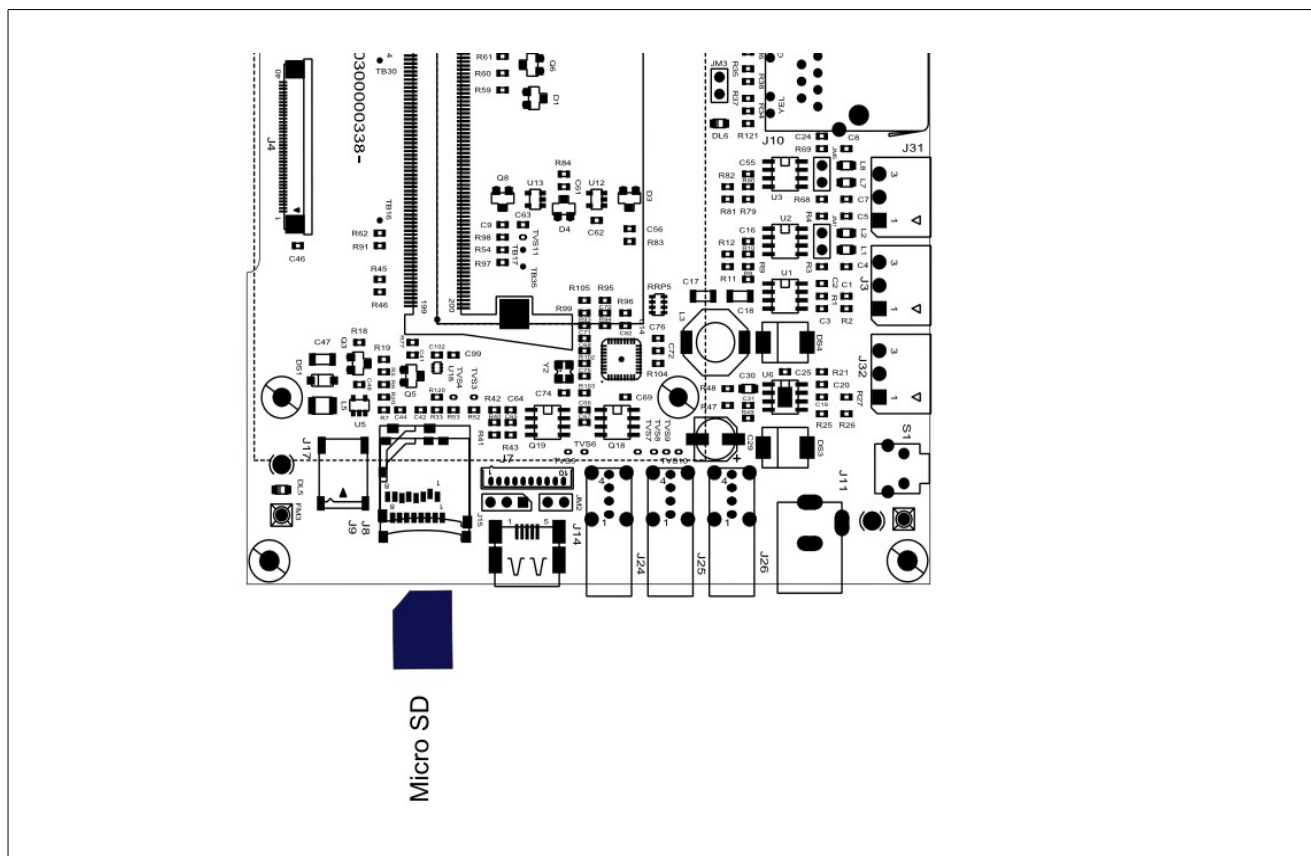
This document is an overview about cable connecting map of GEAM6428, i.CoreM53 and i.CoreM6X module Evaluation board. It describes the connector and the interface unit available to user, and it specifies the electrical characteristic of signals



The figure below shows the whole wiring map and its join connectors. This document will try to analyse all type of used connections to help the user's start up.

Micro SD Connections

The evaluation Board has a Micro SD switch detected connector. It uses both Micro SD standard type card and Micro SD High Capacity type card.



Micro SD card features are:

- Capacity: variable from 32 MB to 32 GB
- Length: 15 mm
- Depth: 11 mm
- Height: 1 mm
- Voltage supply 2,7V - 3,6V
- Slot : TransFlash
- MTBF: 1.000.000 h/e
- Operating temperature min.: -25 °C
- Operating temperature max: +85 °C

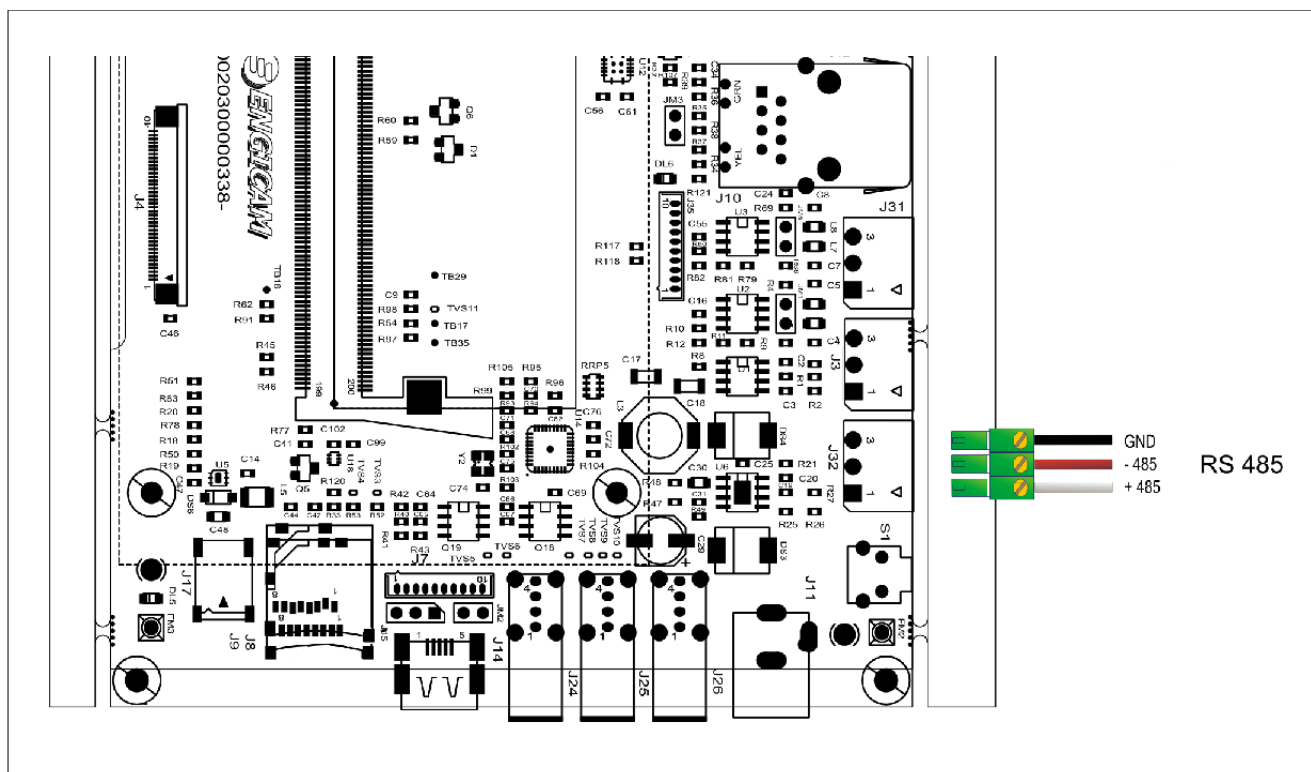
SD connector interface (ref J8/J9):

| Number | Name | Voltage |
|--------|----------|---------|
| 1 | SD1_DAT2 | +3,3V |
| 2 | SD1_DAT3 | +3,3V |
| 3 | SD1_CMD | +3,3V |
| 4 | VCC | +3,3V |
| 5 | SD1_CLK | +3,3V |
| 6 | GND | - |
| 7 | SD1_DAT0 | +3,3V |
| 8 | SD1_DAT1 | +3,3V |

NOTE: The i.CoreM53 & M6x modules have also the boot option from the SD card

RS485 Interface

The following figure represents the connections of the RS485 signals. The RS485 bus is connected through a terminal male connector (EUROCLAMP code PV03-3.5-H-P or compatible connector) mounted on PCB and referenced J32.



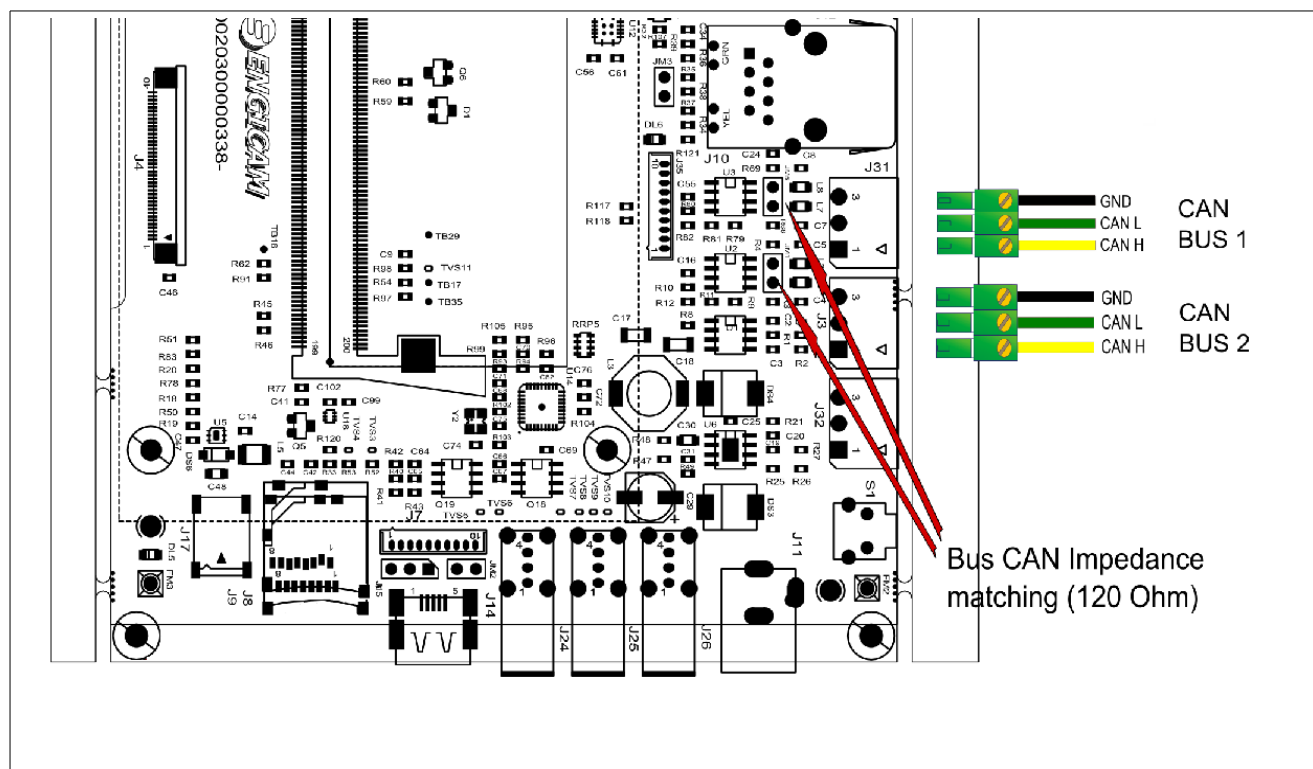
The wiring map of female connector (EUROCLAMP code SH03-3,5) used for UART is shown in the following table.

J32 connector mapping

| Pin Number | Signal Name | Function Description | Voltage |
|------------|-------------|--------------------------------------|---------------|
| 1 | RS485 P | Non Inverting Receiver In/Driver Out | UART Standard |
| 2 | RS485 N | Inverting Receiver In/Driver Out | UART Standard |
| 3 | GND | Power Signal | - |

CAN Bus Interfaces

The following figure represents the connections CAN bus's signals. The CAN bus is connected through two terminal male connectors (EUROCLAMP code PV03-3.5-H-P or compatible connector) mounted on PCB and referenced J3-J31. In the figure there are also shown the jumpers for matching the Bus's impedance at 120 Ohm (JM5 for CAN Bus1 , JM1 for CAN Bus2).



The wiring map of female connector (EUROCLAMP code SH03-3,5) used for CAN is shown in the following table.

J3 connector mapping (NOT present in GEAM6428 Basic module)

| Pin Number | Signal Name | Function Description | Voltage |
|------------|-------------|-------------------------|------------------------|
| 1 | CAN H | High level can bus line | Standard CAN Compliant |
| 2 | CAN L | Low level can bus line | Standard CAN Compliant |
| 3 | GND | Power Signal | - |

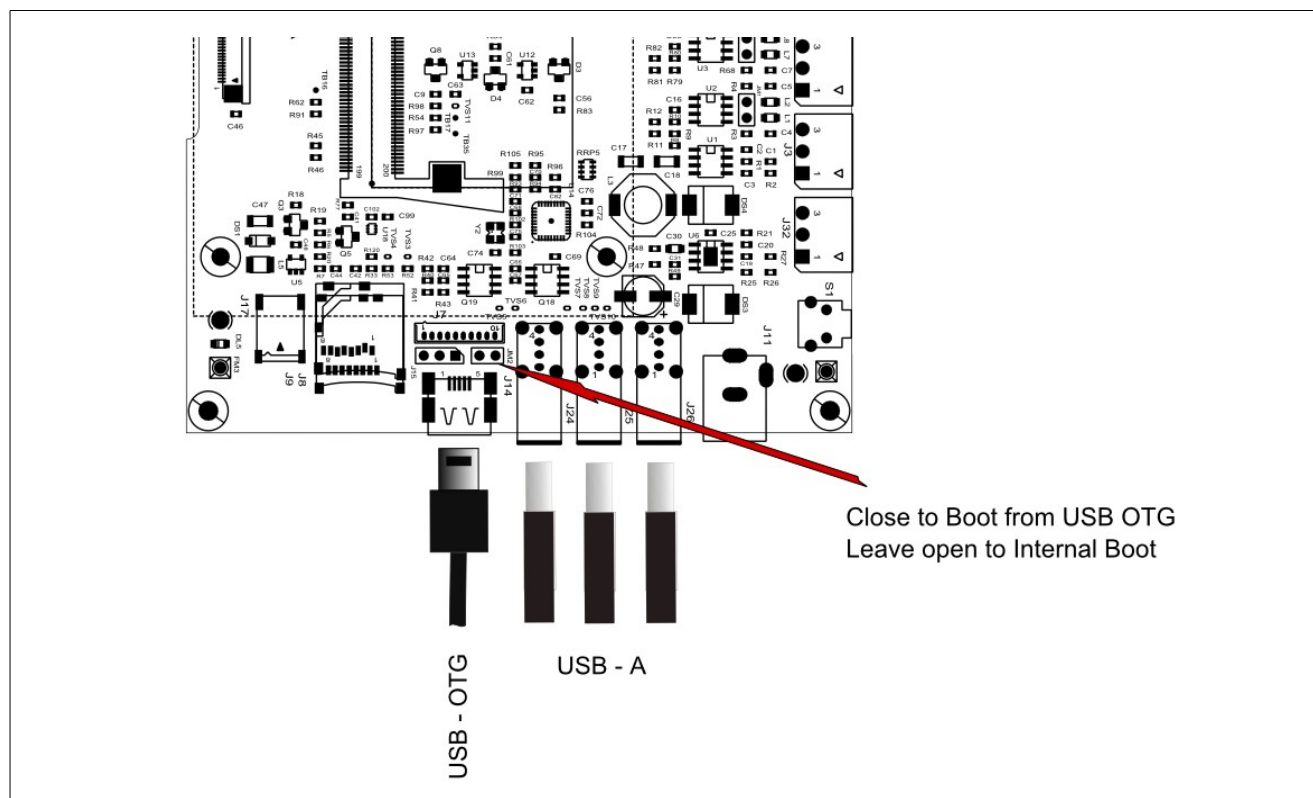
J31 connector mapping (NOT present in GEAM6428 Basic module)

| Pin Number | Signal Name | Function Description | Voltage |
|------------|-------------|-------------------------|------------------------|
| 1 | CAN H | High level can bus line | Standard CAN Compliant |
| 2 | CAN L | Low level can bus line | Standard CAN Compliant |
| 3 | GND | Power Signal | - |

Note: the module "GEAM6428 Basic" which uses the processor i.Mx283 does not have any CAN bus interface. You've to consider these pin as NC.

USB e Mini USB Connections

Evaluation board provides of 3 USB Host A type and 1 USB OTG both High-speed 2.0 type. All available and referenced J24, J25, J26, J14



In the following tables are represented the electrical connection of USB interface, the first table shows the USB standard interface connections (USB type A plug), the second table shows the USB OTG interface connections (USB OTG type mini AB plug)

J24, J25, J26 USB Host A type

| Pin Number | Signal Name | Function Description | Voltage |
|------------|-------------|----------------------|--------------|
| 1 | VBUS | Power Signal | Standard USB |
| 2 | DM | Data N | Standard USB |
| 3 | DP | Data P | Standard USB |
| 4 | GND | Power Signal | Standard USB |

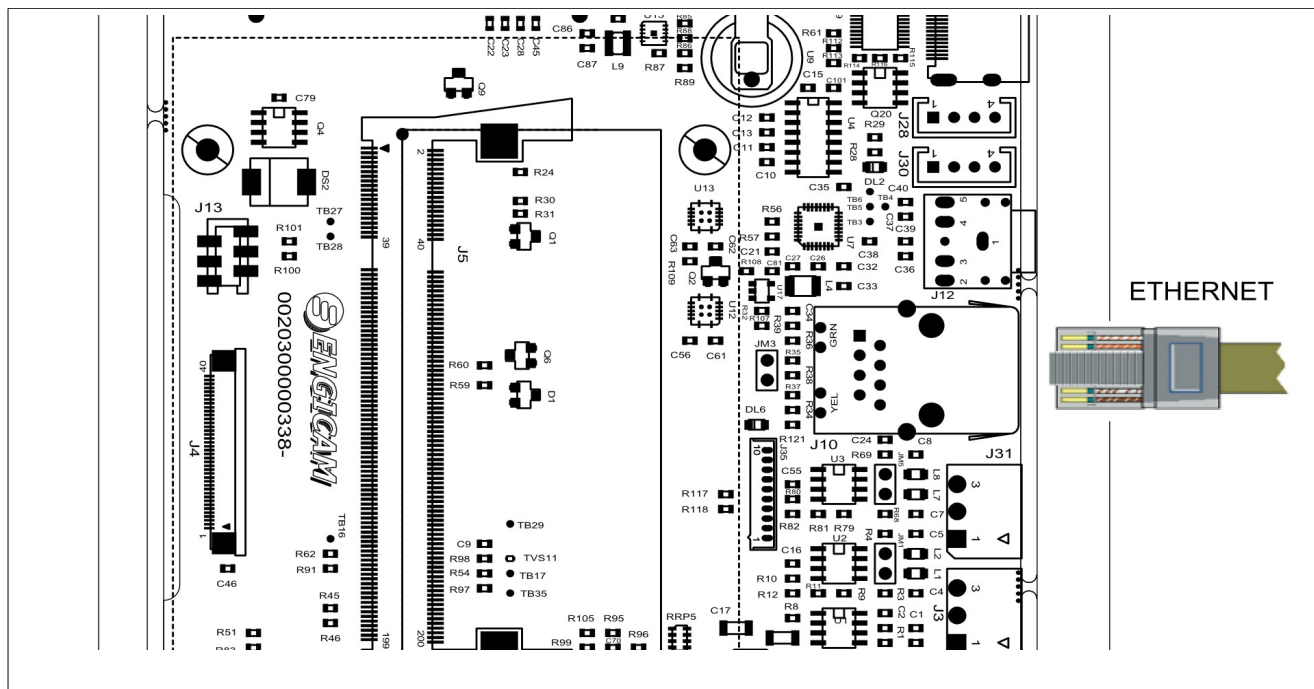
J14 USB OTG type mini AB

| Pin Number | Signal Name | Function Description | Voltage |
|------------|-------------|----------------------|--------------|
| 1 | VBUS | Power Signal | Standard USB |
| 2 | DM | Data N | Standard USB |
| 3 | DP | Data P | Standard USB |
| 4 | ID | Standard USB OTG | Standard USB |
| 5 | GND | Power Signal | Standard USB |

Note: from USB OTG is possible to boot the Module by closing jumper JM2, to voltage reference please refer to **Boot Jumper set up** chapter and to module's Hw manual.

Ethernet Connection

The figure represents the Ethernet 10/100 connection. This connection uses a RJ45 standard plug (8 wires) with standard UTP cable. The reference of connector is J10.



The following table shows the wiring map (as above mentioned you must use a standard UTP cable)

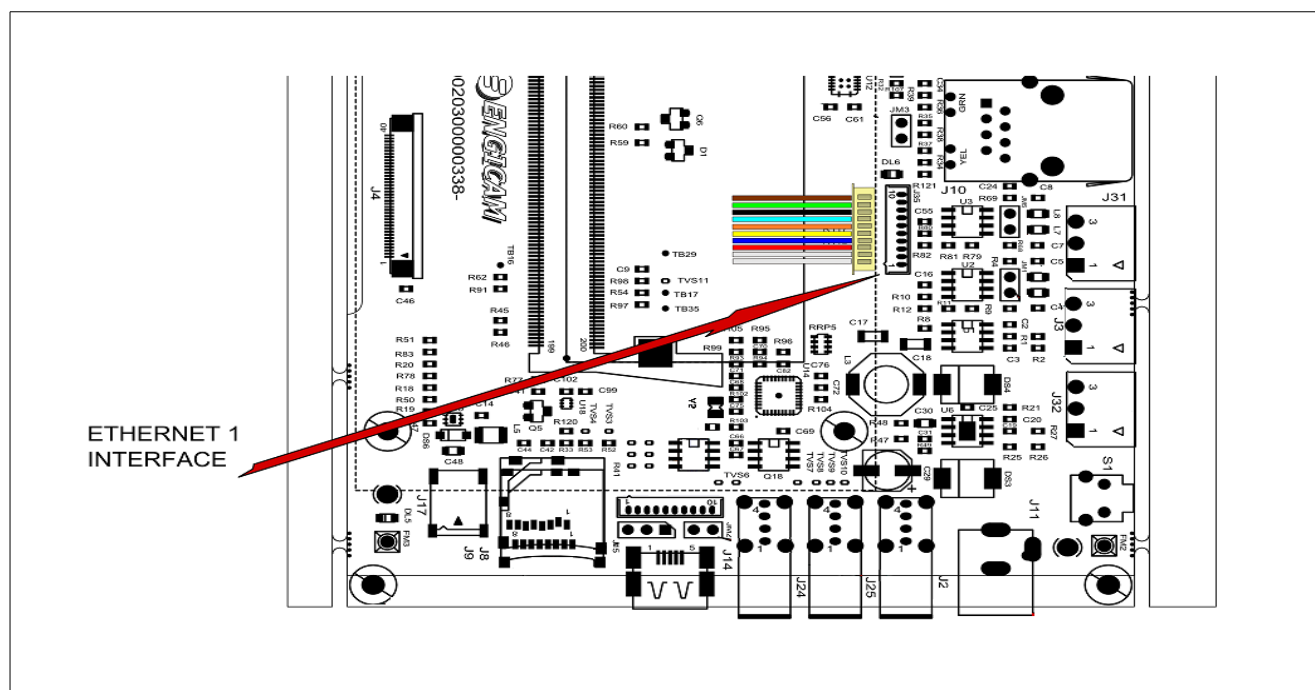
| Pin Number | Signal Name | Function Description | Voltage |
|------------|-------------|--------------------------|-------------------|
| 1 | TX+ | Transmit positive signal | Standard Ethernet |
| 2 | TX- | Transmit negative signal | Standard Ethernet |
| 3 | RX+ | Receive positive signal | Standard Ethernet |
| 4 | NC | - | - |
| 5 | NC | - | - |
| 6 | RX- | Receive negative signal | Standard Ethernet |
| 7 | NC | - | - |
| 8 | NC | - | - |

NOTE: For further information is strongly recommended to refer to the Hardware manual and the attached documents

Ethernet 1 Connection

(Only for GEAM6428 Full module)

The figure represents the Ethernet1 10/100 connection. This connection uses a Molex 53047-1010 connector which mates with 51021-1000 PicoBlade Wire-to-Wirer. The reference of connector is J35.



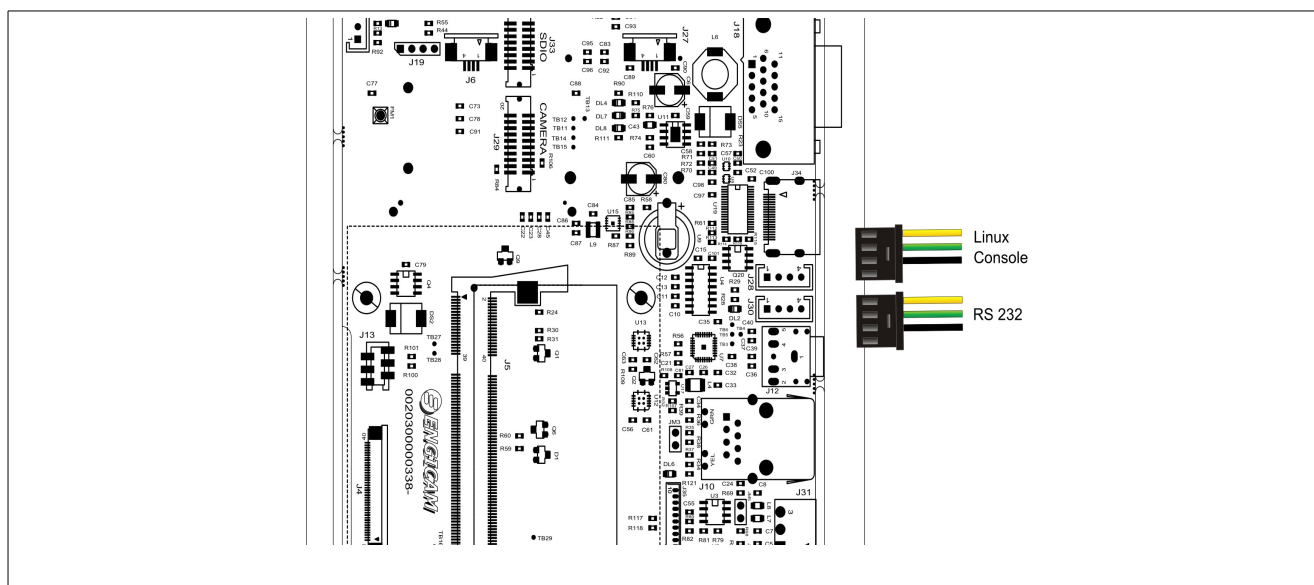
The following table shows the wiring map (as above mentioned you must use a standard UTP cable)

| Pin Number | Signal Name | Function Description | Voltage |
|------------|------------------------|------------------------------|-------------------|
| 1 | NC | - | - |
| 2 | NC | - | - |
| 3 | +3V3_OUT | Power | - |
| 4 | ETH1_LED_ACT_ANOD | Led indicator Anode signal | Standard Ethernet |
| 5 | ETH1_LED_10_100_KATHOD | Led Indicator Cathode signal | Standard Ethernet |
| 6 | ETH1_RXP | Receive positive signal | Standard Ethernet |
| 7 | ETH1_RXN | Receive negative signal | Standard Ethernet |
| 8 | GND | Power | - |
| 9 | ETH1_TXP | Transmit positive signal | Standard Ethernet |
| 10 | ETH1_TXN | Transmit negative signal | Standard Ethernet |

NOTE: For further information is strongly recommended to refer to the Hardware manual and the attached documents

RS232 & Linux Console Connections

The evaluation board has also two RS232 connections (see figure) which use connectors Modu II type (4 poles), referenced J28 and J30. The evaluation Kit is already equipped with an appropriate cable.



The following table shows the wiring map and the electrical features of connections. When Linux is installed the UART1 is used like console. Note that only 3 poles are connected, the fourth is left NC.

J30

| Pin Number | Signal Name | Function Description | Voltage |
|------------|-------------|----------------------|----------------|
| 1 | UART2_TXD | Transmit Signal | RS232 Standard |
| 2 | UART2_RXD | Receive Signal | RS232 Standard |
| 3 | GND | Power Signal | - |

J28

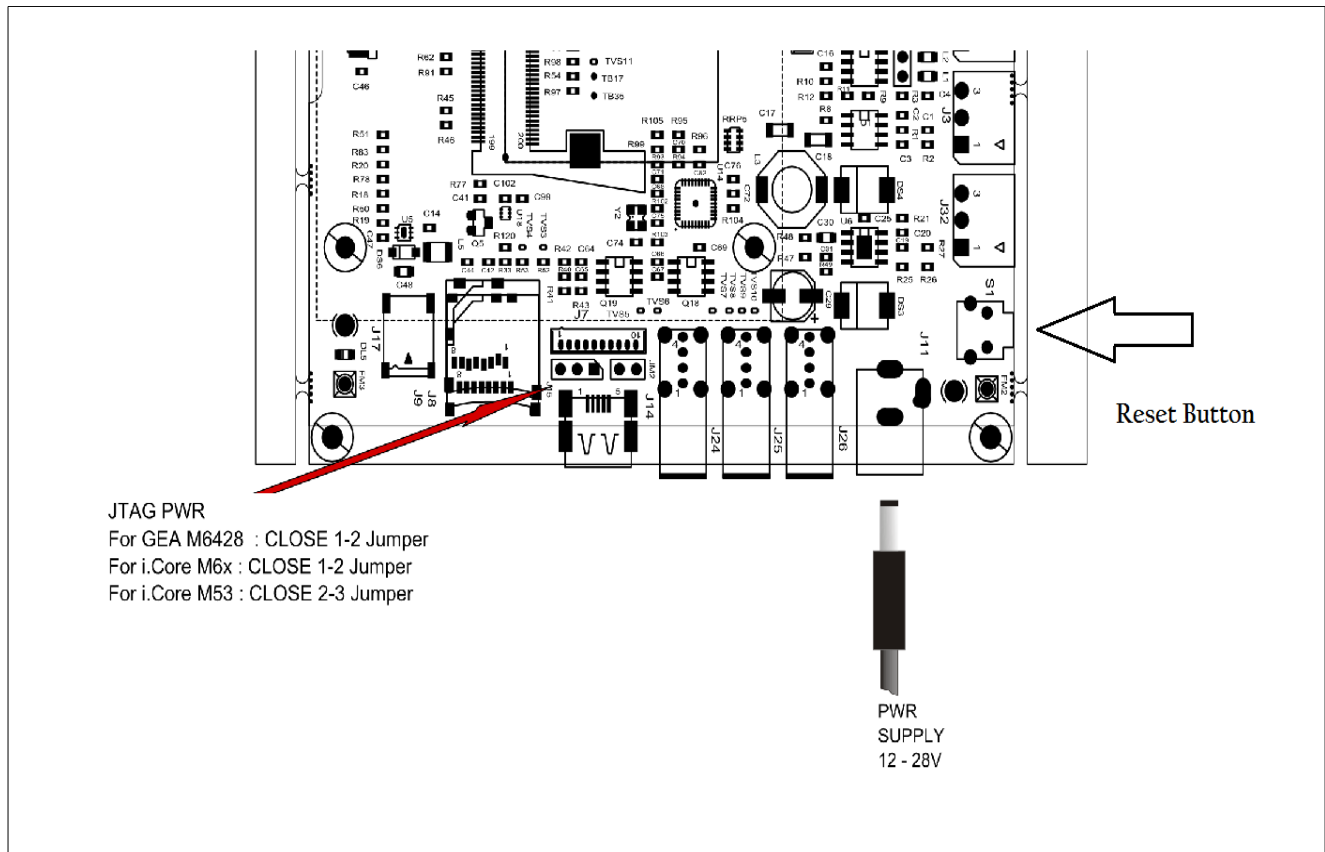
| Pin Number | Signal Name | Function Description | Voltage |
|------------|-------------|----------------------|----------------|
| 1 | UART1_TXD | Transmit Signal | Standard RS232 |
| 2 | UART1_RXD | Receive Signal | Standard RS232 |
| 3 | GND | Power Signal | - |

The default communications settings is shown in following table:

| Linux console default settings | |
|--------------------------------|--------|
| Baud rate | 115200 |
| Data length | 8 bit |
| Parity | none |
| Stop | 1bit |

Power Supply Connections

The figure shows the power supply connection. The evaluation board receives an input DC voltage, which ranging from +12V to +28V. The connector J11 is a SOCKET PCB DC 2.5MM PK10. All the evaluation kit is already equipped with its own external plug in adaptors.



Insert the plug in the socket to switch on the evaluation board. The button S1 is used to reset the board.

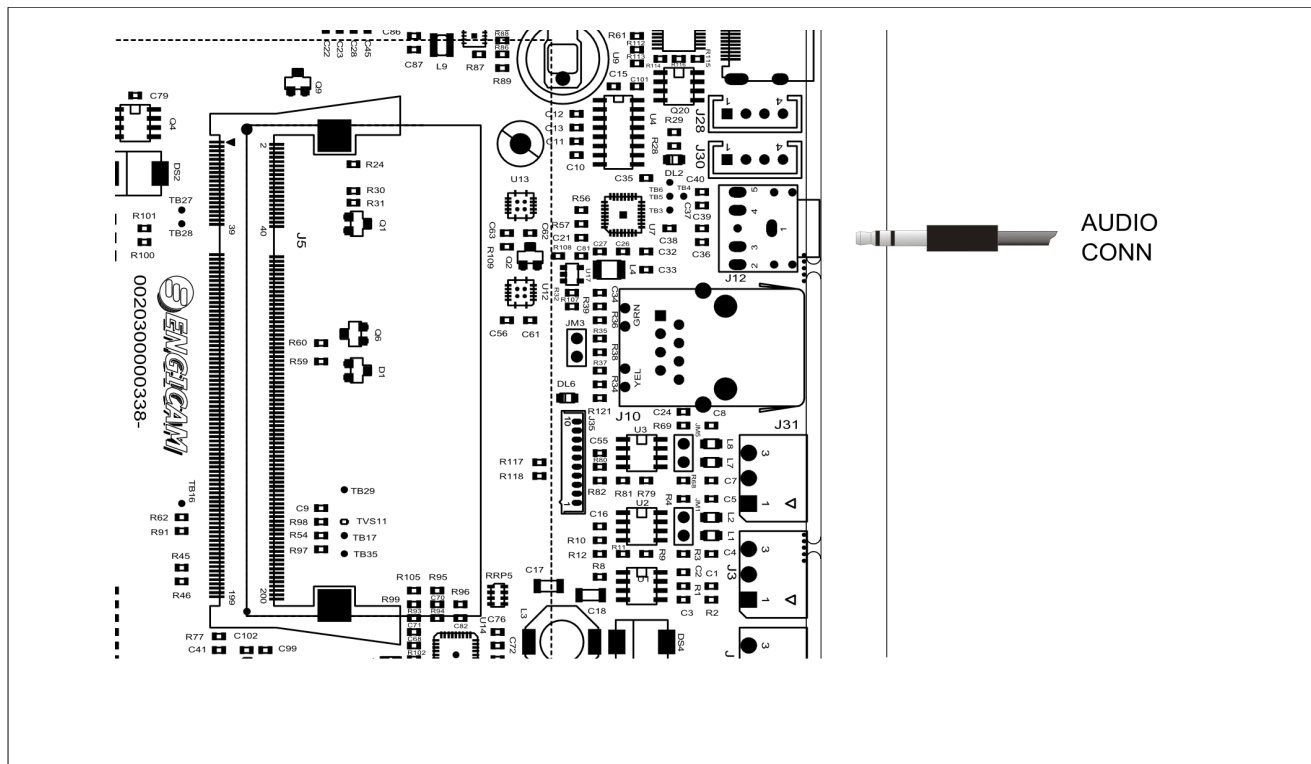
WARNING:

To obtain the compatibility with all modules, in the evaluation board the JTAG signals are pulled up through +JTAG_PWR which could be put to +1,8V or +3,3V using jumper referenced J15 (as signalled in the figure).

Note: For further information please refer modules' Hw manual

Audio Connection

The following figure shows the audio mode connection, which is mated with a bushing connector type ADIMPEX code GP000540 (6mm dia) compliant with a standard plug JACK 3,5mm.



Analog Outputs features:

HP Output:

- 100 dB SNR (-60 dB input) and
- -80 dB THD+N

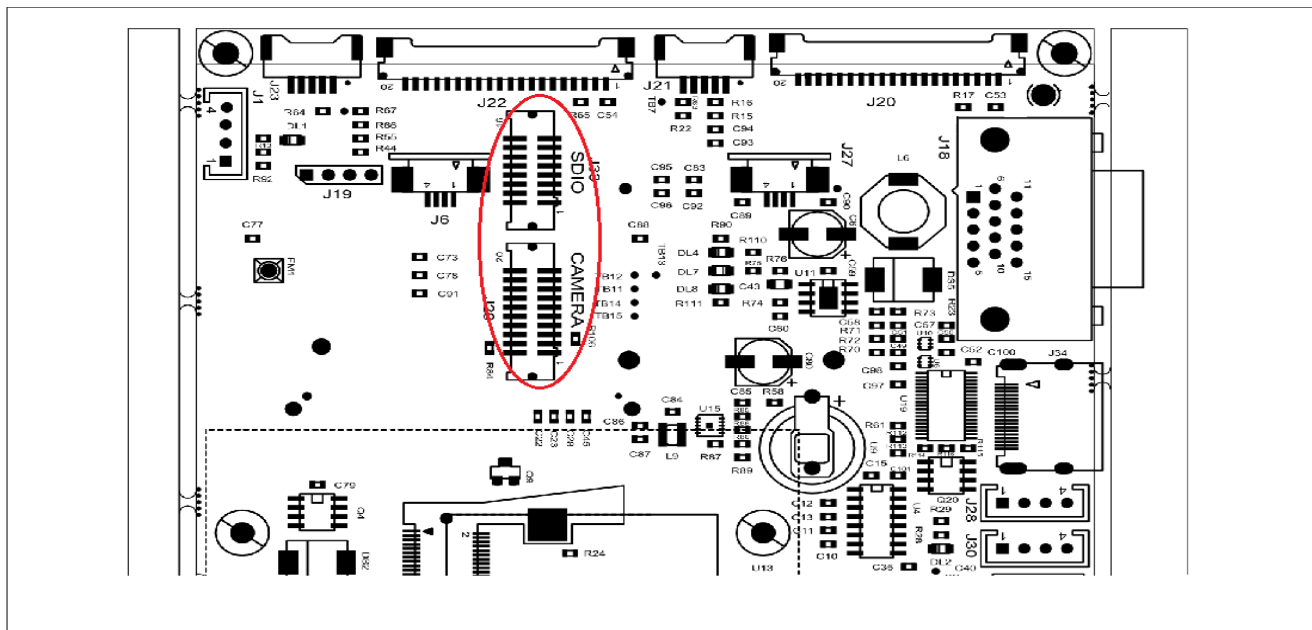
Line Out:

- 100 dB SNR (-60 dB input) and
- -85 dB THD+N

Note: For further information about audio specifications please refer to SGTL5000 data sheet

Expansion Connector

The Evaluation Board is provided of two Expansion connectors (model Samtec code SHF-108-01-L-D-SM-K and SHF-110-01-L-D-SM-K, J29 e J33). These connectors make available a variety of signals which are usable for standard or custom applications. Samtec SHF mates with FFSD-08 or FFTP-08 and FFSD-10 & FFTP-10 series.



The first expansion connector (named SDIO) has the following signals available:

J33 SDIO connector

| Pin Number | Signal Name | Function Description | Voltage |
|------------|---------------|---------------------------|---------|
| 1 | +3V3_UMTS | Power PIN | - |
| 2 | +3V3_UMTS | Power PIN | - |
| 3 | GND | Power PIN | - |
| 4 | UART3_RXD | UART3 TXD signal | +3,3V |
| 5 | UART3_TXD | UART3 RXD signal | +3,3V |
| 6 | UART3_RTS | UART3 CTS signal | +3,3V |
| 7 | SD2_D0 | eSDHC 2 DAT 0 signal | +3,3V |
| 8 | SD2_D1 | eSDHC 2 DAT 1 signal | +3,3V |
| 9 | SD2_D2 | eSDHC 2 DAT 2 signal | +3,3V |
| 10 | SD2_D3 | eSDHC 2 DAT 3 signal | +3,3V |
| 11 | SD2_CLK | eSDHC 2 CLK signal | +3,3V |
| 12 | SD2_CMD | eSDHC 2 CMD signal | +3,3V |
| 13 | UART3_CTS | UART3 CTS signal | +3,3V |
| 14 | GPIO_2_SD2_WP | External Interface Module | +3,3V |
| 15 | GND | Power PIN | - |
| 16 | GPIO_4_SD2_CD | External Interface Module | +3,3V |

The expansion SDIO provide to:

- 1x UART (TTL/CMOS levels) interface (4 signals)
- 1x SD interface (6 signals)
- 2x signals of External Interface Module

NOTE: remove the RS485 transceiver for usage of the UART3.

The second expansion connector (named CAMERA) has the following signals available:

J29 Camera connector

| Pin Number | Signal Name | Function Description | Voltage |
|------------|-------------|---------------------------------------|---------|
| 1 | +3V3_OUT | Power PIN | - |
| 2 | +3V3_OUT | Power PIN | - |
| 3 | GND | Power PIN | - |
| 4 | CSI_D[12] * | CMOS Sensor Interface Data 12 | +3,3V |
| 5 | CSI_D[13] * | CMOS Sensor Interface Data 13 | +3,3V |
| 6 | CSI_D[14] * | CMOS Sensor Interface Data 14 | +3,3V |
| 7 | CSI_D[15] * | CMOS Sensor Interface Data 15 | +3,3V |
| 8 | CSI_D[16] * | CMOS Sensor Interface Data 16 | +3,3V |
| 9 | CSI_D[17] * | CMOS Sensor Interface Data 17 | +3,3V |
| 10 | CSI_D[18] * | CMOS Sensor Interface Data 18 | +3,3V |
| 11 | CSI_D[19] * | CMOS Sensor Interface Data 19 | +3,3V |
| 12 | CSI_VSYNC * | CMOS Sensor Interface Vertical Sync | +3,3V |
| 13 | CSI_HSYNC * | CMOS Sensor Interface Horizontal Sync | +3,3V |
| 14 | CSI_CLK * | CMOS Sensor Interface Pixel Clock | +3,3V |
| 15 | GND | Power PIN | - |
| 16 | NC | - | - |
| 17 | NC | - | - |
| 18 | I2C_SCL** | I2C SCL Signal | +3,3V |
| 19 | I2C_SDA** | I2C SDA Signal | +3,3V |
| 20 | NC | - | - |

The expansion CAMERA provide to:

- CMOS Sensor Interface (11 Signals) (only for i.CoreM53 and i.CoreM6x)

NOTE: For a customized use of the signals' connectors please refer to the module "Hardware manual" and Freescale's "Reference manual"

Warning:

for the entire code of mating connector please refer to SAMTEC catalogue or to the following internet link: www.samtec.com

* **Note3:** CSI interface is not present in the Module GEAM6428 so you can use J29 interface only to connect the I2C bus or to use the power signals

**** WARNING:**

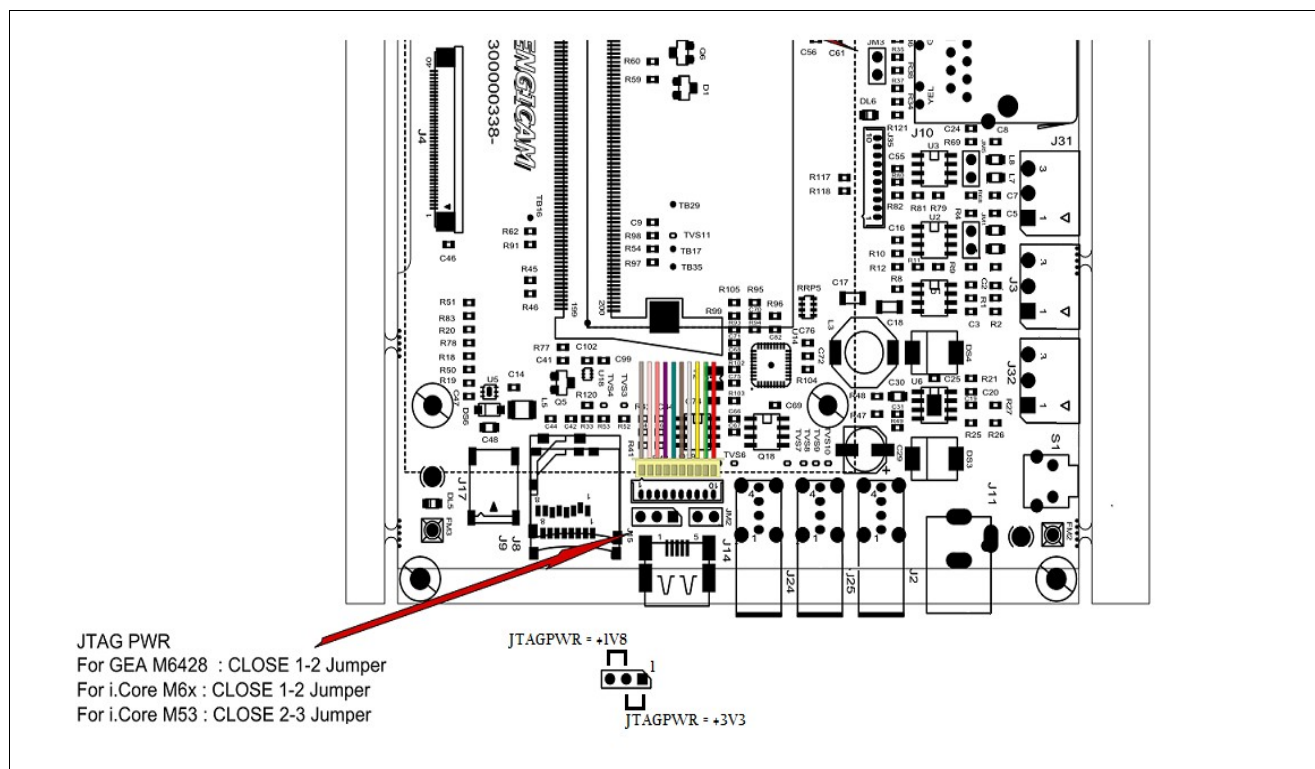
the address 0x48 of the 7-bit I2C bus is used by the PMIC of i.CoreM53 (e.g. using the temperature sensor TI LM75 there is bus conflict)

In the following table are shown the signals available using GEAM6428 on J29 connector.

| Pin Number | Signal Name | Function Description | Voltage |
|------------|-------------|----------------------|---------|
| 1 | +3V3_OUT | Power PIN | - |
| 2 | +3V3_OUT | Power PIN | - |
| 3 | GND | Power PIN | - |
| 4-14 | NC | - | - |
| 15 | GND | Power PIN | - |
| 16 | +1V8 | Power PIN | - |
| 17 | NC | - | - |
| 18 | I2C_SCL | I2C SCL Signal | +3,3V |
| 19 | I2C_SDA | I2C SDA Signal | +3,3V |
| 20 | NC | - | - |

JTag Jumper and Connector

Joint Test Action Group (JTAG) is the common name used for the IEEE 1149.1 standard entitled **Standard Test Access Port and Boundary-Scan Architecture** for test access ports used for testing printed circuit boards using boundary scan. JTAG is often used as an IC debug or probing port. There are no official standards for JTAG adapter physical connectors. The evaluation board mounts a socket by Molex, code 53047-10 (referenced J7) which mates with 51021-1000 PicoBlade Wire-to-Wirer.



| PIN Number | Name | Primary Function Description | Voltage |
|------------|------------|---------------------------------------|--------------|
| 1 | +JTAG_PWR | JTAG Interface | +1V8 or +3V3 |
| 2 | JTAG_TRSTB | JTAG Interface | +1V8 or +3V3 |
| 3 | JTAG_TDI | JTAG Interface | +1V8 or +3V3 |
| 4 | JTAG_TMS | JTAG Interface | +1V8 or +3V3 |
| 5 | JTAG_TCK | JTAG Interface | +1V8 or +3V3 |
| 6 | GND | Power Pin | - |
| 7 | NC | - | - |
| 8 | JTAG_TDO | JTAG Interface | +1V8 or +3V3 |
| 9 | GND | Power Pin | - |
| 10 | JTAG_nSRST | JTAG Interface with Pull-up on module | +1V8 or +3V3 |

WARNING!

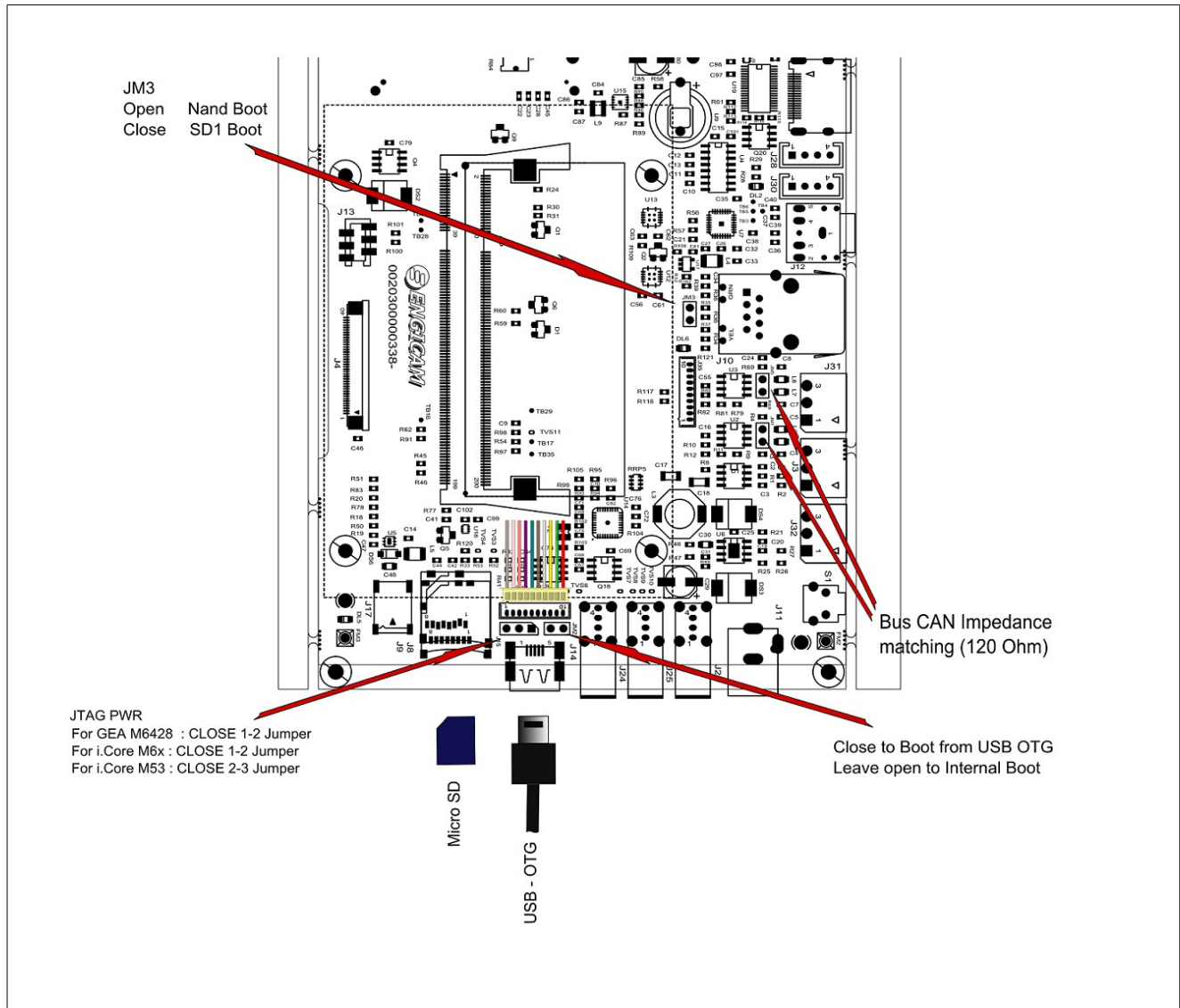
To obtain the compatibility with all modules, in the evaluation board the JTAG signals are pulled up through +JTAG_PWR which could be put to +1,8V or +3,3V using jumper referenced J15.

If you intend to use both module on your main board and don't use a JTag external console is mandatory to remove the pull-up or pull-down resistors.

Boot Jumper set up

Boot mode's pin determines how the module runs the boot. The evaluation board has 2 jumpers used to choose the boot sequence JM2 and JM3. The Jumper referenced JM2 determines the internal or external (by USB OTG) boot mode.

In the following picture is shown the the possible jumpers setup



In the evaluation board we try to set-up all the possible configurations for bootstrap from several devices

Important: this options are used only for iMx6x, iMx53 and GEAM6428 module.

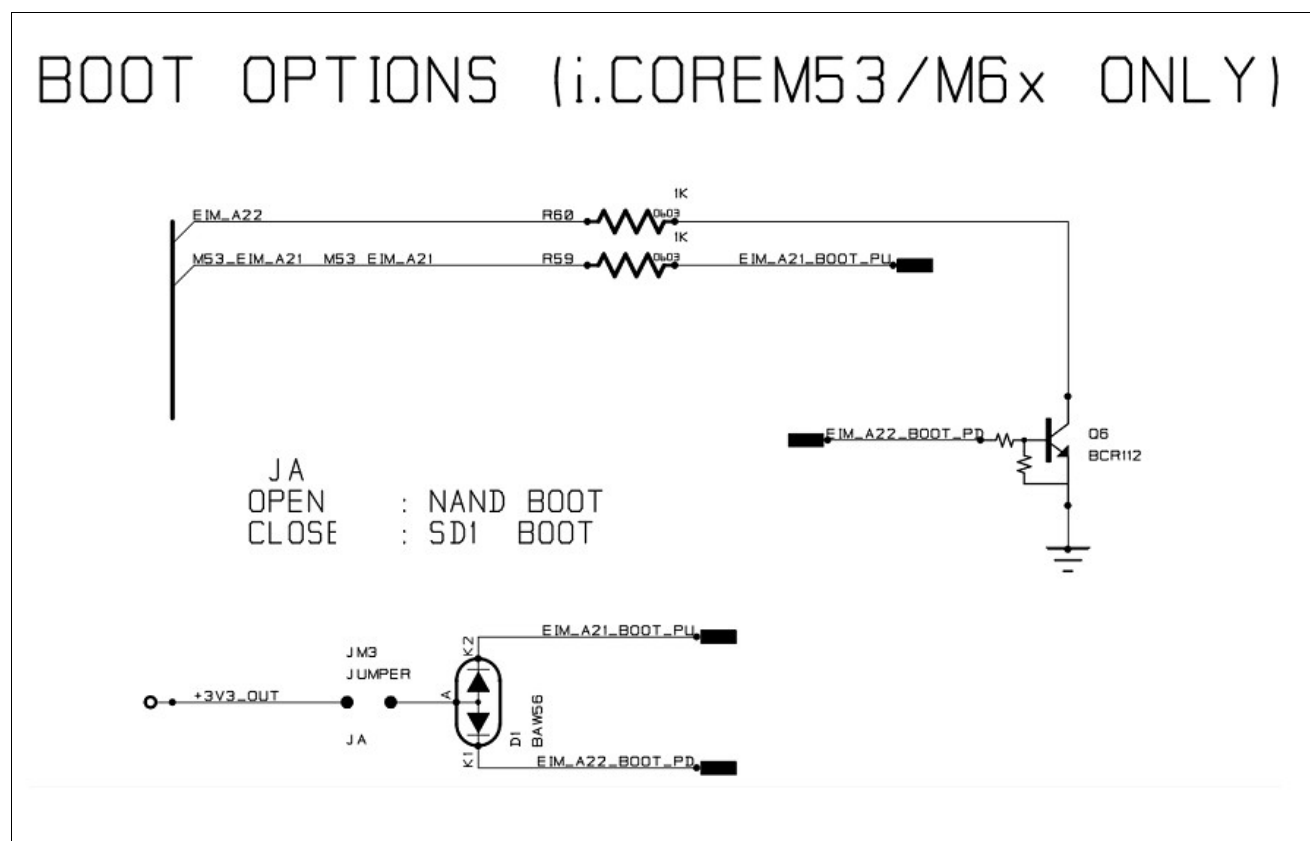
Please refer also to Hw manuals for further informations

The boot from USB OTG is usually used for the bootloader release.

| BOOT_MODE | Action |
|-----------|----------------------------|
| 0 | Boot from internal modules |
| 1 | Boot from USB/OTG |

The jumper referenced JM3 allows to choice the boot sequence. The following table lists the possible boot choices:

| JM3 | Boot CFG |
|-------|-----------|
| Open | Nand Boot |
| Close | SD1 Boot |



As shown in the picture above, the GEAM6428 module **can NOT** do the boot from SD card

Note: for further information is strongly recommended to refer to the modules "Hardware manual" and Freescale's "Reference manual"

Flashing application on SD card (i.CoreM53 only)

*It is often not easy to use company network to flash application, due to network security (proxy, etc...). We will see in this tutorial, how to flash a Linux application in a SD card with ONLY a SD card Reader and simple standard Linux commands. Before start this procedure please go in to **/data/iMx53/ltib** folder.*

Flashing u-boot

With the SD card Reader, we will flash the first part.

```
$ sudo dd if=u-boot.bin of=/dev/sdb bs=512 skip=2 seek=2 && sudo sync
```

Flashing Linux Kernel

With the SD card Reader, we will flash the second part. Keep in mind that 1MB=1048576B -> Kernel Offset.

```
$ sudo dd if=uImage of=/dev/sdb bs=1M seek=1
```

Configure u-boot variables

To launch the Kernel, you need to configure u-boot.

- Plug the serial cable on the J28 connector of iCore baseboard: 115kbps, 8 bits, 1 stop and no parity
- Put the SD card in the J15slot of iCore baseboard, power up the board , and launch the hyperterminal application.
In the hyperterminal print environnement variables type:
i.CoreM53> printenv

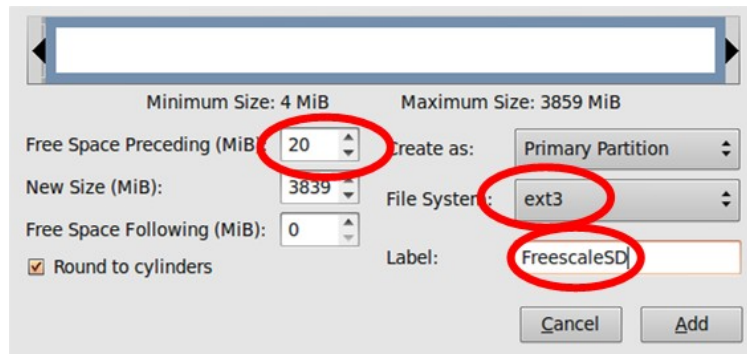
you must have this output from printenv command:

```
bootdelay=3
loadaddr=0x70800000
netdev=eth0
ethprime=FEC0
uboot=u-boot.bin
kernel=uImage
nfsroot=/opt/eldk/arm
bootargs_nfs=setenv bootargs ${bootargs} root=/dev/nfs ip=dhcp nfsroot=${serverip}:${nfsroot},v3,tcp
bootcmd_net=run bootargs_base bootargs_nfs; tftpboot ${loadaddr} ${kernel}; bootm
ethact=FEC0
ethaddr=00:02:02:04:04:08
bootcmd_mmc=run bootargs_base bootargs_mmc; mmc read 0 ${loadaddr} 0x800 0x1800; bootm
bootcmd_obds=ext2load mmc 0:1 0x70800000 /unit_tests/obds.bin; go 70800000
vga=video=mxcdi1fb:GBR24,VGA-XGA di1_primary vga
bootargs_mmc=set bootargs ${bootargs} root=/dev/mmcblk0p1 rw rootwait
baudrate=115200
hdmivideo=mxcdi0fb:RGB24,1024x768M@60
bootcmd=run bootcmd_mmc
lvds=video=mxcdi1fb:RGB666,SVGA di1_primary ldb=di1
bootargs_base=setenv bootargs console=ttymx0,115200 ${lcd}
filesize=34770
fileaddr=70800000
ipaddr=192.168.2.102
fecaddr=00:02:02:04:04:08
serverip=192.168.2.4
serverip=192.168.2.4
lcd=video=mxcdi0fb:RGB666,URT-WVGA di0_primary
stdin=serial
stdout=serial
stderr=serial
```

Create ext3 partition

With the SD card Reader, create an ext3 partition. You can use *gparted*, a graphical partition manager tool. Launch *gparted*:

```
$ sudo gparted
```



Create a new ext3 partition, with 20MB of offset

Copying Linux

To copy *rootfs* folder generated by *LTIB*, type in the shell:

```
$ sudo cp -r rootfs/* /media/FreescaleSD/ && sudo sync
```


LVDS CABLE INTERFACES

The Following scheme represents connectors' pin-out of the evaluation board, for both the LVDS interfaces, J20 and J22. The connector which mates with LVDS interfaces is DF14-20S-1.25C Hirose or compatible code.

| STRAND COLOR | SIGNAL | N° |
|--------------|-----------|----|
| Red | VCC | 1 |
| Red | VCC | 2 |
| Black | GND | 3 |
| Black | SEL6-8 NC | 4 |
| White/Orange | Rin0- | 5 |
| Orange | Rin0+ | 6 |
| Black | GND | 7 |
| White/Green | Rin1- | 8 |
| Green | Rin1+ | 9 |
| Black | GND | 10 |
| White/Blue | Rin2- | 11 |
| Blue | Rin2+ | 12 |
| Black | GND | 13 |
| Gray/Magenta | CLKin- | 14 |
| Magenta | CLKin+ | 15 |
| Black | GND | 16 |
| White/Brown | Rin3- NC | 17 |
| Brown | Rin3+ NC | 18 |
| White | RSV NC | 19 |
| None | NC | NC |

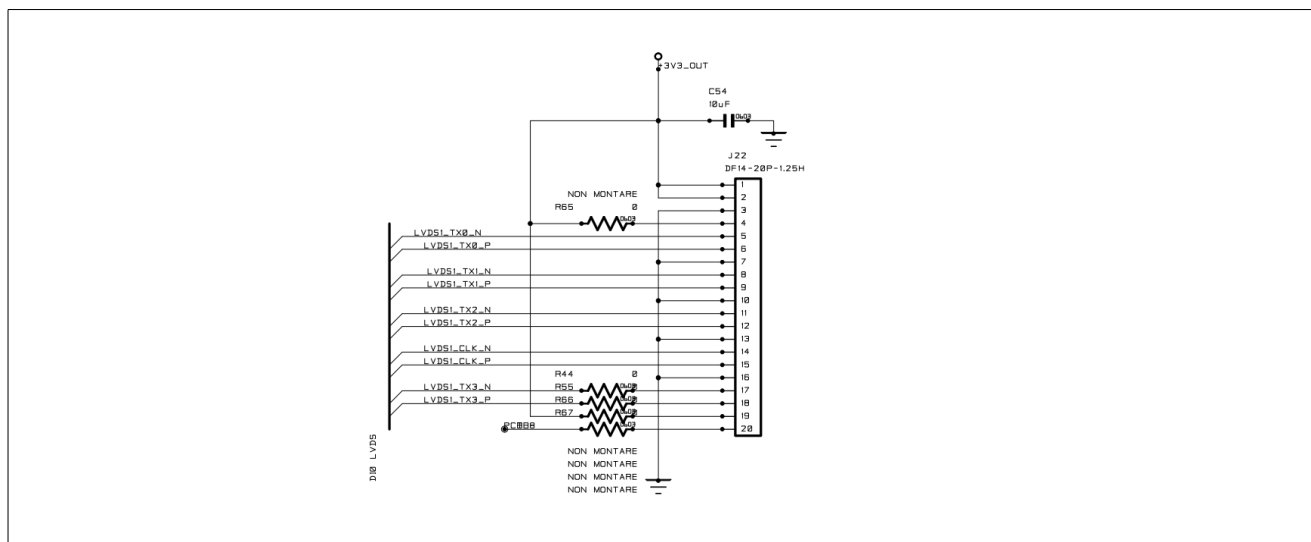
| CABLE | |
|-------------|----------|
| Diameter mm | Standard |
| Length mm | CUSTOM |

| NUMBER 1 POSITION | |
|-------------------|----|
| UP | 1 |
| DW | 20 |

| BOARD Connector | |
|-----------------|----------------|
| CONNECTOR | |
| Part Number | DF14-20S-1.25C |
| Producer | HRS (HIROSE) |

The colour of each wire is for reference only and not mandatory

Note that the pin 4 – 17 – 18 – 19 – 20 are not connected therefore the LVDS interfaces are both configured for 18 bit. You can change this configuration and use 24 bit configuration for LVDS0 by mounting the resistor R17 for PIN4, R15 for PIN17, R16 for PIN18, R22 for PIN19, R63 for PIN20, or for LVDS1 by mounting the resistor R65 for PIN4, R44 for PIN17, R55 for PIN18, R66 for PIN19, R67 for PIN20.



LVDS BACK-LIGHT interface

The evaluation board allows to interface to back-light connection through 2 types of connectors:

- Molex code 53780-0570 that is interfaced with Molex code 51146-0500 or compatible
- JTE code A3500WR-S-02P that is the standard for the displays equipped with back-light cable (mates JTS code BHSR-02VS-1 or compliant)

The Following scheme represents connectors' pin-out of the evaluation board for back-light interfaces

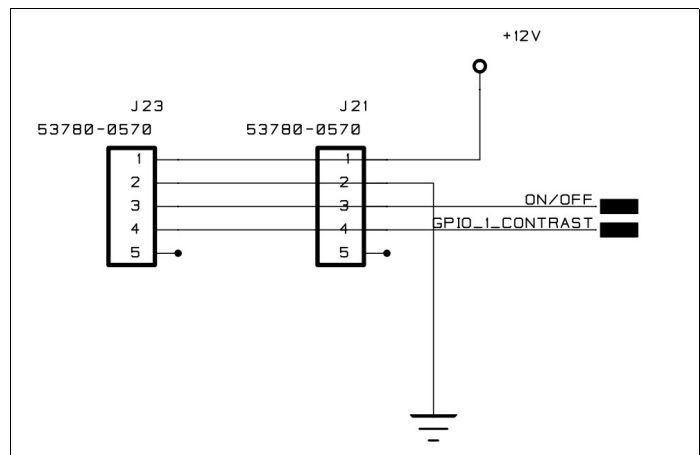
Molex J21, J23 cable interface

| STRAND COLOR | SIGNAL | N° |
|--------------|---------|----|
| Red | VCC | 1 |
| Black | GND | 2 |
| Blue | ON/OFF | 3 |
| Yellow | DIMMING | 4 |
| None | NA | 5 |

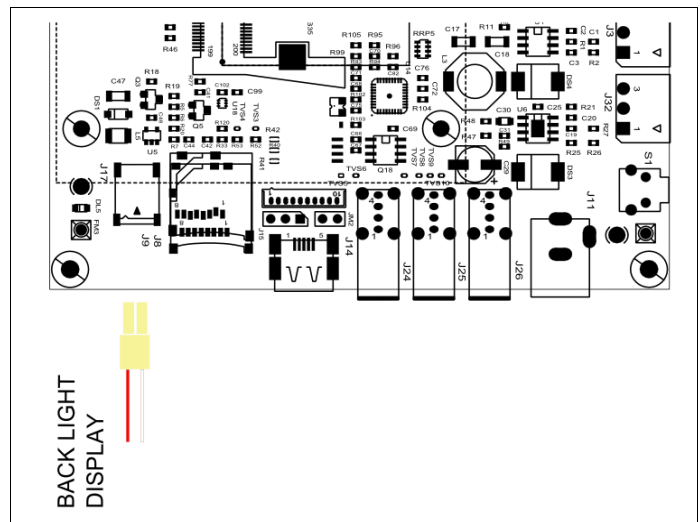
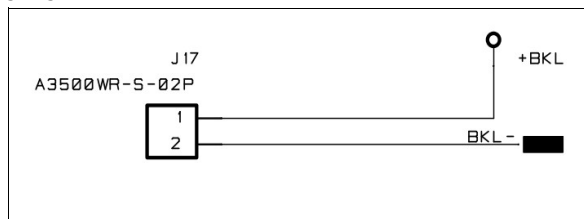
| BOARD Connector | |
|-----------------|------------|
| CONNECTOR | |
| Part Number | 51146-0500 |
| Producer | MOLEX |

| CABLE | |
|-------------|----------|
| Diameter mm | standard |
| Length mm | CUSTOM |

| NUMBER 1 POSITION | |
|-------------------|---|
| UP POSITION | 1 |
| DW POSITION | 5 |



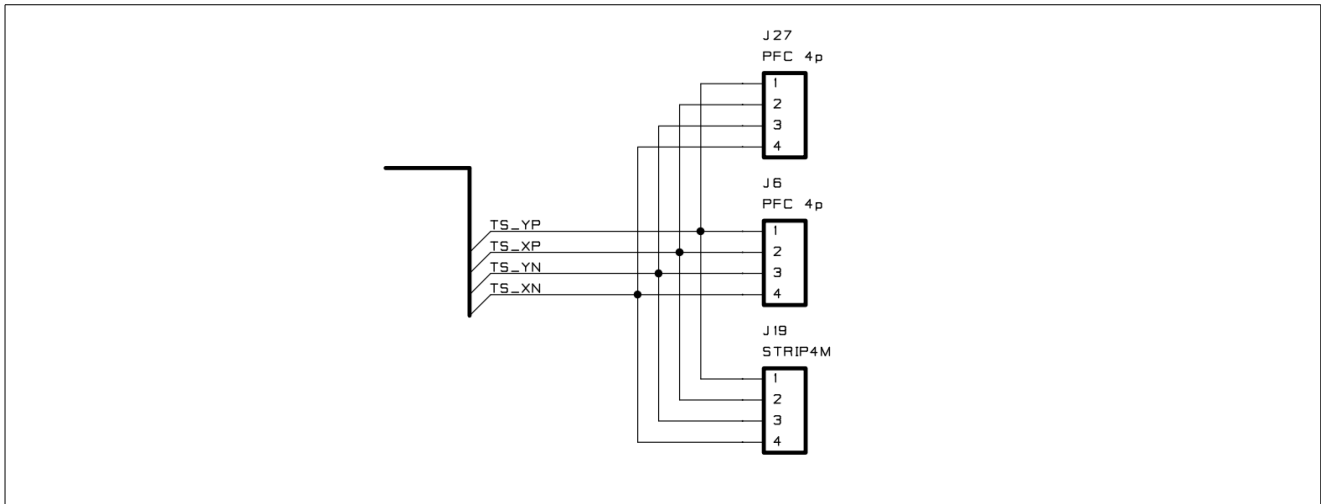
JTE J17



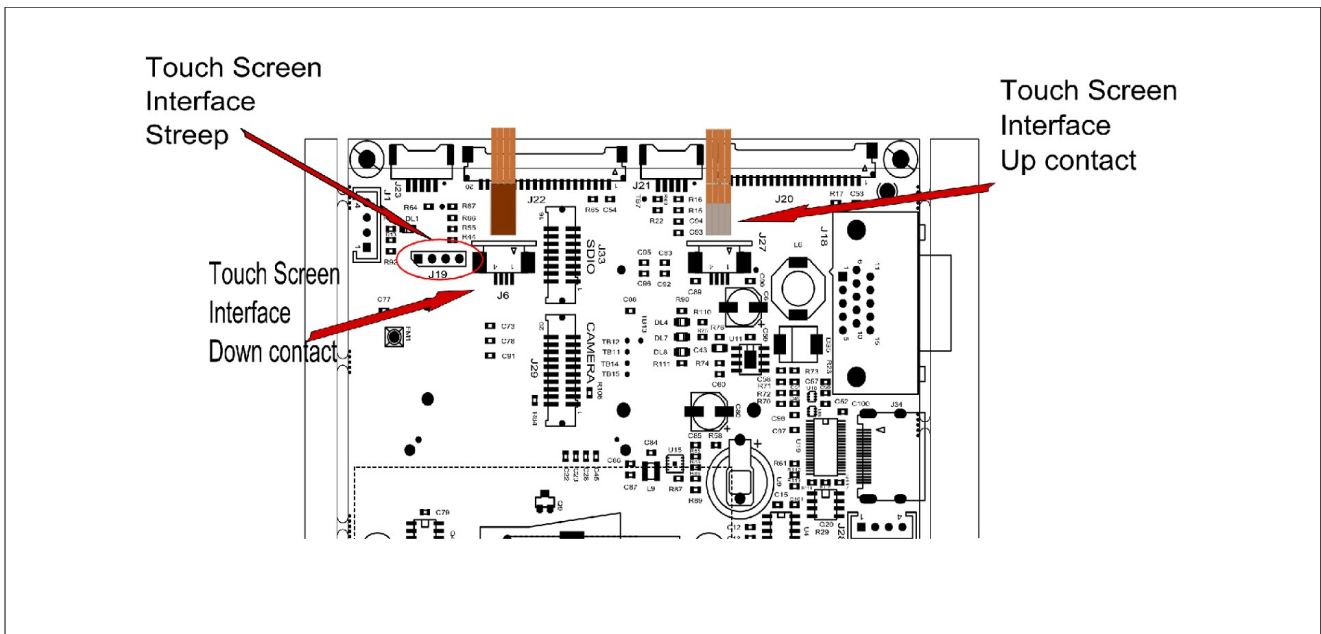
Even in this scheme the colour of each wire is for reference only and not mandatory

TOUCHSCREEN

The evaluation board provide of 3 kind of connector for touch-screen interfaces. The connectors are type FFC/FPC, Tyco code 84952-4 and Tyco code 84953-4 for Flex cable complaint (see figure below). The first (84952-4) is a bottom contact type connector the second (84953-4) is top contact type connector. At last there is a strip line, pitch 2,54mm, for back-light wired with singles strands. All the connector are mapped as shown in the image below:

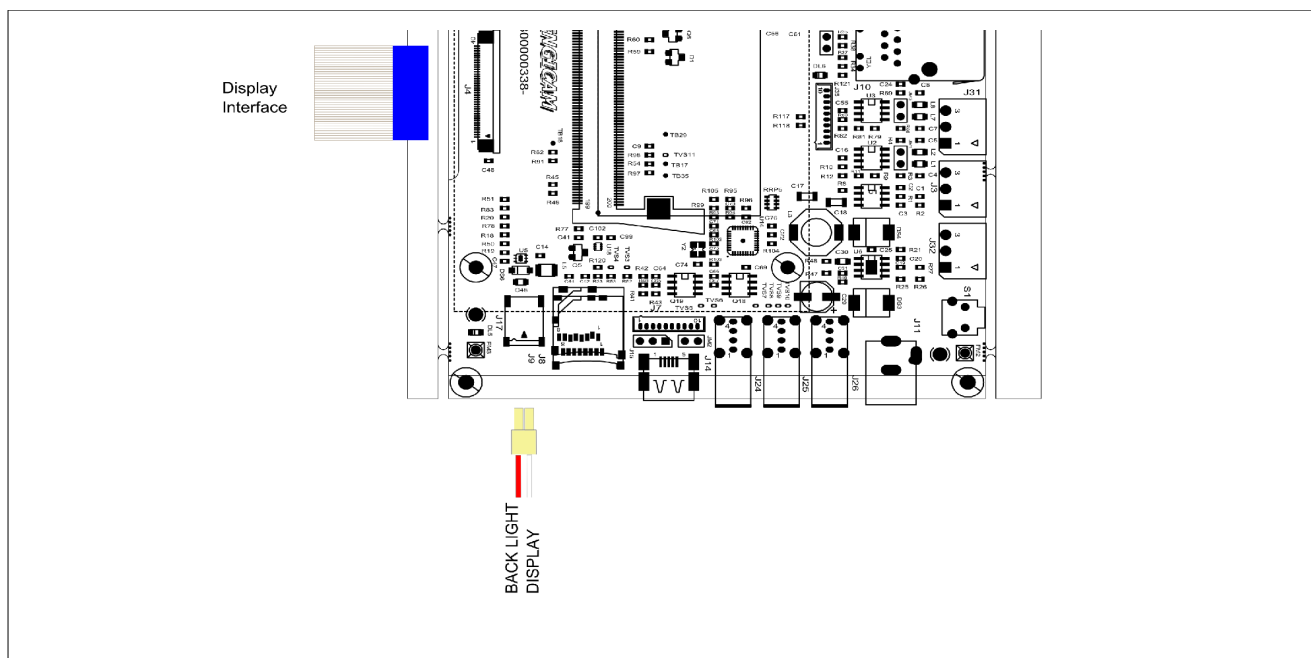


The following figure shows the touch screen interfaces mapped on the board:



Parallel RGB Interface

The evaluation board is equipped with one parallel RGB data port, this interface contains RGB data of 18 bit, pixel clock. Following are reported the schematic interface with FFC 40 ways cable.



The evaluation kit is equipped with 7" TFT LCD parallel RGB display 800x480 with touch-screen interfaced with FFC/FPC Bottom, SMT 0.5MM, R/A, 40 ways connector referenced J4 the table below shows the signals positioning

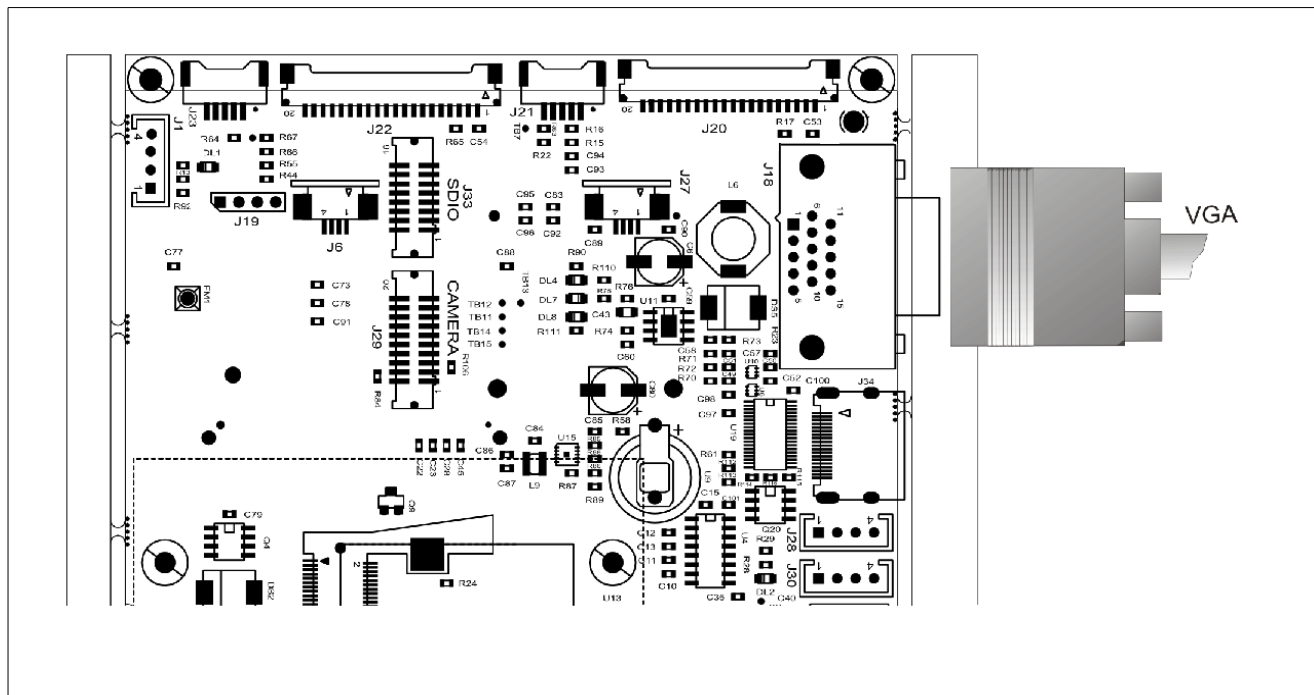
| Number | Name | Primary Function Description | Voltage |
|--|------------|------------------------------|----------|
| 1, 2, 10, 11, 12, 16, 20, 24, 28, 32, 36, 37, 39, 40 | GND | PWR Pin | - |
| 4, 5, 6, 7 | VCC | PWR Pin | +3V3_OUT |
| 3, 8 | NC | - | - |
| 38 | DISP0_CLK | LCD interface CLK | +2.775V |
| 29 | DISP0_D17 | LCD interface RED | +2.775V |
| 30 | DISP0_D16 | LCD interface RED | +2.775V |
| 31 | DISP0_D15 | LCD interface RED | +2.775V |
| 33 | DISP0_D14 | LCD interface RED | +2.775V |
| 34 | DISP0_D13 | LCD interface RED | +2.775V |
| 35 | DISP0_D12 | LCD interface RED | +2.775V |
| 21 | DISP0_D11 | LCD interface GREEN | +2.775V |
| 22 | DISP0_D10 | LCD interface GREEN | +2.775V |
| 23 | DISP0_D9 | LCD interface GREEN | +2.775V |
| 25 | DISP0_D8 | LCD interface GREEN | +2.775V |
| 26 | DISP0_D7 | LCD interface GREEN | +2.775V |
| 27 | DISP0_D6 | LCD interface GREEN | +2.775V |
| 13 | DISP0_D5 | LCD interface BLU | +2.775V |
| 14 | DISP0_D4 | LCD interface BLU | +2.775V |
| 15 | DISP0_D3 | LCD interface BLU | +2.775V |
| 17 | DISP0_D2 | LCD interface BLU | +2.775V |
| 18 | DISP0_D1 | LCD interface BLU | +2.775V |
| 19 | DISP0_D0 | LCD interface BLU | +2.775V |
| 9 | DISP0_DRDY | LCD interface | +2.775V |

The touch-screen of parallel interface is connected by J6 bottom contact type connector.

VGA Interface

ONLY for iMx53 Module

The evaluation board also has one TV-out/VGA port up to 150 Mpixels/sec (1080p at 60 Hz) with a 15-pin VGA connector interface. The interface VGA is equipped with a standard VGA connector DB 15 female PCB.



PIN Configuration on board:

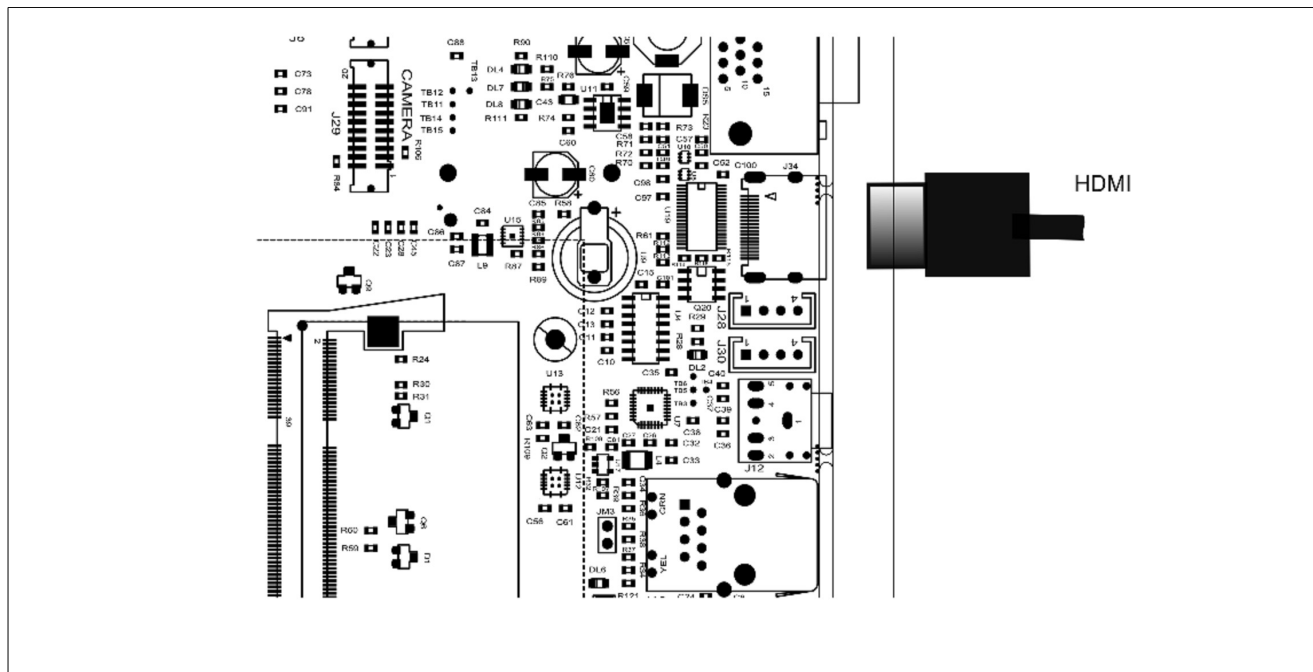
| Pin Number | Name | Description |
|------------|-------|-----------------|
| PIN 1 | RED | Red video |
| PIN 2 | GREEN | Green video |
| PIN 3 | BLUE | Blue video |
| PIN 4 | NC | Not connected |
| PIN 5 | GND | Ground |
| PIN 6 | GND | Ground |
| PIN 7 | GND | Ground |
| PIN 8 | GND | Ground |
| PIN 9 | +5 V | +5 V DC |
| PIN 10 | NC | Not connected |
| PIN 11 | NC | Not connected |
| PIN 12 | NC | Not connected |
| PIN 13 | HSync | Horizontal sync |
| PIN 14 | VSynC | Vertical sync |
| PIN 15 | NC | Not connected |

Note: the i.CoreM6Q and GEAM6428 are NOT equipped with the VGA interface

HDMI Interface

(Only for i.CoreM6x)

HDMI is a compact audio/video interface for transferring uncompressed digital audio/video data from a HDMI - compliant device to a compatible digital audio device, computer monitor, video projector, and digital television. For information about the HDMI specifications refer to the HDMI standard.



The connector is a standard HDMI type 19 poles . In the table is shown the standard pin configuration.

PIN Configuration on board:

| Pin Number | Name |
|------------|-----------------------------|
| PIN 1 | TMDS Data2+ |
| PIN 2 | TMDS Data2 Shield |
| PIN 3 | TMDS Data2- |
| PIN 4 | TMDS Data1+ |
| PIN 5 | TMDS Data1 Shield |
| PIN 6 | TMDS Data1- |
| PIN 7 | TMDS Data0+ |
| PIN 8 | TMDS Data0 Shield |
| PIN 9 | TMDS Data0- |
| PIN 10 | TMDS Clock+ |
| PIN 11 | TMDS Clock Shield |
| PIN 12 | TMDS Clock- |
| PIN 13 | CEC |
| PIN 14 | Reserved |
| PIN 15 | SCL |
| PIN 16 | SDA |
| PIN 17 | Ground |
| PIN 18 | +5V |
| PIN 19 | Hot Plug detect / HEC Data+ |

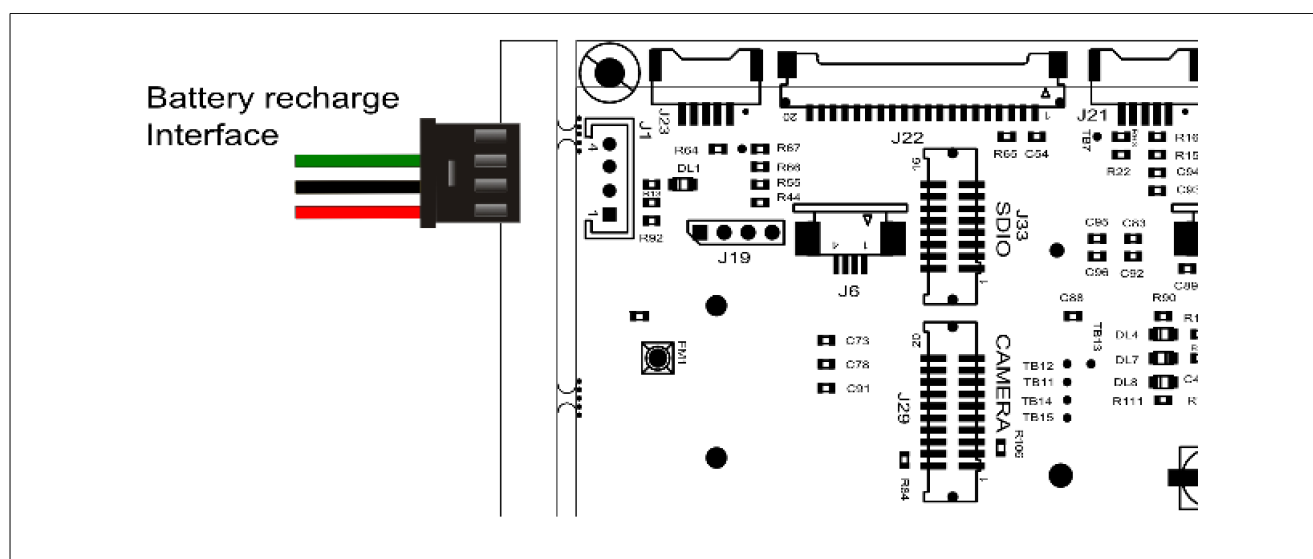
Note: the i.CoreM53 and GEAM6428 are not equipped with the HDMI interface

Lithium battery recharge Interface

The evaluation board has the possibility to accommodate a lithium rechargeable battery. The connector J1 is used to connect the battery to the system.

For the i.CoreM53 there is a custom circuitry on EVB which allows to manage the recharge of battery. The GEAM6428 has an internal manage of battery recharge. *

Note: not all the modules are able to manage a rechargeable battery



The signals in the connector are reported in the following table

J1 connector

| Pin Number | Signal Name | Function Description |
|------------|-------------|----------------------|
| 1 | +LIBAT | ** |
| 2 | GND | ** |
| 3 | TBAT | ** |

* Note: for further information please refer to Hw manual of GEAM6428

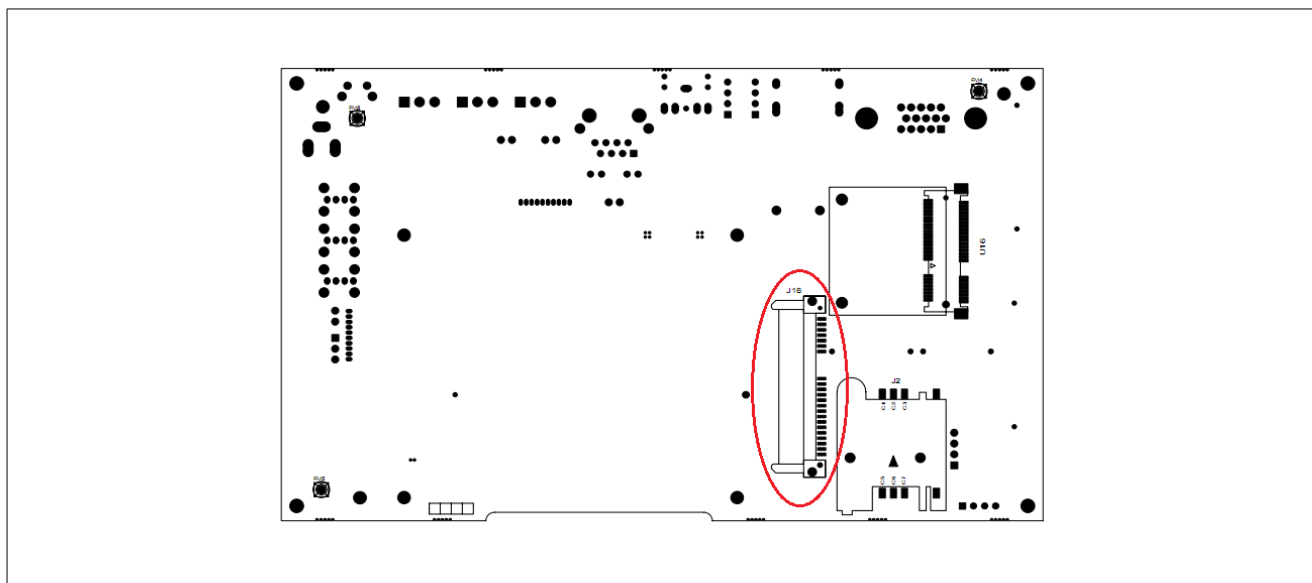
** Note: for the functions' description and use, please refer to the Hw manual of the desired module.

WARNING

Only the modules i.CoreM53 and GEAM6428 have the possibility to manage the recharge of battery

SATA Interface

Serial ATA (SATA or Serial AT Attachment) is a computer bus interface for connecting host bus adapters to mass storage devices such as hard disk drivers and optical drives. Serial ATA was designed to replace the older parallel ATA (PATA) standard (often called by the old name IDE), offering several advantages over the older interface: reduced cable size and cost (7 conductors instead of 40), native hot swapping, faster data transfer through higher signalling rates, and more efficient transfer through an (optional) I/O queuing protocol.



Sata interface connector (which mates with the standard connector PLUG, SATA 22PS) is assembled in the bottom side of the board(solder side), as shown in the figure above.

In the following table are shown the connections to SATA connector.

| Pin Number | Signal Name |
|------------|-------------|
| S1 | Ground |
| S2 | SATA_TXP * |
| S3 | SATA_TXM * |
| S4 | Ground |
| S5 | SATA_RXM * |
| S6 | SATA_RXP * |
| S7 | Ground |
| P1 | NC |
| P2 | NC |
| P3 | NC |
| P4 | Ground |
| P5 | Ground |
| P6 | Ground |
| P7 | +5V |
| P8 | +5V |
| P9 | +5V |
| P10 | Ground |
| P11 | NC |
| P12 | Ground |
| P13 | NC |
| P14 | NC |
| P15 | NC |

* Note: SATA signals are not present in the GEAM6428 module