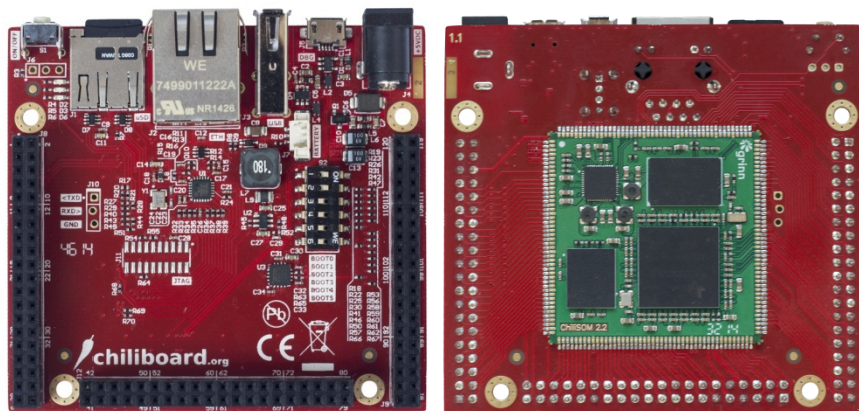




## chiliboard DATASHEET



**V1.0**

**GRINN 2016**

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# 1. Summary

## 1.1. Description

The chiliboard is ready to use straight out of the box. Easy expansion capabilities, functional commercial applications and a short time of placing on the market make it an effective gateway to success.

The chiliboard is linux-friendly. Board includes an ARM Cortex-A8 processor, NAND memory, DDR3 RAM memory, power management controller, Ethernet, USB 2.0 interfaces,  $\mu$ SD card slot and more than 100 general purpose ports. These features make it the perfect choice for professional commercial use. Additionally, chiliboard enables you to implement any kind of application in such areas as IoT, HMI (Human - Machine Interface), building or industrial automation and many more. Thus the compact chiliboard becomes the foundation for innovative solutions: it can become a multimedia device, an IT management hub or an industrial process controller. The chiliboard is targets at companies and individuals who want to develop their products for mass production. This is possible thanks to the chiliSOM module. It is worth noting that chiliSOM is the most flexible solution on the market in regard to hardware configurations.

## 1.2. Features

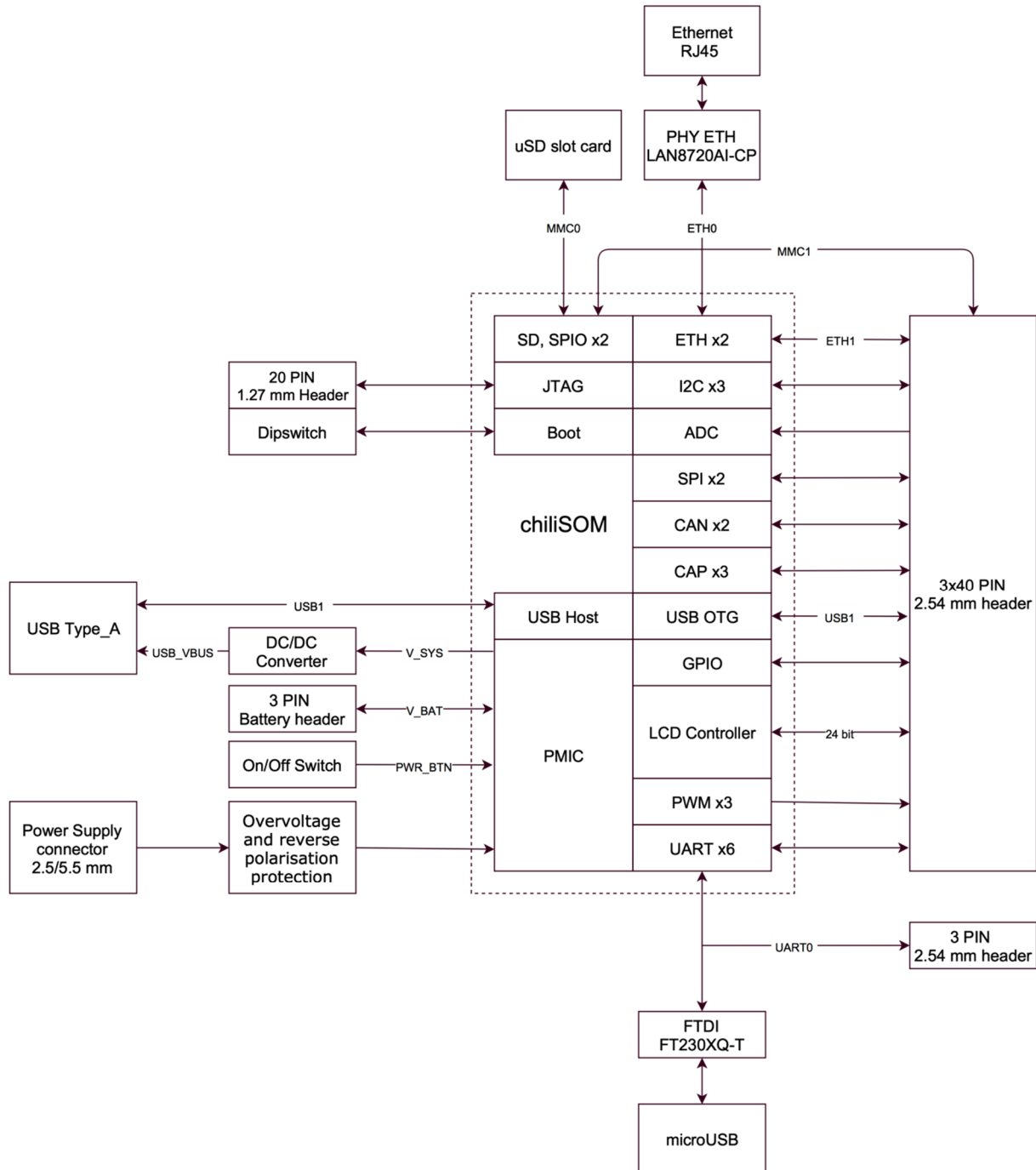
- Small size industrial single board computer based on chiliSOM module
- 10/100 Mb Ethernet, RJ45
- USB 2.0
- micro USB for power supply and serial debug
- $\mu$ SD card slot
- 3 x 40 Pins for expansion connectors
- Boot configuration DIP switch
- JTAG port
- Debug header
- 3 LEDs
- Li-Ion battery connector
- Dedicated power output for LCD backlight
- Build in battery charger and power management controller
- 5V power supply
- Compatible with chiliboard expansion sandwiches

## 1.3. Additional information

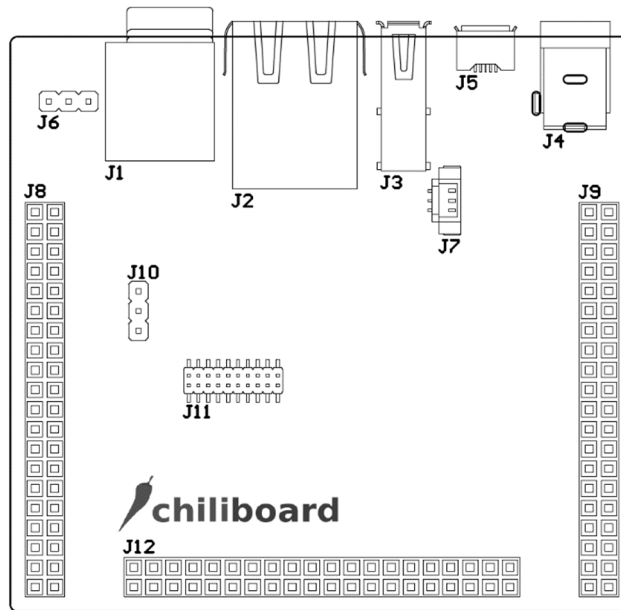
The board circuit diagram and instructions on how to start with software development using chiliboard are available on the website: [www.chiliboard.org](http://www.chiliboard.org)

## 2. Functional Description

### 2.1. Block Diagram



## 2.2. Connectors on the board



## 2.3. Connectors list

Connector	Description
J1	µSD slot card
J2	Ethernet [RJ45]
J3	USB Host [Type A]
J4	Power supply [2.5/5.5mm]
J5	Micro USB [Type B connector] <sup>1</sup>
J6	Power on/off jumper [2.54 mm]
J7	Battery connector
J8	40 pins connector for expansion sandwich [2.54 mm] <sup>1</sup>
J9	40 pins connector for expansion sandwich [2.54 mm] <sup>1</sup>
J10	Debug port [2.54 mm]
J11	JTAG
J12	40 pins connector for expansion sandwich [2.54 mm] <sup>1</sup>

<sup>1</sup> Connectors available on Premium and Professional versions of chiliboard

## 2.4. Connectors description

### 2.4.1. $\mu$ SD slot card [ J1 ]

Pin	chiliboard Connector	chiliSOM Connector	AM335x Pin	Description
1	SD_DAT2	125	G18	$\mu$ SD Data
2	SD_DAT3	124	G17	$\mu$ SD Data
3	SD_CMD	123	G18	Command line
4	3.3V_D	176, 177	-	VDD 3.3V
5	SD_CLK	122	G17	Clock
6	GND	-	-	GND
7	SD_DAT0	120	G16	$\mu$ SD Data
8	SD_DAT1	119	G15	$\mu$ SD Data
9	SD_CD	142	V8	Supply Voltage

### 2.4.2. Ethernet RJ45 [ J2 ]

The chiliboard is equipped with 10/100Mb Ethernet interface based on LAN8720AI-CP transceiver by Microchip. Table below presents the connected LAN8720AI-CP and chiliSOM module.

chiliboard Connector	chiliSOM Connector	AM335x Pin	Description
ETH_MDIO	90	M17	Multifunction pin.
ETH_MDC	89	M18	Multifunction pin.
ETH_RXD1	94	L15	Multifunction pin.
ETH_RXD0	93	M16	Multifunction pin.
ETH_RXERR	104	J15	Multifunction pin.
ETH_TXEN	105	J16	Multifunction pin.
ETH_TXD0	99	K17	Multifunction pin.
ETH_TXD1	100	K16	Multifunction pin.
ETH_CRSDV	106	H17	Multifunction pin.
ETH_RESETn	P113	A10	Reset.

### 2.4.3. USB type A [ J3 ]

The chiliSOM supports two USB OTG host ports. The chiliboard is equipped with USB type A socket. It is driven by chiliSOM USB2.0 controller.

Pin	chiliboard Connector	chiliSOM Connector	AM335x Pin	Description
1	USB1_VCC	-	-	USB VCC
2	USB1_D_P	77	R17	USB1 data positive
3	USB1_D_N	76	R18	USB1 data negative
4	GND	-	-	GND

### 2.4.4. Power supply [ J4 ]

The J4 connector is dedicated for 5V DC power supply. The DC power socket is compatible with the standard 2.5mm / 5.5mm power plug. Power input on the chiliboard has reverse polarity and overvoltage protection.

### 2.4.5. micro USB Type B connector [ J5 ]

The micro USB port on the chiliboard is used for serial interface communication. The default parameters for the serial port are:

Baud rate: 115200,

Data bits: 8,

Stop bits: 1,

Parity: None

The micro USB port can be also used as the power supply for chiliboard with the current up to 500mA. When the expansion board is connected we recommend using external power supply connected to J4.

The micro USB port is assembled on premium and professional versions of chiliboard.

Pin No	chiliboard Connector	chiliSOM Connector	AM335x Pin	Description
1	DBG_USB_VCC	-	-	USB Power supply
2	DBG_RXD	127	E15	RX Debug [FTDI Converter] Input data
3	DBG_TXD	126	E16	TX Debug [FTDI Converter] Output data
4	-	-	-	No connected
5	GND	-	-	GND

### 2.4.6. Battery [ J7 ]

The chiliboard is ready to works with Li-Ion 3.6V battery. Socket JS-1147V-03 with three pin with pitch 1.25 mm is available on the board. This socket is compatible with plug JS-1146-03.



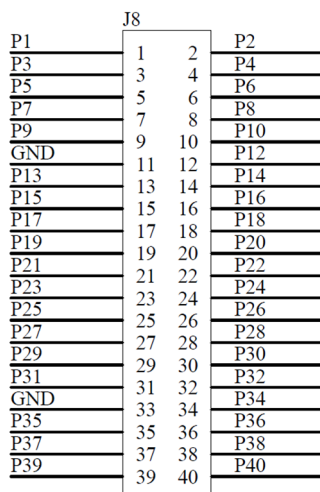
Pin	chiliboard Connector	chiliSOM Connector	Description
1	BAT TEMP	184	Battery temperature, connected to PMIC TPS65217C inside chiliSOM <sup>1</sup>
2	GND	-	GND
3	V_BAT	181,182,183	Battery power supply

<sup>1</sup>more information is available on TPS65217C PMIC datasheets.



### 2.4.7. 40 pins connector for expansion sandwich [ J8 ]

Connector is assembled on premium and professional versions of chiliboard.

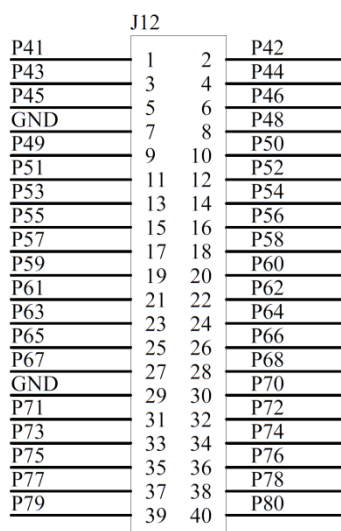


Pin No	chiliboard Connector	chiliSOM Connector	AM335x Pin	Function
1	P1	152	D12	Multifunction pin.
2	P2	151	D13	Multifunction pin.
3	P3	150	B13	Multifunction pin.
4	P4	149	A13	Multifunction pin.
5	P5	148	A14	Multifunction pin.
6	P6	153	C13	Multifunction pin.
8	P7	154	B12	Multifunction pin.
8	P8	155	C12	Multifunction pin.
9	P9	146	D14	Multifunction pin.
10	P10	145	A15	Multifunction pin.
11	P11	-	-	GND
12	P12	144	A17	Multifunction pin.
13	P13	141	A16	Multifunction pin.
14	P14	140	B16	Multifunction pin.
15	P15	139	B17	Multifunction pin.

16	P16	138	C16	Multifunction pin.
17	P17	137	C17	Multifunction pin.
18	P18	136	C18	Multifunction pin.
19	P19	134	D17	Multifunction pin.
20	P20	133	D18	Multifunction pin.
21	P21	132	D15	Multifunction pin.
22	P22	131	D16	Multifunction pin.
23	P23	129	E17	Multifunction pin.
24	P24	128	E18	Multifunction pin.
25	P25	117	B6	Multifunction pin.
26	P26	116	C7	Multifunction pin.
27	P27	115	B7	Multifunction pin.
28	P28	114	A7	Multifunction pin.
29	P29	113	-	1.8V_ADC
30	P30	112	C8	Multifunction pin.
31	P31	111	B8	Multifunction pin.
32	P32	110	A8	Multifunction pin.
33	P33	-	-	GND
34	P34	107	H16	Multifunction pin.
35	P35	103	J17	Multifunction pin.
36	P36	102	J18	Multifunction pin.
37	P37	101	K15	Multifunction pin.
38	P38	98	K18	Multifunction pin.
39	P39	96	L17	Multifunction pin.
40	P40	95	L16	Multifunction pin.

### 2.4.8. 40 pins connector for expansion sandwich [ J12 ]

Connector is assembled on premium and professional versions of chiliboard.

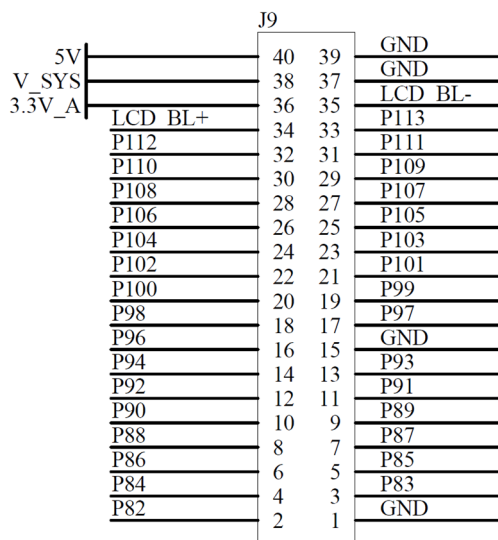


Pin No	chiliboard Connector	chiliSOM Connector	AM335x Pin	Function
1	P41	92	L18	Multifunction pin.
2	P42	90	M17	Multifunction pin.
3	P43	89	M18	Multifunction pin.
4	P44	88	F16	Multifunction pin.
5	P45	87	M15	Multifunction pin.
6	P46	86	P16	Multifunction pin.
8	P47	-	-	GND
8	P48	84	N17	Multifunction pin.
9	P49	82	P15	Multifunction pin.
10	P50	83	N18	Multifunction pin.
11	P51	73	V9	Multifunction pin.
12	P52	74	T13	Multifunction pin.
13	P53	71	T17	Multifunction pin.
14	P54	72	U9	Multifunction pin.

15	P55	69	U18	Multifunction pin.
16	P56	70	U17	Multifunction pin.
17	P57	66	T16	Multifunction pin.
18	P58	67	V17	Multifunction pin.
19	P59	64	V16	Multifunction pin.
20	P60	65	U16	Multifunction pin.
21	P61	62	U15	Multifunction pin.
22	P62	63	T15	Multifunction pin.
23	P63	60	R14	Multifunction pin.
24	P64	61	V15	Multifunction pin.
25	P65	58	U14	Multifunction pin.
26	P66	59	T14	Multifunction pin.
27	P67	56	R13	Multifunction pin.
28	P68	57	V14	Multifunction pin.
29	P69	-	-	GND
30	P70	54	U13	Multifunction pin.
31	P71	53	V13	Multifunction pin.
32	P72	52	R12	Multifunction pin.
33	P73	51	T12	Multifunction pin.
34	P74	50	U12	Multifunction pin.
35	P75	49	T11	Multifunction pin.
36	P76	48	T10	Multifunction pin.
37	P77	47	U10	Multifunction pin.
38	P78	46	V12	Multifunction pin.
39	P79	44	T9	Multifunction pin.
40	P80	43	R9	Multifunction pin.

### 2.4.9. 40 pins connector for expansion sandwich [ J9 ]

Connector is assembled on premium and professional versions of chiliboard.



Pin No	chiliboard Connector	chiliSOM Connector	AM335x Pin	Function
1	P81	-	-	GND
2	P82	42	V8	Multifunction pin.
3	P83	40	T8	Multifunction pin.
4	P84	41	U8	Multifunction pin.
5	P85	38	V7	Multifunction pin.
6	P86	39	R8	Multifunction pin.
8	P87	35	R7	Multifunction pin.
8	P88	37	U7	Multifunction pin.
9	P89	33	T6	Multifunction pin.
10	P90	34	T7	Multifunction pin.
11	P91	31	R6	Multifunction pin.
12	P92	32	U6	Multifunction pin.
13	P93	29	R5	Multifunction pin.
14	P94	30	U5	Multifunction pin.

15	P95	-	-	GND
16	P96	28	V5	Multifunction pin.
17	P97	26	T5	Multifunction pin.
18	P98	25	V4	Multifunction pin.
19	P99	24	V3	Multifunction pin.
20	P100	23	V2	Multifunction pin.
21	P101	22	U4	Multifunction pin.
22	P102	21	U3	Multifunction pin.
23	P103	20	U2	Multifunction pin.
24	P104	19	U1	Multifunction pin.
25	P105	17	T4	Multifunction pin.
26	P106	16	T3	Multifunction pin.
27	P107	15	T2	Multifunction pin.
28	P108	14	T1	Multifunction pin.
29	P109	13	R4	GND
30	P110	12	R3	Multifunction pin.
31	P111	11	R2	Multifunction pin.
32	P112	10	R1	Multifunction pin.
33	P113	8	A10	Multifunction pin.
34		170, 171	-	LCD_BL+
35		167, 168	-	LCD_BL-
36		178	-	3.3V_A
37	-	-	-	GND
38		172, 173	-	V_SYS
39	-	-	-	GND
40		1,2	-	5V

### 2.4.10. Debug [ J10 ]

Debug connector is attached to the same serial port as micro USB [J5]. It can be useful in the basic version of chiliboard without FTDI IC and micro USB connector. The default parameters for debug port are:

Baud rate: 115200,

Data bits: 8,

Stop bits: 1,

parity: None

Pin	chiliboard Connector	chiliSOM Connector	AM335x Pin	Description
1	DBG_TXD	126	E16	TX Debug
2	DBG_RXD	127	E15	RX Debug
3	GND	-	-	GND

### 2.4.11. JTAG [ J11 ]

Pin	chiliboard Connector	chiliSOM Connector	AM335x Pin	Description
1	TMS	161	C11	JTAG Test Mode Select
2	TRSTn	157	B10	JTAG Test Reset
3	TDI	160	B11	JTAG Data In
4	GND	-	-	GND
5	3.3 V_D	176, 177	-	Power supply 3.3V
6	-	-	-	No connected
7	TDO	159	A11	JTAG Data Out
8	GND	-	-	GND
9	RTCK	158	-	JTAG Test Clock Return
10	GND	-	-	GND
11	TCK	158	A12	JTAG Test Clock
12	GND	-	-	GND
13	EMU0	163	C14	JTAG EMU 0
14	EMU1	162	B14	JTAG EMU 1
15	RESET	8	A10	JTAG Reset

16	GND	-	-	GND
17	-	-	-	No connected
18	-	-	-	No connected
19	-	-	-	No connected
20	GND	-	-	GND

Normally connector J11 is not assembled on the board.

## 2.5. Boot options

CPU AM335x supports booting from:

- Memory: NOR, NAND, MMC or SPI-EEPROM
- Peripheral: Ethernet, USB or UART

After power-up, list of possible boot method reading configuration pins SYSBOOT[15:0]. Only SYSBOOT[5..0] are exposed on chiliboard DIP switches. Pins SYSBOOT[14], SYSBOOT[9], SYSBOOT[6] are set to HIGH, other lines are set to LOW.

For choose the boot options is available 6 pins dipswitch (S2).

The table below shows all options of boot configuration.

BOOT[4:0]	1st	2nd	3rd	4th
00000	RESERVED	RESERVED	RESERVED	RESERVED
00001	UART0	XIP w/MUX2	MMC0	SPI0
00010	UART0	SPI0	NAND	NAND I2C
00011	UART0	SPI0	XIP MUX2	MMC0
00100	UART0	XIP w/MUX1	MMC0	NAND
00101	UART0	XIP MUX1	SPI0	NAND I2C
00110	EMAC1	SPI0	NAND	NAND I2C
00111	EMAC1	MMC0	XIP w/MUX2	NAND
01000	EMAC1	MMC0	XIP MUX2	NAND I2C



01001	EMAC1	XIP w/MUX1	NAND	MMC0
01010	EMAC1	XIP MUX1	SPI0	NAND I2C
01011	USB0	NAND	SPI0	MMC0
01100	USB0	NAND	XIP MUX2	NAND I2C
01101	USB0	NAND	XIP MUX1	SPI0
01110	RESERVED	RESERVED	RESERVED	RESERVED
01111	UART0	EMAC1	RESERVED	RESERVED
10000	XIP MUX1	UART0	EMAC1	MMC0
10001	XIP w/MUX1	UART0	EMAC1	MMC0
10010	NAND	NAND I2C	USB0	UART0
10011	NAND	NAND I2C	MMC0	UART0
10100	NAND	NAND I2C	SPI0	EMAC1
10101	NAND I2C	MMC0	EMAC1	UART0
10110	SPI0	MMC0	UART0	EMAC1
10111	MMC0	SPI0	UART0	USB0
11000	SPI0	MMC0	USB0	UART0
11001	SPI0	MMC0	EMAC1	UART0
11010	XIP MUX2	UART0	SPI0	MMC0
11011	XIP w/MUX2	UART0	SPI0	MMC0
11100	MMC1	MMC0	UART0	USB0
11101	RESERVED	RESERVED	RESERVED	RESERVED
11110	RESERVED	RESERVED	RESERVED	RESERVED
11111	FAST EXT	EMAC1	UART0	RESERVED

BOOT[5]

Description

0

CLKOUT1 disabled

1

CLKOUT1 enabled

## 2.6. User interface

### 2.6.1. LEDs

The chiliboard is equipped with three LEDs. LED D4 is dedicated to indicate that power is on, LEDs D2 and D3 are for use by user.

Name	chiliboard Connector	chiliSOM Connector	AM335x Pin	Description
D2	EMU0	163	C14	User LEDs
D3	EMU1	162	B14	User LEDs
D4	3.3V_D	176, 177	-	Indicates that power is on

### 2.6.2. On/Off switch

Name	chiliboard Connector	chiliSOM Connector	AM335x Pin	Description
S1	PWR_BTN	7	R7	Switch ON/OFF chiliboard

## 3. Electrical Characteristics

### 3.1. Absolute Maximum Ratings

	min.	max.	unit
Supply voltage, V_DC, V_USB		5.8	V
Supply voltage, V_BAT	-0.3	7	V
Terminal current, V_SYS		3	A
Operating ambienttemperature	0	70	°C

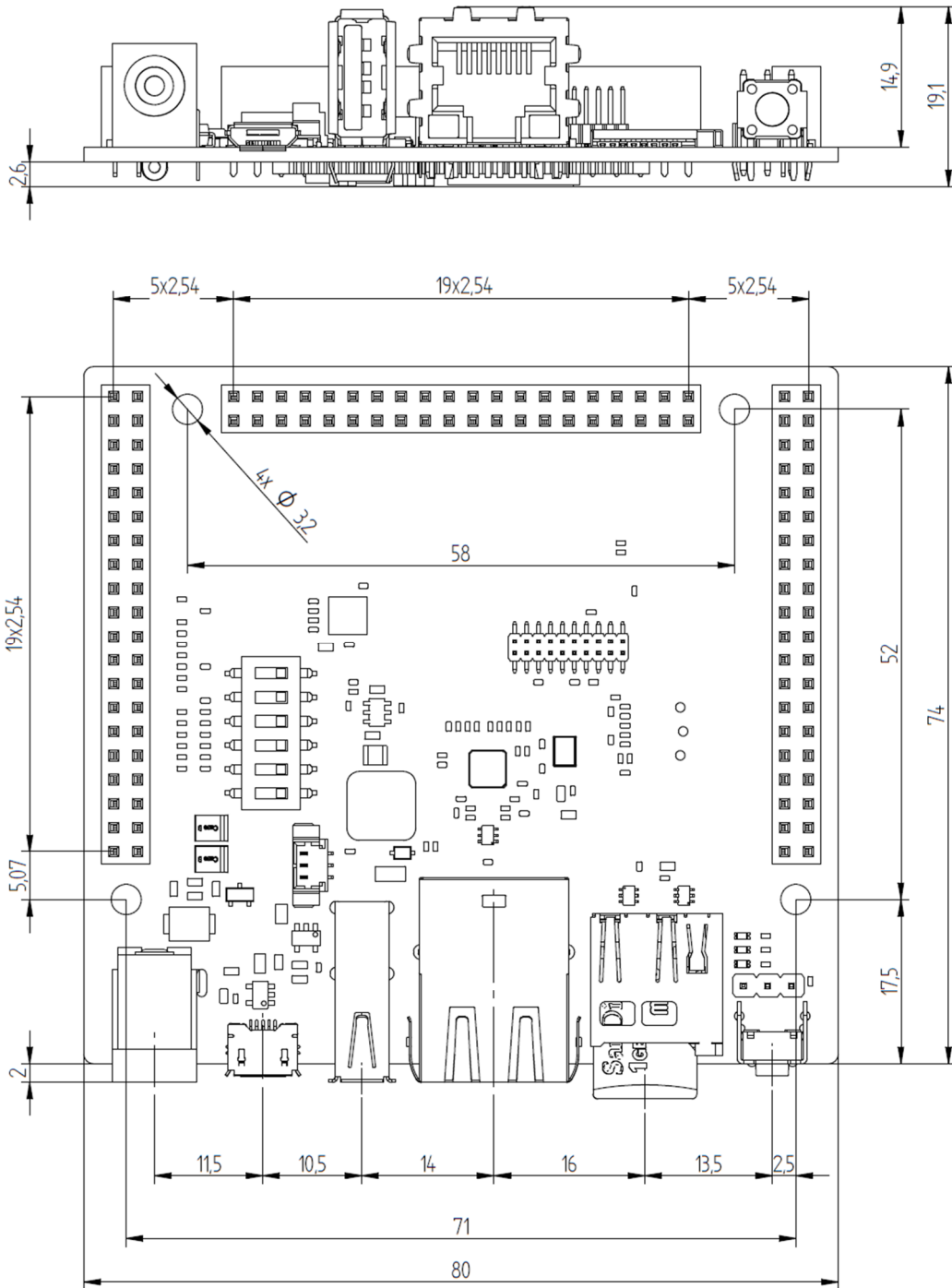
Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the module. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute maximum rated conditions for extended periods may affect module reliability. For detailed absolute maximum ratings see AM335X and TPS65217C datasheet.

### 3.2. Recommended Operating Conditions

	min.	nom.	max.	unit
Supply voltage, V_DC, V_USB	4.3	5.0	5.8	V
Supply voltage, V_BAT	2.7	3.6	5.5	V
Battery current, V_BAT			2	A
Current, USB1_VBUS			500	mA
Outputcurrent, V_SYS	0		500 (5V) 250 (3.6V)	mA
Outputcurrent, 3.3VD <sup>1</sup>	0		400 (200)	mA
Outputcurrent, 1.8V_ADC	0		50	mA

- (1) Output current from 3.3VD is reduced by current consumption of chiliSOM module (AM335X USB PHY, IO Buffers and NAND Flash memory. Maximum current consumption of 2 x USB PHY and NAND memory) is 40+40+35=115mA. Current consumption of IO Buffers is depends on application. It's recommended to use maximum of 200mA from 3.3VD output. For detailed recommended operating conditions see AM335X and TPS65217C datasheet.

## 4. Mechanical Characteristics



## 5. Ordering Information

### 5.1. Order table

	BASIC	PREMIUM	PROFESSIONAL
chiliSOM	AM3352 600 MHz 128 MB DDR3	AM3352 600 MHz 128 MB DDR3 256 NAND Flash	AM3358 1 GHz 512 MB DDR3 256 NAND Flash 3D Accelerator
10/100 Mb Ethernet	•	•	•
USB 2.0	•	•	•
Power supply connector	•	•	•
µSD card slot	•	•	•
Li-Ion battery connector	•	•	•
Build in battery charger and power management circuit	•	•	•
3 LEDs	•	•	•
Debug header	•	•	•
Boot choose dipswitch	•	•	•
JTAG port (not populated)	•	•	•
Micro USB for power supply and serial debug		•	•
Expansions connectors 3x40 PIN		•	•
Dedicated power output for TFT backlights		•	•

## 6. Document Revision History

Document Revision	Notes
1.0	Initial revision.

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