SB-T35

Reference Guide

CompuLab

Table of Contents

Table 1   Document Revision Notes

Date	Description
November 2009	First release
November 2010	Updated for SB-T35 1v3. For details, please refer to the "Board Revision Notes" table.
April 2015	Updated for SB-T35 1v41. For details, please refer to the "Board Revision Notes" table. • Block Diagram update • Added "Bluetooth" section into table 4 • Baseboard interface connector data update (chapter 4.1) • Legal notice & company address update • Revised chapter 4.13 to reflect connector P27 instead of P7.

Please check for a newer revision of this manual at CompuLab's web site – http://www.compulab.co.il/. Compare the revision notes of the updated manual from the web site with those of the printed or electronic version you have.

Table 2   Board Revision Notes

Date	Description
November 2009	Board revision 1v1. First release
November 2010	Board revision 1v3. • Added support for CM-T3517. • Added CAN transceiver and isolator. • Added P25 connector for CAN interface. • Added support for two additional USB2.0 ports. Added connectors P23 and P25. • Added automatic main power source selection circuitry. • Added power path selector hot swap support. • Left and right channels swapped on audio-out connector J4. • Added automatic USB power supply selection. USB power source is automatically selected according to SB-T35 main power source. • Added automatic VCC_PER voltage selection circuit. SB-T35 automatically selects appropriate peripheral voltage source for both CM-T3530 and CM-T3517. • Added CompuLab Video Input connector P26. • Added a touch screen headers E11 and E12. • Backlight driver power source changed to VCC3_3 instead of VCC_CM. • Fixed DVI and LVDS synchronization signal connection.

November 2012	Board revision 1v41.
	• Removed P7 40-pin FPC connector
	• Added P27 50-pin FPC connector for compliance with following LCDs:
	  o Anders DX4-D43A
	  o Startec KD050C-1A-TP (through adapter)

1 INTRODUCTION

1.1 About This Document

This document is part of a set of reference documents providing information necessary to operate and program CompuLab's SB-T35 baseboard.

1.2 Related Documents

For additional information not covered in this manual, refer to the documents listed in Table 3.

Table 3   Related Documents

Document	Location
CM-T3530 Developer Resources	http://www.compulab.co.il/
CM-T3517 Developer Resources	http://www.compulab.co.il/
CM-T3730 Developer Resources	http://www.compulab.co.il/

2 OVERVIEW

2.1 Highlights

<table>
<tr>
<td>

- Carrier base-board designed to support the CM-T3xxx product line
- Implements a Single Board Computer when combined with a CM-T3xxx module.
- Supports CM-T3530, CM-T3517 and CM-T3730 modules
- Extends the CM-T3xxx graphics controller with interfaces for LVDS, RGB and DVI monitors
- Camera interface
- Up to 3 serial ports
- Host and slave USB ports
- Touchscreen interface
- Keypad and GPIO connectors
- Audio support with stereo output and line input
- Two 100 Mbps Ethernet ports
- MMC / SD / SDIO socket
- Back-up battery for RTC
- Lithium-ion battery charger

</td>
<td>

The SB-T35 is a carrier baseboard designed for the CompuLab CM-T3xxx product line. The SB-T35 routes the CM-T3xxx interfaces to standard connectors and also enriches the CM-T3xxx feature set with additional peripheral devices.

A combination of the SB-T35 with one of the CM-T3xxx modules implements a fully functional SBC (single board computer).

The rich feature set of the SBC is customizable according to the price / performance targets of the user's application.

The power supply options of the SB-T35 enable its integration in mobile applications powered by a rechargeable battery. Charger and battery management support is provided on-board.

</td>
</tr>
</table>

2.2 Block Diagram

Figure 1 SB-T35 Block Diagram
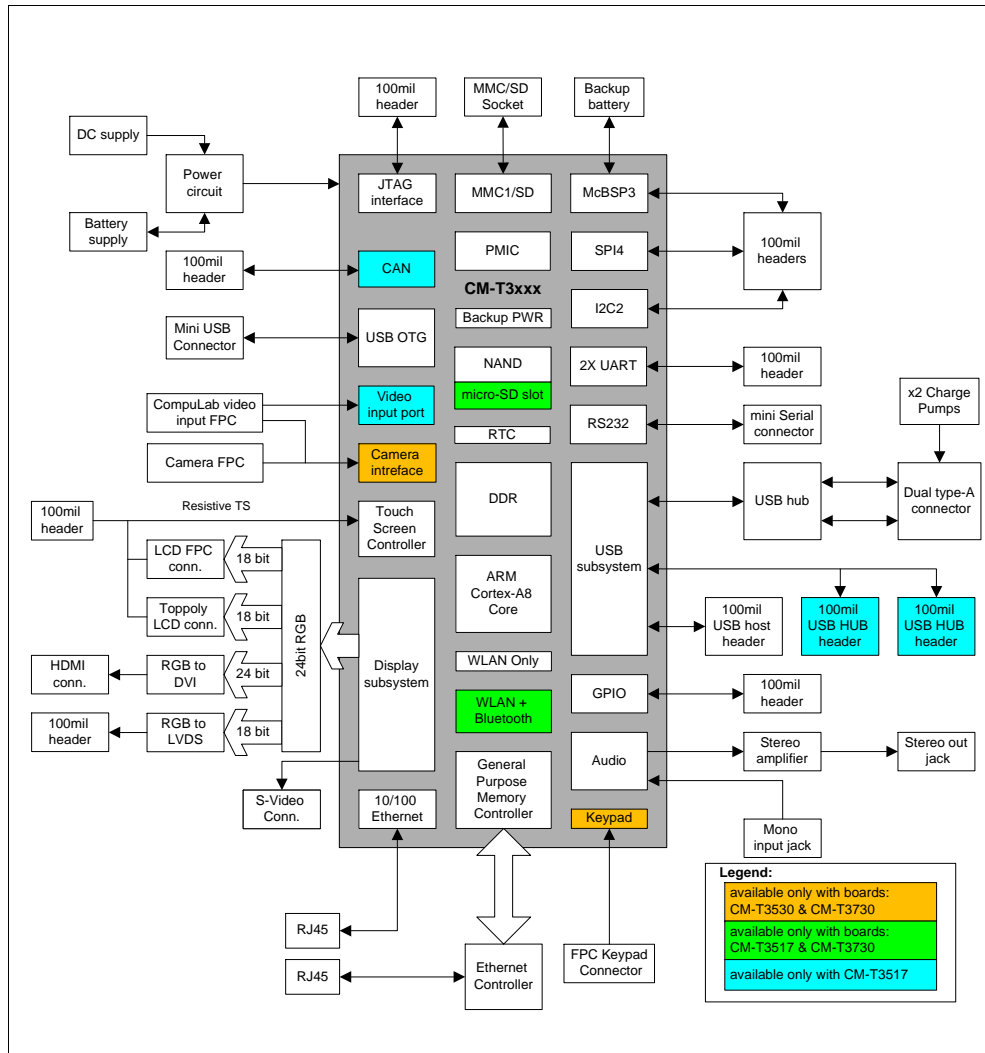
2.3 Features

The SB-T35 is a carrier baseboard designed for the CompuLab CM-T3xxx product line. This product line is based on the Texas Instruments OMAP3 and Sitara SoC families. The SB-T35 supports the following CompuLab modules:

- CM-T3530
- CM-T3517
- CM-T3730

A combination of the SB-T35 with a particular module is referred to as "SBC-T3xxx".

Table 4 Summarizes the features available with the SB-T35.

The "SB Option" column specifies the SB-T35 P/N code that is required, in order to have the particular feature. The "CM-T3xxx Option" column specifies the CM-T3xxx P/N code that is required to have the particular feature. SBC-T3xxx features are the combination of features provided by the attached CM-T3xxx module and the features implemented on the SB-T35. To have the particular feature, both the CM and SB options of that feature must be implemented.

"+" means that the feature is always available, regardless of P/N code.

"-" means that the feature is never available with the specific CM-T35xx CoM, regardless of P/N code.

Table 4   SB-T35 Features

Feature	Specifications	SB Option	CM-T3517 Option	CM-T3530 Option	CM-T3730 Option
CPU SDRAM Flash Disk	See Feature List of the relevant CM-T3xxx module	+			
COM-A	RTS/CTS controls, 100-mil header	+	+	+	+
COM-B	RTS/CTS controls, 100-mil header	+	+	+	+
COM-C	Rx/TX only, RS-232, ultra mini serial conn.	+	+	+	+
Ethernet	CM-T35xx 100 Mbps Ethernet port, RJ-45 connector and activity LED's	+	E	E	E
	SB-T35 100 Mbps Ethernet port. LAN9220 controller. RJ-45 connector and activity LED's	E	+	+	+
LCD Panel	TD035STEE1 (3.5", 480x640, TFT) panel support. 60-pos FPC connector for direct interface to TD035STEE1	+	+	+	+
	STN and TFT panel support. 40-pos FPC connector for direct interface to certain TFT panels	+	+	+	+
DVI	DVI monitor support, HDMI connector	LD	+	+	+
LVDS	4 pair LVDS panel interface, 100-mil header	LL	+	+	+
TV-out	Composite video, S-Video connector	+	+	+	+
USB 2.0 OTG	USB 2.0 OTG port, USB mini-AB connector	+	+	+	+
USB 2.0 host	Two USB 2.0 host ports, 480 Mbps. Implemented by USB 2.0 high-speed hub. Type-A connector	+	U2	U	U
	An additional USB 2.0 high speed port, 480 Mbps. 100-mil header	+	U3		
	An additional USB 2.0 high speed port, 480 Mbps. 100-mil header	+	U5	-	-
GPIO	11 lines on 100-mil header	+	+	+	+
Touch Panel	TSC2046 touchscreen controller for resistive panels. Interface to LCD panel	+	I	I	I

Sound I/O	I2S compliant audio codec, Line input and Speakers (stereo) jacks	+	A	+	+
RTC Battery	Real time clock component on CM-T3xxx, supplied by lithium battery on SB-T35	+	+	+	+
WiFi	WiFi interface, provided by CM-T3xxx	+	W	W	W
Bluetooth	Bluetooth interface, provided by CM-T3xxx	-	W	-	W
SDIO / MMC	MMC / SD / SDIO support including SDHC up to 32GB. Standard full-size SD socket	+	+	+	+
Camera interface	24-pos FPC connector for direct interface to certain camera modules	+	-	+	+
Video input interface	40-pos FPC connector for direct interface with CompuLab video input module	+	+	+	+
Battery management	Charging and supervision support for Lithium-ion polymer batteries	S	+	+	+
CAN bus	CAN bus host port. Implemented by CM-T3517 internal CAN controller. 100-mil header.	+	+	-	-

Table 5   Electrical, Mechanical and Environmental Specifications

Supply Voltage	High efficiency switched power supply. Sleep mode support. Unregulated 3.3 to 4.2 volt input from battery or regulated 5V from wall adapter
Power consumption	1W to 3W in full activity, depending on CPU speed and selected features Below 50mW in sleep mode
Dimensions	166 mm (L) x 82 mm (W) x 23 mm (H)
Weight	107 grams
Operation temperature (case)	Commercial: 0o to 70o C Extended: -20o to 70o C Industrial: -40o to 85o C
Storage temperature	-40o to 85o C
Relative humidity	10% to 90% (operation) 05% to 95% (storage)
Shock	50G / 20 ms
Vibration	20G / 0 - 600 Hz
MTBF	> 100,000 hours

3 SYSTEM COMPONENTS

3.1 DC Power Supply

The SB-T35 DC power sub-system uses an external 5V DC power supply through connector J1. The SB-T35 generates a 3.8V power rail internally, using the LM2743 DC-DC step-down converter. Alternatively, the SB-T35 can be powered with a Lithium-ion polymer battery. The SB-T35 on-board power selection circuit automatically selects the main power supply.

The various voltages required for powering SB-T35 peripherals are generated by on-board circuitry according to the block diagram below.

Figure 2 Power Scheme
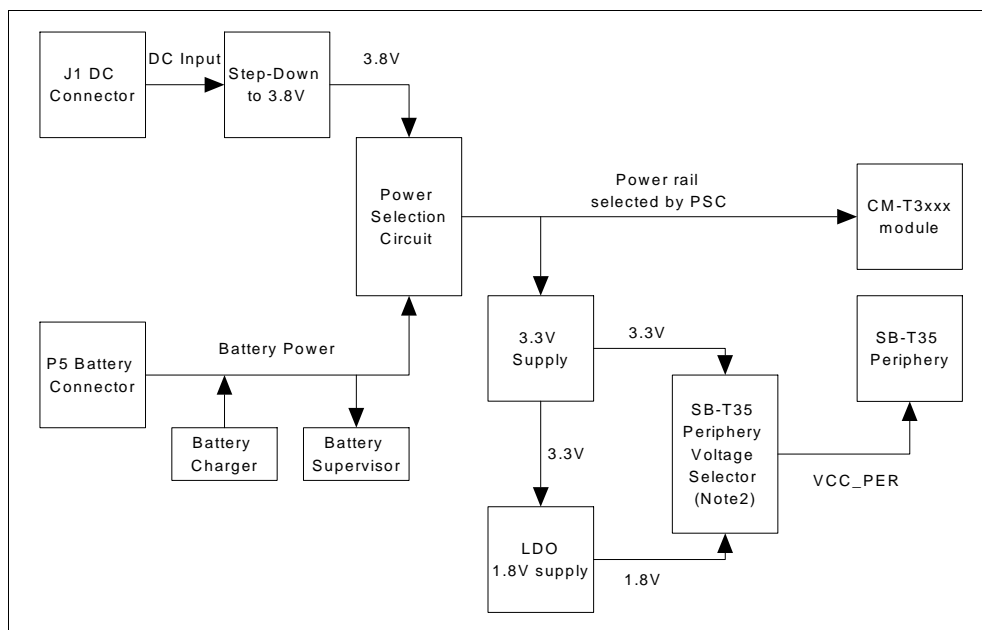
NOTE: The power selection circuit is available only on SB-T35 rev 1.3 or later. Older board revisions require manual input selection implemented with jumper E2.

NOTE: The periphery voltage selector is available only on SB-T35 rev 1.3 or later. Older board revisions only support peripheral power rail of 1.8V.

3.1.1   Power Selection Circuit – PSC

The SB-T35 PSC automatically selects the system main power source, according to the table below.

Table 6   PSC Operation Table

DC power supply is connected to J1	Battery is connected to P5	System power source (Selected by PSC)
No	Yes	Battery
Yes	No	Internally generated 3.8V
Yes	Yes	Internally generated 3.8V

3.2   Battery Management

The SB-T35 battery management system incorporates a battery charger and a battery supervisor.

The battery charger is based on the ISL6291 CC-CV charger, responsible for charging the battery and monitoring its temperature. The "charging" LED (DS2) is on, when the battery is being charged. The charger operates without any system intervention and can operate even when there is no CoM installed.

The battery supervisor is based on the DS2786 supervisor. It interfaces with the system through an I^2C port (I^2C-3 on CM-T3xxx) and makes battery information available for the system upon request.

3.3   Ethernet

The SB-T35 is equipped with the SMSC LAN9220 single chip Ethernet controller that is interfaced with the local bus of the CM-T3xxx. Ethernet signals are routed to the RJ-45 connector (P16).

Figure 3   Ethernet Scheme
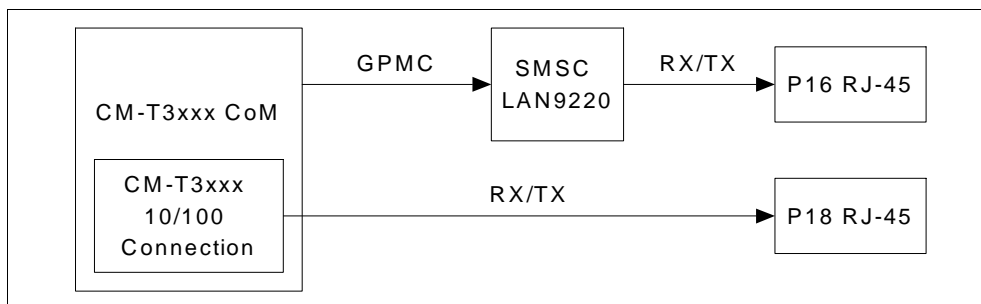
The LAN9220 component is a single chip 10/100 Ethernet MAC with integrated PHY and HP Auto-MDIX support. It is fully compliant with IEEE 802.3/802.3u standards. The following features are supported:

- 10BASE-T and 100BASE-TX support
- Full and Half duplex support
- Full-duplex flow control
- Automatic 32bit CRC generation and checking
- Auto-negotiation

The LAN9220 controller is connected to GPMC CS4 on the CM-T3xxx local bus. GPIO65 acts as the LAN9220 interrupt request signal.

3.4   DVI Transmitter

The SB-T35 is equipped with a DVI Transmitter that is based on the TFP410/SIL164 IC. DVI output signals are routed from the DVI Transmitter to the onboard HDMI Connector (J2). The DVI Transmitter is connected to the 24bit display interface of the CM-T3xxx.

TFP410/SIL164 are fully DVI 1.0-compliant transmitters. The DVI Transmitter on the SB-T35 is configured for rising edge data sampling, single ended pixel clock and standard 3.3V CMOS input signal levels. The internal DVI transmitter can be shut down by software (GPIO54) and can also inform the system (through GPIO109) whether a monitor is connected to the transmitter output.

In order to use the DVI interface, the CM-T3xxx display system has to be configured properly for 24bit active matrix data transmission. Additionally, the display interface logic level (controlled by jumper E8) must be set to 3.3V.

3.5   LVDS Transmitter

The SB-T35 is equipped with an LVDS Transmitter that is based on the DS90C365A IC. LVDS output signals are routed from the LVDS Transmitter IC to an onboard 100mil header (P20). The LVDS Transmitter is connected to the display interface of the CM-T3xxx.

The DS90C365A is a National Semiconductor +3.3V Programmable LVDS Transmitter 18-bit Flat Panel Display link-87.5MHz. The transmitter is fully compatible with the TIA/EIA-644 LVDS standard and supports VGA, SVGA and XGA display modes.

The LVDS Transmitter is configured for rising edge data sampling. GPIO162 can be configured to put the transmitter into shutdown mode.

In order to use the LVDS interface, the CM-T3xxx display system has to be configured properly for 18bit active matrix data transmission. Additionally, the display interface logic level (controlled by jumper E8) must be set to 3.3V.

3.6 USB HOST Subsystem

The SB-T35 provides several high-speed USB2.0 host ports.

- When SB-T35 is used with CM-T3530/CM-T3730 - up to 3 USB2.0 host ports are available.
- When SB-T35 is used with CM-T3517 - up to 5 USB2.0 host ports are available.

In addition to the ports provided by the CM-T3xxx module, the SB-T35 is equipped with an onboard high-speed USB2.0 hub that is based on the SMSC USB2513 IC, fully compliant with the USB2.0 specification. The USB hub up-link is directly interfaced with the USB-2 port of the CM-T3xxx. The USB hub provides two downlink connections routed directly to the dual type-A USB connector (P17).

The following block-diagram describes the SB-T35 USB subsystem.

Figure 4   USB Subsystem
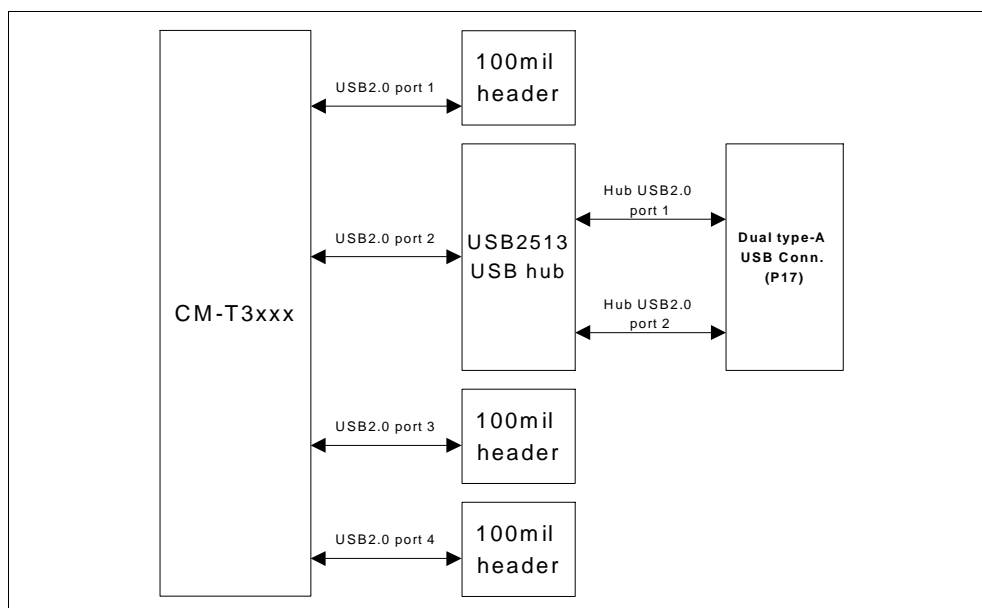
NOTE: Ports 3 and 4 are available only when SB-T35 is used with CM-T3517.

3.7 CAN transceiver

The SB-T35 is equipped with a CAN transceiver and a galvanic isolator. The CAN transceiver is based on the TJA1050 component from NXP. It is fully compatible with the ISO 11898 standard and supports speeds up to 1 Mbps. The galvanic isolator is based on the ISO7221 component from TI, supporting a 150 Mbps top signaling rate. The isolator is UL 1577, IEC 60747-5-2 (VDE 0884, Rev 2), IEC 61010-1, and CSA approved.

The CAN bus PHY output is routed to CAN bus connector (P25).

NOTE: CAN bus functionality is supported only when SB-T35 is used with CM-T3517.

3.8　Audio Amplifier

The SB-T35 is equipped with a stereo audio out signal amplifier that is based on the TPA102DGN IC. Amplifier inputs are driven by the AUDIO_OUT_R/L signals of the CM-T3xxx. Amplifier output is routed directly to the onboard headphone jack (J4).

The TPA102DGN is a 150mW Stereo Power Amplifier from Texas Instruments. The audio amplifier is capable of delivering 150mW of continuous RMS power per channel into 8Ω loads.

The Audio amplifier is configured for a gain of 1V/V. It can also be shut down by software (GPIO61).

3.9　Back-Up Battery

An on-board 18mAh rechargeable coin cell lithium battery is the back-up power supply for RTC timekeeping. This battery is in charge of powering the CM-T3xxx RTC whenever the main power supply is not present.

NOTE: The E7 jumper must be installed for RTC back-up support.

4 INTERFACES AND CONNECTORS

4.1 CM-T3xxx Interface Connectors (P1, P2)

The CM-T3xxx CoM is interfaced through two 0.6mm pitch, 140pin connectors - P1 and P2.

For signal descriptions, please refer to the relevant CoM Reference Guide.
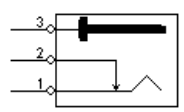
Table 7   P1 and P2 connector data

Manufacturer	P/N of SB-T35 Connector	P/N of CM-T3xxx Connector (Mating)
AMP	8-5353189-0	8-5353183-0 or CON140

4.2 DC Power Jack (J1)

Table 8   5V DC input jack pinout

Pin	Signal Name
1	GND
2	NC
3	VCC_5V

Table 9   J1 connector data
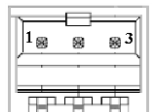
Manufacturer	Mfg. P/N
Astron	15-02037-R

Mating with power supply adapter 209C10020 supplied by CompuLab.

4.3 Battery Connector (P5)

Table 10   P5 connector pinout

Pin	Signal Name
1	VCC_BAT
2	BT_NTC
3	BAT_GND

Table 11   P5 connector data

Manufacturer	Mfg. P/N	Mating connector
Molex	87438-0343	Molex, P/N: 87439-0300
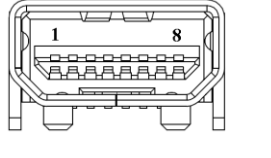
The connector is compatible with the BAT10 battery pack supplied by CompuLab.

4.4 RS232 connector (P12)

The RS232 port of the CM-T3xxx is connected to the SB-T35 on-board RS232 ultra-mini connector (P12). All signals are at RS232 levels.

Table 12   P12 connector pinout

Pin	Signal Name	Pin	Signal Name
1	RS232_TXD	5	NC
2	NC	6	NC
3	RS232_RXD	7	NC
4	NC	8	GND

Table 13   P12 connector data

Manufacturer	Mfg. P/N	Mating connector
Wieson	G3169-500001	Wieson, P/N: 4306-5000

The connector is compatible with the CABDB9UMP cable supplied by CompuLab.

4.5 USB OTG Connector (P8)

The USB OTG port of the CM-T3xxx is routed to the mini-USB type AB connector (P8). For additional details, please refer to the relevant CoM Reference Guide.

Table 14   P8 connector pinout

Pin	Signal Name
1	USB0_5V_OUT
2	USB0_DN
3	USB0_DP
4	USB0_ID
5	GND

Table 15   P8 connector data

Manufacturer	Mfg. P/N	Mating connector
Astron	22-2601-5G-1T-R	Standard USB mini-B plug Standard USB mini-A plug

4.6 USB Host Connector (P17)

The two USB host ports provided by the on-board USB hub are routed to the standard dual type-A USB connector (P17). For additional details on USB VBUS power, please refer to section *4.25* of this document.

Table 16   P17 connector pinout

USB HUB port 1		USB HUB port 2	
Pin	Signal Name	Pin	Signal Name
1	USBHUBP1_VBUS	5	USBHUBP2_VBUS
2	USBHUBP1_DM	6	USBHUBP2_DM
3	USBHUBP1_DP	7	USBHUBP2_DP
4	GND	8	GND

Table 17   P17 connector data

Manufacturer	Mfg. P/N	Mating connector
Astron	22-2104-8(W)-1T-R	Standard USB type A plug

4.7   USB Connectors (P22, P23, P24)

The 100mil header P22 is routed to port USB-1 of the CM-T35xx.

Table 18   P22 connector pinout

Pin	Signal Name
1	USB1_VBUS
2	USB1_DM_E
3	USB1_DP_E
4	GND

The 100mil headers P23 and P24 are routed to USB ports 3 and 4 of the CM-T3517.

Table 19   P23 connector pinout

Pin	Signal Name
1	CM_USBHUBP2_VBUS
2	USBHUBP2_DM_E
3	USBHUBP2_DP_E
4	GND

Table 20   P24 connector pinout

Pin	Signal Name
1	CM_USBHUBP3_VBUS
2	USBHUBP3_DM_E
3	USBHUBP3_DP_E
4	GND

P22, P23 and P24 connectors are compatible with the CONUSB cable available from CompuLab. The CONUSB cable provides a standard USB TYPE A connection.

NOTE: The SB-T35 supports USB functionality on P23 and P24 only when used with the CM-T3517 module.

NOTE: VBUS pins are powered only when the SB-T35 is operated with a DC power supply.

4.8 CAN Connector (P25)

The 100mil header P25 is routed to the CAN port of the CM-T3517 through the CAN isolator and PHY circuitry.

Table 21   P25 connector pinout

Pin	Signal Name
1	CAN_VCC
2	CAN_H
3	CAN_L
4	CAN_GND

NOTE: CAN bus functionality is supported only when SB-T35 is used with CM-T3517.

4.9 CORE Ethernet Connector (P18)

The SB-T35 is equipped with a standard Ethernet RJ45 connector (P18) interfaced with the CM-T3xxx Ethernet controller.

Table 22   P18 connector pinout

Pin	Signal Name
1	CM_ETH_TXP
2	CM_ETH_TXN
3	CM_ETH_RXP
4	-
5	-
6	CM_ETH_RXN
7	-
8	-

Table 23   P18 connector data

Manufacturer	Mfg. P/N	Mating connector
UDE	RTA-1D4B8V1A	Standard Ethernet RJ45 plug

4.10   BASE Ethernet Connector (P16)

The SB-T35 is equipped with a standard Ethernet RJ45 connector (P18) interfaced with the SB-T35 integrated Ethernet controller.

Table 24   P16 connector pinout

Pin	Signal Name
1	SB_ETH_TXP
2	SB_ETH_TXN
3	SB_ETH_RXP
4	-
5	-
6	SB_ETH_RXN
7	-
8	-

Table 25   P16 connector data

Manufacturer	Mfg. P/N	Mating connector
UDE	RTA-1D4B8V1A	Standard Ethernet RJ45 plug

4.11   MMC/SD/SDIO Socket (P13)

The SB-T35 MMC/SD/SDIO interface is based on the MMC-1 interface of the CM-T3xxx. The MMC controller signals are routed to the standard MMC/SD socket (P13). For additional details, please refer to the relevant CoM reference guide.

Table 26   P13 connector pinout

Pin	Signal Name	Pin	Signal Name
1	MMC1_DAT3	9	MMC1_DAT2
2	MMC1_CMD	10	GND
3	GND	11	MMC1_CD
4	VCC_MMC	12	GPIO59
5	MMC1_CLK	13	GND
6	GND	14	GND
7	MMC1_DAT0	15	GND
8	MMC1_DAT1		

NOTE: GPIO59 is used as the Write Protect signal of the MMC/SD/SDIO on the SB-T35.

4.12   DVI Connector (J2)

The SB-T35 is equipped with a standard HDMI socket (J2) providing a DVI interface. The on-board DVI transmitter IC drives the DVI signals through the HDMI socket. For additional details, please refer to section *3.4* of this document.

NOTE: For proper DVI operation, the display interface power selector must be set to 3.3V. For additional details, please refer to section *4.26* of this document.

Table 27   J2 connector pinout

Pin	Signal Name	Pin	Signal Name
1	DVI_TXD2+	12	DVI_TXC-
2	GND	13	GND
3	DVI_TXD_2-	14	NC
4	DVI_TXD1+	15	NC
5	GND	16	NC
6	DVI_TXD1-	17	GND
7	DVI_TXD0+	18	DVI_5V
8	GND	19	NC
9	DVI_TXD0-	20	GND
10	DVI_TXC+	21	GND
11	GND		

4.13   LCD FPC (P27)
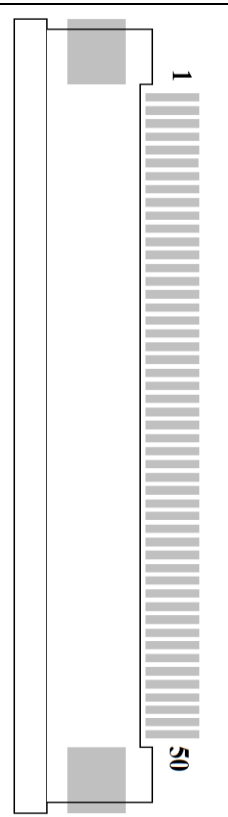
The on-board LCD FPC connector (P27) allows easy integration with the following LCD panels:

- Startec KD050C-1A-TP (through adapter available from Compulab)
- Anders DX4-D43A

NOTE: For proper operation, the display interface power selector must be set to the correct voltage level required for a specific LCD panel. For additional details, please refer to section *4.26* of this document.

Table 28   P27 connector pinout

Pin	Signal Name	Pin	Signal Name	
1	WLD_OUT	26	GND	
2	WLD_CAT	27	LCD_D17_T	
3	VCC3_3	28	LCD_D16_T	
4	I2C2_SCL	29	LCD_D15_T	
5	I2C2_SDA	30	LCD_D14_T	
6	VCC3_3	31	LCD_D13_T	
7	CTP_INT	32	LCD_D12_T	
8	LCD_PWM	33	LCD_D11_T	
9	GND	34	LCD_D10_T	
10	LCD_D23_T	35	LCD_D9_T	
11	LCD_D22_T	36	LCD_D8_T	
12	LCD_D21_T	37	LCD_D7_T	
13	LCD_D20_T	38	LCD_D6_T	
14	LCD_D19_T	39	LCD_D5_T	
15	LCD_D18_T	40	LCD_D4_T	
16	LCD_VSYNC_T	41	LCD_D3_T	
17	LCD_HSYNC_T	42	LCD_D2_T	
18	GND	43	LCD_D1_T	
19	SPI4_CLK	44	LCD_D0_T	
20	SPI4_CS0	45	LCD_RST	
21	SPI4_SIMO	46	GND	
22	SPI4_SOMI	47	TS_Y+	
23	LCD_ACBIAS_T	48	TS_Y-	
24	GND	49	TS_X-	
25	LCD_PCLK_T2	50	TS_X+	

Table 29   P7 connector data

Manufacturer	Mfg. P/N	Mating connector
CVILux	CF20-501D0R0(-LF)	FFC, 50 cont, 0.5mm

4.14   TOPPOLY LCD Connector (P15)

The TOPPOLY LCD connector (P15) allows seamless integration with the TD035STEE1 LCD module. LCD interface, control and power signals and touch-screen interface signals are routed to this connector.

NOTE: For proper operation with TD035STEE1, the display interface logic level must be set to 3.3V. For more information please refer to chapter *4.26* of this document.

Table 30   P15 connector pinout

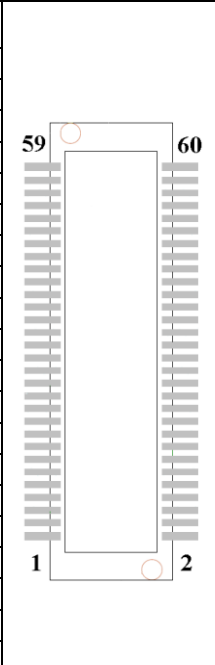| Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
1	GND	21	GND	41	LCD_D17_T
2	TS_Y+	22	LCD_D0_T	42	GND
3	TS_X+	23	LCD_D1_T	43	VCC3_3
4	TS_Y-	24	LCD_D2_T	44	NC
5	TS_X-	25	LCD_D3_T	45	GND
6	GND	26	LCD_D4_T	46	LCD_PCLK_T2
7	NC	27	LCD_D5_T	47	GND
8	NC	28	GND	48	LCD_ACBIAS_T
9	GND	29	LCD_D6_T	49	SPI4_SOMI
10	NC	30	LCD_D7_T	50	SPI4_CS0
11	NC	31	LCD_D8_T	51	SPI4_SIMO
12	NC	32	LCD_D9_T	52	NC
13	NC	33	LCD_D10_T	53	SPI4_CLK
14	NC	34	LCD_D11_T	54	LCD_VSYNC_T
15	GND	35	GND	55	LCD_HSYNC_T
16	NC	36	LCD_D12_T	56	NC
17	LCD_RST	37	LCD_D13_T	57	NC
18	NC	38	LCD_D14_T	58	WLD_CAT
19	NC	39	LCD_D15_T	59	WLD_OUT
20	VCC3_3	40	LCD_D16_T	60	GND

- SPI4_SOMI, SPI4_SIMO, SPI4_CS0, SPI4_CLK signals are SPI interface lines (SPI-4) used for LCD setup.
- TS_[X+/Y-/X+/Y-] signals are input lines of the CM-T3xxx touch screen controller. These signals are accessible through the Touch-screen Headers (E11, E12).
- WLD_OUT and WLD_CAT are positive and negative terminals of the 20V / 20mA white LED driver supplying the LCD backlight.

Table 31   P15 connector data

Manufacturer	Mfg. P/N	Mating connector
Matsushita	AXK5F60547YG	Matsushita, P/N: AXK6F60547YG

The connector is compatible with the TD035STEE1 LCD panel available from CompuLab.

4.15 Touch-screen Headers (E11, E12)

The touch-screen headers provide an easy way to interface custom touch-panels with the CM-T3xxx touch-screen interface.

Table 32   E11, E12 connectors pinout

Pin	Signal Name	Pin	Signal Name
E11-1	TS_X-	E12-1	TS_X+
E11-2	TS_Y-	E12-2	TS_Y+

4.16 LVDS Header (P20)

LVDS output signals are routed from the LVDS transmitter IC to the onboard 100mil header (P20).

NOTE: The P20 connector does not provide power for the LVDS LCD panel and its backlight. External power source is required.

NOTE: For proper operation with the LVDS Transmitter, the display interface logic level must be set to 3.3V. For more information please refer to chapter _4.26_ of this document.
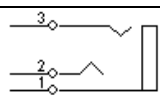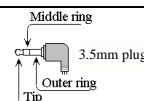
Table 33   P20 connector pinout

Pin	Signal Name	Pin	Signal Name
1	LVDS_N0	6	GND
2	LVDS_N1	7	LVDS_N2
3	LVDS_P0	8	LVDS_NCLK
4	LVDS_P1	9	LVDS_P2
5	GND	10	LVDS_PCLK

4.17 Audio Jacks (J3, J4)

The SB-T35 features two 3.5mm jacks, one for stereo headphone output (J4) and the other (J3) for mono audio input.

Table 34   J4 connector pinout

Pin	Signal Name	Mating plug pin	Jack pin-out	Mating plug
1	GND	Outer ring		
2	AUDIO_OUT_R_F	Middle ring		
3	AUDIO_OUT_L_F	Tip		

Table 35   J3 connector pinout

Pin	Signal Name	Mating plug pin	Jack pin-out	Mating plug
1	GND	Outer ring		
2	NC	Middle ring		
3	AUDIO_IN	Tip		

Table 36   J3 and J4 connectors data

Manufacturer	Mfg. P/N	Mating connector
Kycon	ST-3500-3N	Standard 3.5mm stereo plug

4.18   Camera FPC (P19)

The quick capture interface signals of the CM-T3530 and CM-T3730 modules are routed to the camera module connector (P19) on the SB-T35.

NOTE: Connector P19 is supported only when SB-T35 is used with either CM-T3530 or CM-T3730.

Table 37   P19 connector pinout

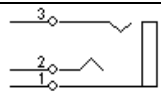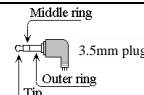| Pin	Signal Name	Pin	Signal Name
1	GND	13	CAM_D9_CON
2	VCC2_8	14	VCC1_8
3	CAM_D4_CON	15	VCC1_5
4	CAM_D3_CON	16	CAM_HS_CON
5	CAM_D5_CON	17	CAM_nPWDN
6	CAM_D2_CON	18	CAM_VS_CON
7	CAM_D6_CON	19	CAM_FLD/CAM_RST
8	CAM_PCLK_T	20	I2C3_SCL/GPIO184
9	CAM_D7_CON	21	VCC2_8
10	GND	22	I2C3_SDA/GPIO185
11	CAM_D8_CON	23	GND
12	CAM_XCLKA_CON	24	CAM_STROBE_CON

I2C3_(SDA/SCL) is the I2C-3 interface of the CM-T3530/CM-T3730 module. It is used to configure the camera module.

Table 38   P19 connector data
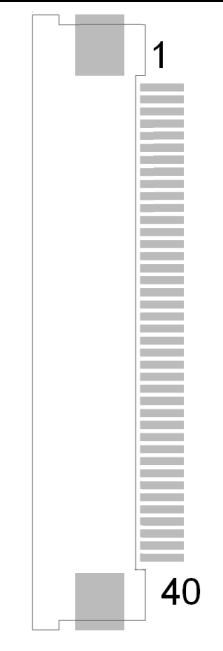
Manufacturer	Mfg. P/N	Mating connector
CVILux	CF20-241D0R0	FFC, 24 cont, 0.5mm

4.19   CompuLab Video Input FPC (P26)

The on-board Compulab Video Input FPC connector (P26) allows easy integration with the Compulab Video Input module. P26 is interfaced with the CM-T3xxx Camera/Video interface.

Table 39   P26 connector pinout

Pin	Signal Name	Pin	Signal Name	
1	CAM_STROBE_CON	21	CAM_D1_CON	
2	CAM_FLD/CAM_RST	22	CAM_D2_CON	
3	I2C3_SDA/GPIO185	23	GND	
4	VCC_CM	24	NC	
5	I2C3_SCL/GPIO184	25	GND	
6	NC	26	NC	
7	CAM_VS_CON	27	GND	
8	NC	28	CAM_CLK_T	
9	CAM_HS_CON	29	GND	
10	GND	30	CAM_XCLKA_CON	
11	GND	31	GND	
12	CAM_D7_CON	32	NC	
13	VCC_CM	33	NC	
14	CAM_D6_CON	34	NC	
15	VCC_PER	35	NC	
16	CAM_D5_CON	36	NC	
17	VCC_PER	37	NC	
18	CAM_D4_CON	38	NC	
19	CAM_D0_CON	39	NC	
20	CAM_D3_CON	40	NC	

Table 40   P26 connector data

Manufacturer	Mfg. P/N	Mating connector
CVILux	CF20-401D0R0	FFC, 40 cont, 0.5mm

4.20 Keypad FPC (P10)

The CM-T3530/CM-T3730 keypad interface is routed to the keypad FPC connector (P10).
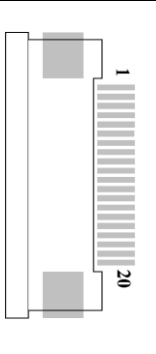
NOTE: Connector P10 is supported only when SB-T35 is used with either CM-T3530 or CM-T3730.

Table 41   P10 connector pinout

Pin	Signal Name	Pin	Signal Name	
1	KPD_R0	11	KPD_C0	
2	KPD_R1	12	KPD_C1	
3	KPD_R2	13	KPD_C2	
4	KPD_R3	14	KPD_C3	
5	NC	15	GND	
6	KPD_R4	16	KPD_C4	
7	KPD_R5	17	KPD_C5	
8	NC	18	NC	
9	NC	19	NC	
10	NC	20	GND	

The connector is compatible with the KEYPAD available from CompuLab.

Table 42   P10 connector data

Manufacturer	Mfg. P/N	Mating connector
CVILux	CF20-201D0R0	FFC, 20 cont, 0.5mm

4.21 S-Video Connector (P14)

The SB-T35 uses an on-board mini-Din connector to route the CM-T3xxx TV-out signals to an external device such as an analog TV set.

Table 43   P14 connector pinout

Pin	Signal Name	
3	GND	
5	GND	
6	TV_OUT1	
8	TV_OUT2	

Table 44   P14 connector data

Manufacturer	Mfg. P/N	Mating connector
AUK	MDJ04F	Standard 4-pin mini-Din Plug

4.22   Miscellaneous Signals Headers (P9, P11)

The 100mil header (P9) provides access to some of the CM-T3xxx serial interfaces. These signals are routed through SB-T35 level shifters and operate at 3.3V voltage levels.

Table 45   P9 connector pinout

Pin	Signal Name	Pin	Signal Name
1	SPI4_CS0	9	UART1_CTS_C
2	SPI4_SIMO	10	UART1_TX_C
3	SPI4_SOMI	11	McBSP3_FSX/UART2_RX/GPIO143_C
4	GND	12	McBSP3_DR/UART2_RTS/GPIO141_C
5	VCC3_3	13	VCC3_3
6	SPI4_CLK	14	McBSP3_DX/UART2_CTS/GPIO140_C
7	UART1_RX_C	15	McBSP3_CLK/UART2_TX/GPIO142_C
8	UART1_RST_C	16	GND

The 100mil header (P11) provides access to some of the CM-T3xxx system signals. These signals are routed directly from the CoM to P11 and operate at VCC_PER voltage levels.

Table 46   P11 connector pinout

Pin	Signal Name	Pin	Signal Name
1	HDQ_SIO/GPIO170	9	GND
2	I2C2_SCL/GPIO168	10	ADC_IN0
3	PWRON	11	ADC_IN1
4	I2C2_SDA/GPIO183	12	VCC1_8
5	GND	13	GND
6	SYS_CLKOUT1	14	PMIC_LED_B
7	SYS_nRESWARM	15	PMIC_LED_A
8	VCC_PER	16	VCC_PER

4.23   JTAG Header (P4)

The JTAG 100mil header (P4) outputs the JTAG signals of CM-T3xxx. The header pinout is a standard TI ARM-14 JTAG pinout.

Table 47   P4 connector pinout

Pin	Signal Name	Pin	Signal Name
1	JTAG_TMS	8	GND
2	JTAG_nTRST	9	JTAG_RTCK
3	JTAG_TDI	10	GND
4	GND	11	JTAG_TCK
5	VCC_PER	12	GND
6	NC	13	JTAG_EMU0
7	JTAG_TDO	14	JTAG_EMU1

4.24 Input Power Selector (E2)

NOTE: This section is relevant only for SB-T35 rev 1.1.

The SB-T35 can be powered either by a battery or directly from an external DC supply. The input power selector jumper (E2) setting determines the operating mode.

Table 48   Input Power Selector Modes

Jumper Position (Shorted pins)	Operating mode
1 - 2	System main power source is a DC supply through J1 connector.
2 - 3	System main power source is a battery connected to connector P5.
NC	Power off

4.25 USB Power Selectors (E3, E4)

NOTE: This section is relevant only for SB-T35 rev 1.1.

The USB power selection jumpers (E3 and E4) provide two power supply options for the dual USB2.0 host connector (P17). When the system is powered by an external 5V DC source, P17 may be supplied from the main input power rail. When a Lithium-ion polymer battery powers the system, the on-board 5V charge pumps should supply P17.

E3 controls the current output of USB1 (P17 bottom).

E4 controls the current output of USB2 (P17 top).

The table below is applicable to E3 and E4.

Table 49   USB Power Selector Modes

Jumper Position (Shorted pins)	Operating mode
1 – 2	P17 is supplied by 5V DC. Output current limited up-to 500mA
2 – 3	P17 is supplied by the charge pump. Output current limited up to 100mA
NC	P17 is not supplied with 5V

4.26 Display Interface Power Selector (E8)

The display interface power selector jumper (E8) controls the logic levels of the CM-T3530/CM-T3730 parallel RGB display interface. The table below describes all the possible combinations available with this jumper.

Table 50   LCD Interface Power Selector Modes

Jumper Position (Shorted pins)	Operating mode
1 – 2	CM-T3530/CM-T3730 display interface operates at 1.8V voltage level
2 – 3	CM-T3530/CM-T3730 display interface operates at 3.3V voltage level
NC	Display interface is not powered

NOTE: When SB-T35 is used with the CM-T3517 CoM, the E8 jumper setting is ignored and the display interface is always operated at 3.3V.

4.27   Battery Charger Disable Jumper (E1)

The on-board battery charger may be disabled with jumper E1.

Table 51   Battery Charger Jumper Modes

Jumper Position (Shorted pins)	Operating mode
1 – 2	Main Battery Charging is disabled
NC	Main Battery Charging is enabled (if a battery is connected to P5, and DC supply is connected to J1)

4.28   RTC Backup Battery Jumper (E7)

The RTC backup battery jumper should be assembled for normal operation. When this jumper is removed, the backup battery is disconnected from the CM-T3xxx and RTC backup is disabled. This jumper may be removed for preventing backup battery depletion while the system is in storage.

Table 52   Backup Battery Jumper Modes

Jumper Position (Shorted pins)	Operating mode
1 – 2	RTC back-up is enabled
NC	Backup battery is disconnected. RTC backup disabled

4.29   Boot Source Jumper (E6)

The boot source jumper controls the boot sequence of the CM-T3xxx. This jumper is an alternative to the "Boot Source" button.

For additional details, please refer to the relevant CoM Reference Guide.

Table 53   Boot Source Jumper Modes

Jumper Position (Shorted pins)	Operating mode
1 – 2	Alternate boot sequence (MMC-1 first)
NC	Standard boot sequence (NAND first)

4.30   Boot Source Button (SW1)

The SB-T35 features a user-accessible boot source button (SW1). Pressing this button during power-up or reset will cause the CM-T3xxx to boot with the alternate boot sequence.

For additional details, please refer to the relevant CoM Reference Guide.

4.31   Reset Button (SW2)

The SB-T35 features a user-accessible reset button (SW2). Pressing the reset button issues a cold reset to the system.

4.32 LED's (DS1, DS2, DS3)

The table below describes SB-T35 LEDS.

Table 54   LED Description

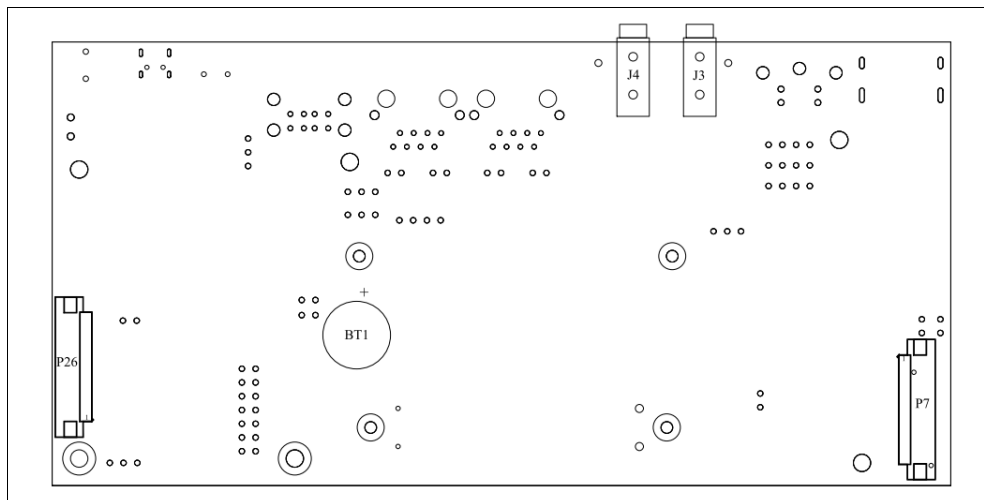| LED	Color	System	LED activity
DS1	Green	Power	Indicates that the 3.3V rail is active
DS2	Red	Charger	Indicates that the battery connected to P5 is being charged
DS3	Green	Power	Indicates that the 3.8V rail is active

5   MECHANICAL DRAWINGS

Figure 5   SB-T35 top
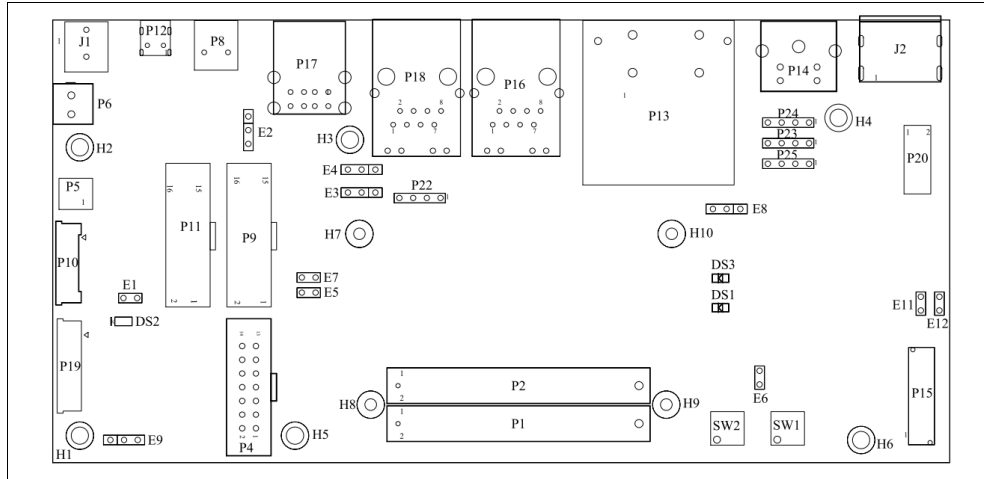
Figure 6   SB-T35 bottom (X-Ray view - as seen from top side)

Mechanical drawings are available in DXF format from CompuLab's website, following [Developer] >> [SB-T35] >> [SB-T35 - Dimensions and Connectors Location] links.

6 OPERATIONAL CHARACTERISTICS

6.1 Absolute Maximum Ratings

Parameter	Min	Typ	Max	Unit
Main power supply voltage	4.8	5	5.2	V

6.2 Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
Main power supply voltage	4.8	5	5.2	V

6.3 DC Electrical Characteristics

Parameter	Operating Conditions	Min	Typ	Max	Unit
SD / MMC / SDIO					
V_{IH}	VCC_MMC = 1.8V	1.17		2.1	V
	VCC_MMC = 3.0V	1.875		3.3	
V_{IL}	VCC_MMC = 1.8V	-0.3		0.63	V
	VCC_MMC = 3.0V	-0.3		0.75	
V_{OH}	VCC_MMC = 1.8V	1.6			V
	VCC_MMC = 3.0V	2.25			
V_{OL}	VCC_MMC = 1.8V			0.2	V
	VCC_MMC = 3.0V			0.375	
1.8V Digital I/O					
V_{IH}		1.17		2.1	V
V_{IL}		-0.3		0.63	V
V_{OH}		1.4			V
V_{OL}				0.4	V
3.3V Digital I/O					
V_{IH}		2.145		3.3	V
V_{IL}		0		1.155	V
V_{OH}		2.9			V
V_{OL}				0.4	V
Display Interface					
V_{OH}	LCD_VIO = 3.3V	2.3			V
					V
V_{OL}	LCD_VIO = 3.3V			0.7	V
					V
I^2C (open drain with internal pull up to 1.8V)					
V_{IH}		1.26		2.3	V
V_{IL}		-0.5		0.54	V
V_{OH} (open drain with 3mA sink current)		0		0.36	V
JTAG					
V_{IH}		1.17		2.1	V
V_{IL}		-0.3		0.63	V
V_{OH}		1.6			V

V_{OL}					0.2	V
RS232						
TX Voltage Swing			±5	±5.4		V
RX Voltage Swing				±25		V

(where V_{OL} is V_{OL})

6.4 Power Consumption

To be added in a future revision of this document.

6.5 Operating Temperature Ranges

The information in this section refers to the SB-T35 board only. For temperature ranges of off-board components such as the LCD panel or battery pack, please refer to the component's datasheet.

The SB-T35 is available with three options of operating temperature range:

Table 55   Operating Temperature Ranges

Range	Temp.	Description
Commercial	0º to 70º C	Sample boards from each batch are tested for the lower and upper temperature limits. Individual cards are not tested.
Extended	-20º to 70º C	Every board undergoes a short test for the lower limit (-20º C) qualification.
Industrial	-40º to 85º C	Every board is extensively tested for both lower and upper limits and at several midpoints.

7   ACCESSORIES

Table 56   Accessories

Compulab P/N	Part Name	Description
503M100100	KEYPAD	9-key keypad. Used in combination with CABFPC20. Connects to P10 on SB-T35.
210P47000	BAT10	Lithium Ion Polymer, 3.7V, 2850mAh battery. Connects to P5 on the SB-T35.
139D3V000	LCD35	3.5", TFT, 640x480x18bpp, 3.0V LCD. Can be connected directly to P15 on SB-T35
199D10170	CABDB9UMP	Cable, DB9-F to Ultra Mini Plug (USB like), L=2m (RS-232) Used to connect the RS232 interface of the SB-T35 to a PC. Connects directly to P12 on the SB-T35.
410X60200	CABFPC20	FPC cable, 0.5mm, 20-pos. Used with KEYPAD.
410X60400	CABFPC40	FPC cable, 0.5mm, 40-pos. Used with CONLCD-GEN.
503R101301	CONLCD-GEN	General purpose LCD interface module. Used in combination with CABFPC40 to provide a generic LCD interface. Connects to P7 on SB-T35.