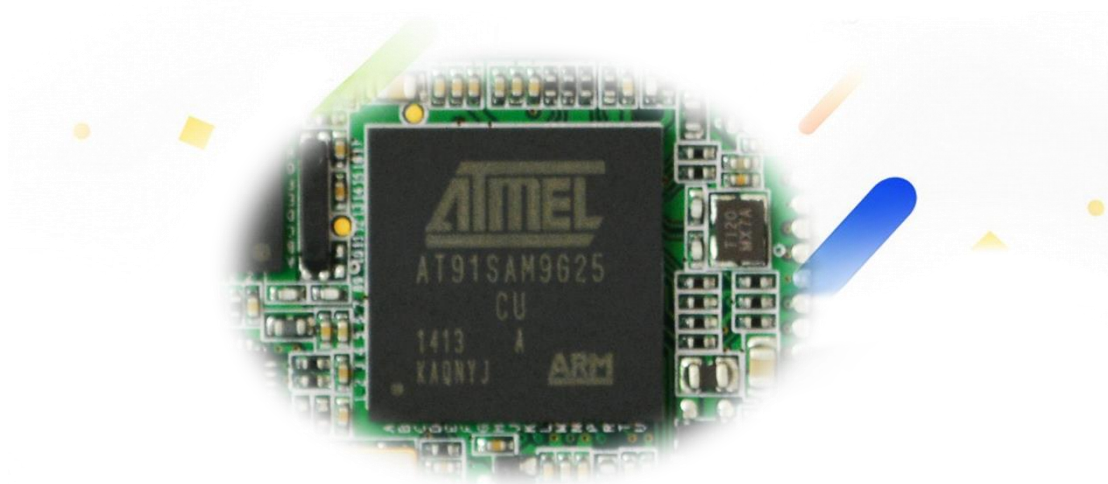


MINI9G25 Reference User Manual

V1.0



Boardcon Embedded Design

www.boardcon.com

1. Introduction

1.1. About this Manual

This manual is intended to provide the user with an overview of the board and benefits, complete features specifications, and set up procedures. It contains important safety information as well.

1.2. Feedback and Update to this Manual

To help our customers make the most of our products, we are continually making additional and updated resources available on the Boardcon website (www.boardcon.com , www.armdesigner.com). These include manuals, application notes, programming examples, and updated software and hardware. Check in periodically to see what's new!

When we are prioritizing work on these updated resources, feedback from customers is the number one influence. If you have questions, comments, or concerns about your product or project, please no hesitate to contact us at support@armdesigner.com.

1.3. Limited Warranty

Boardcon warrants this product to be free of defects in material and workmanship for a period of one year from date of buy. During this warranty period Boardcon will repair or replace the defective unit in accordance with the following process:

A copy of the original invoice must be included when returning the defective unit to Boardcon. This limited warranty does not cover damages resulting from lightning or other power surges, misuse, abuse, abnormal conditions of operation, or attempts to alter or modify the function of the product.

This warranty is limited to the repair or replacement of the defective unit. In no event shall Boardcon be liable or responsible for any loss or damages, including but not limited to any lost profits, incidental or consequential damages, loss of business, or anticipatory profits arising from the use or inability to use this product.

Repairs made after the expiration of the warranty period are subject to a repair charge and the cost of return shipping. Please contact Boardcon to arrange for any repair service and to obtain repair charge information.

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1 MINI9G25 Introduction

1.1 Summary

MINI9G25 is a cost-effective System-on-Module (SoM) thought of to drastically reduce the development time to design a low-power and low-EMI Linux Embedded device. The hardware such as CPU, RAM, Flash, Ethernet, power and EMI components are integrated on a 6-layers, just 40x40 mm (1.57x1.57 inch) PCB that permitting hardware designers to development a simple and cheap carrier board.

1.2 Specifications

- ◆ CPU
 - Atmel ARM9 @ 400Mhz on Atmel AT91SAM9G25
- ◆ RAM
 - 128 or 256 MByte DDR2
- ◆ ROM
 - On-board 128MB Nand Flash
 - 128MB to 1GB SLC Nand Flash optional
- ◆ POWER
 - high-efficiency DC-DC converter
 - 3.3V Power input
- ◆ Up to 3 host ports
 - One hi-speed host/device
 - One hi-speed host
 - One full-speed
- ◆ Watchdog
- ◆ Boot mode Setting
- ◆ 6 UARTs (3 five line and 1 three line)
- ◆ I2C: up to 2 I2C buses
- ◆ SPI: up to 2 SPI buses
- ◆ GPIO: up to 60 GPIO lines
- ◆ A/D: up to 4- channel @ 10bit
- ◆ SDIO interface

1.4 Mechanical Features

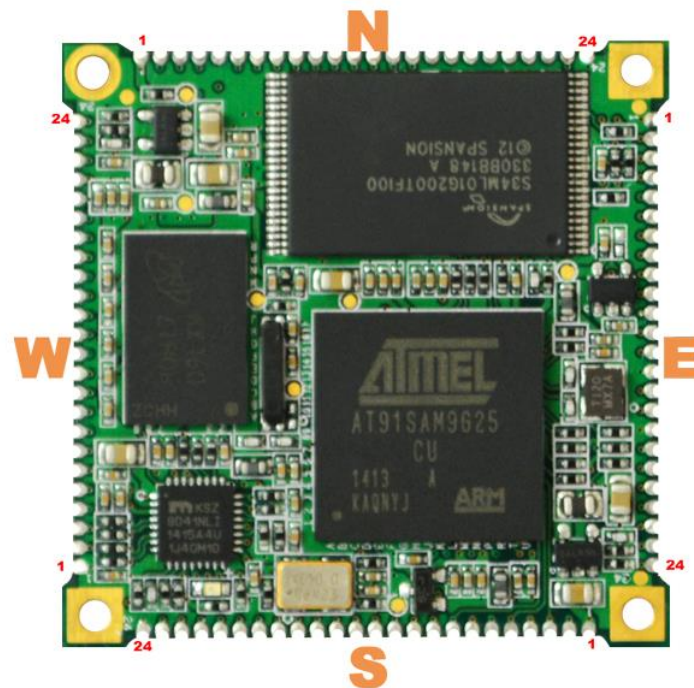
- ◆ Line level: TTL 3.3VROM
- ◆ Size: 40 x 40 mm (1.57x1.57 inch)
- ◆ Weight: 5g
- ◆ Pads pitch: 1.27 mm (50 mill)

- ## 1.5 Block Diagram





1.6 Pin Definition



Pin	IC Pin	Default	Alt	GPIO	Note
N1		3V3			Power in VCC
N2	PC0	SDA1	GPIO	64	I2C bus 1 Data or GPIO
N3	PC1	SCL1	GPIO	65	I2C bus 1 Clock or GPIO
N4	PC2	GPIO		66	
N5	PC3	GPIO		67	
N6	PC4	GPIO		68	
N7	PC5	GPIO		69	
N8	PC6	GPIO		70	
N9	PC7	GPIO		71	
N10	PC8	UTXD0	GPIO	72	UART0: /dev/ttyS5 TXD
N11	PC9	URXD0	GPIO	73	UART0: /dev/ttyS5 RXD
N12	PC10	GPIO		74	
N13	PC11	GPIO		75	
N14	PC12	GPIO		76	
N15	PC13	GPIO		77	
N16	PC14	GPIO		78	
N17	PC15	GPIO		79	
N18	PC16	UTXD1	GPIO	80	UART1: /dev/ttyS6 TXD
N19	PC17	URXD1	GPIO	81	UART1: /dev/ttyS6 RXD
N20	PC18	GPIO	PWM0	82	GPIO or Pulse Wave Modulation Out 0
N21	PC19	GPIO	PWM1	83	GPIO or Pulse Wave Modulation Out 1
N22	PC20	GPIO	PWM2	84	GPIO or Pulse Wave Modulation Out 2



N23	PC21	GPIO	PWM3	85	GPIO or Pulse Wave Modulation Out 3
N24		GND			Power In GND

Pin	IC Pin	Default	Alt	GPIO	Note
E1		GND			Power in VCC
E2	PC22	TXD3	GPIO	86	USART3: /dev/ttyS4 TXD
E3	PC2	RXD3	GPIO	87	USART3: /dev/ttyS4 RXD
E4	PC2	RTS3	GPIO	88	USART3: /dev/ttyS4 RTS
E5	PC2	CTS3	GPIO	89	USART3: /dev/ttyS4 CTS
E6	PC2	GPIO		90	
E7	PC2	RTS1	GPIO	91	USART1: /dev/ttyS2 RTS
E8	PC2	CTS1	GPIO	92	USART1: /dev/ttyS2 CTS
E9	PC2	GPIO		93	
E10	PC30	GPIO		94	
E11	PC31	GPIO		95	
E12	USBCP	D+			USB 2.0 Host full-speed port C
E13	USBCN	D-			USB 2.0 Host full-speed port C
E14		GND			Power In GND
E15	USBBN	D-			USB 2.0 Host hi-speed port B
E16	USBBP	D+			USB 2.0 Host hi-speed port B
E17		GND			Power In GND
E18	USBAN	D-			USB 2.0 Host/Device hi-speed port A
E19	USBAP	D+			USB 2.0 Host/Device hi-speed port A
E20	VBAT				RTC battery backup +3 volt DC input
E21	NRST				Reset input signal (active low)
E22	SHDN				Shutdown output signal (active low)
E23	WKUP				Wake-up input signal (active low)
E24		3V3			Power in VCC

Pin	IC Pin	Default	Alt	GPIO	Note
S1		3V3			Power in VCC
S2	PA21	1W	GPIO	21	Bit banging 1-wire bus or GPIO
S3	PA20	DA3		20	Micro SD Card memory
S4	PA19	DA2		19	Micro SD Card memory
S5	PA18	DA1		18	Micro SD Card memory
S6	PA17	CK		17	Micro SD Card memory
S7	PA16	CDA		16	Micro SD Card memory
S8	PA15	DA0		15	Micro SD Card memory
S9	PA14	NPCS0	GPIO	14	SPI bus 0 chip select 0 or GPIO
S10	PA13	SPCK	GPIO	13	SPI bus 0 clock or GPIO
S11	PA12	MOSI	GPIO	12	SPI bus 0 Master Output or GPIO
S12	PA11	MISO	GPIO	11	SPI bus 0 Master Input or GPIO
S13	PA10	DTXD		10	Debug serial port



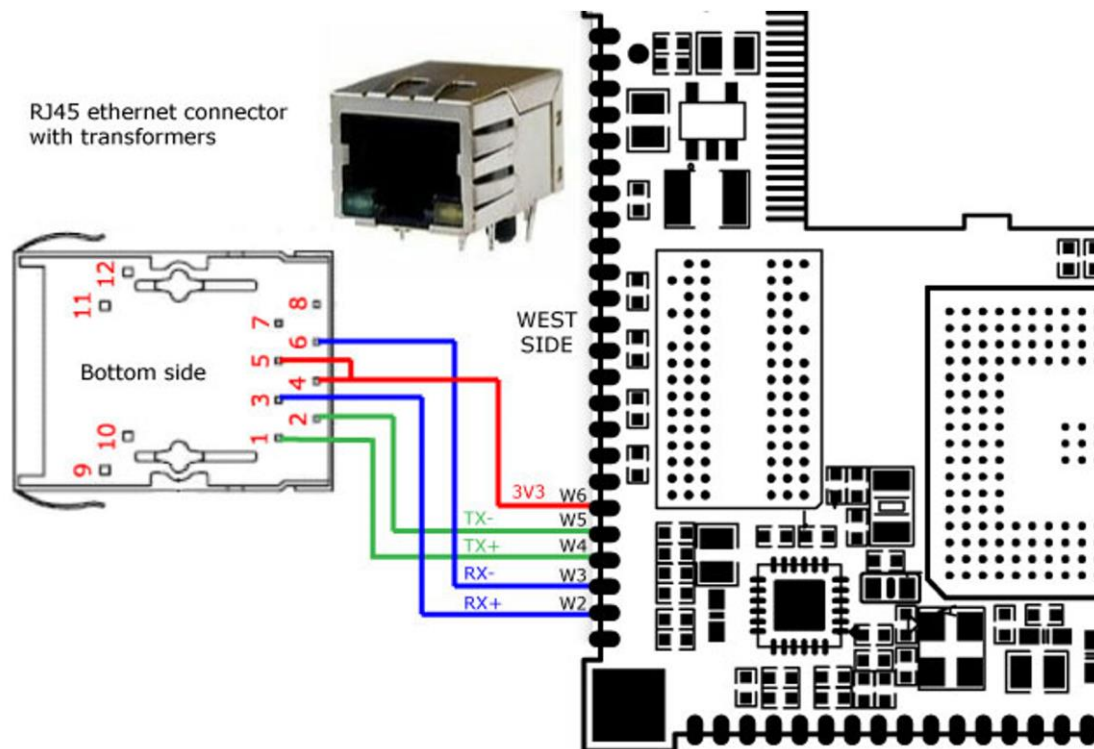
S14	PA9	DRXD		9	Debug serial port
S15	PA8	RXD2	GPIO	8	USART2: /dev/ttyS3 RXD or GPIO
S16	PA7	TXD2	GPIO	7	USART2: /dev/ttyS3 TXD or GPIO
S17	PA6	RXD1	GPIO	6	USART2: /dev/ttyS2 RXD or GPIO
S18	PA5	TXD1	GPIO	5	USART2: /dev/ttyS2 TXD or GPIO
S19	PA4	GPIO		4	
S20	PA3	CTS0	GPIO	3	USART1: /dev/ttyS1 CTS or GPIO
S21	PA2	RTS0	GPIO	2	USART1: /dev/ttyS1 RTS or GPIO
S22	PA1	RXD0	GPIO	1	USART1: /dev/ttyS1 RXD or GPIO
S23	PA0	TXD0	GPIO	0	USART1: /dev/ttyS1 TXD or GPIO
S24		GND			Power In GND

Pin	IC Pin	Default	Alt	GPIO	Note
W1		GND			Power in GND
W2		ETHRXP			Eth RX+
W3		ETHRXN			Eth RX-
W4		ETHTXP			Eth TX+
W5		ETHTXN			Eth TX-
W6		ETH3V3			Eth 3V3
W7		ETHLED1			Eth Yellow led (active)
W8		ETHLED2			Eth Green led (link)
W9	PA22	GPIO		22	
W10	PA23	GPIO		23	
W11	PA24	GPIO		24	
W12	PA25	GPIO		25	
W13	PA26	GPIO		26	
W14	PA27	GPIO		27	
W15	PA28	GPIO		28	
W16	PA29	GPIO		29	
W17	PA30	SDA0	GPIO	30	I2C bus 0 Data or GPIO
W18	PA31	SCL0	GPIO	31	I2C bus 0 Clock or GPIO
W19	ADVREF				A/D converter voltage reference in (max 3.3V)
W20	PB11	AD0	GPIO	43	A/D converter Input 0 or GPIO
W21	PB12	AD1	GPIO	44	A/D converter Input 1 or GPIO
W22	PB13	AD2	GPIO	45	A/D converter Input 2 or GPIO
W23	PB14	AD3	GPIO	46	A/D converter Input 3 or GPIO



2 Hardware Design Guide

2.1 Ethernet

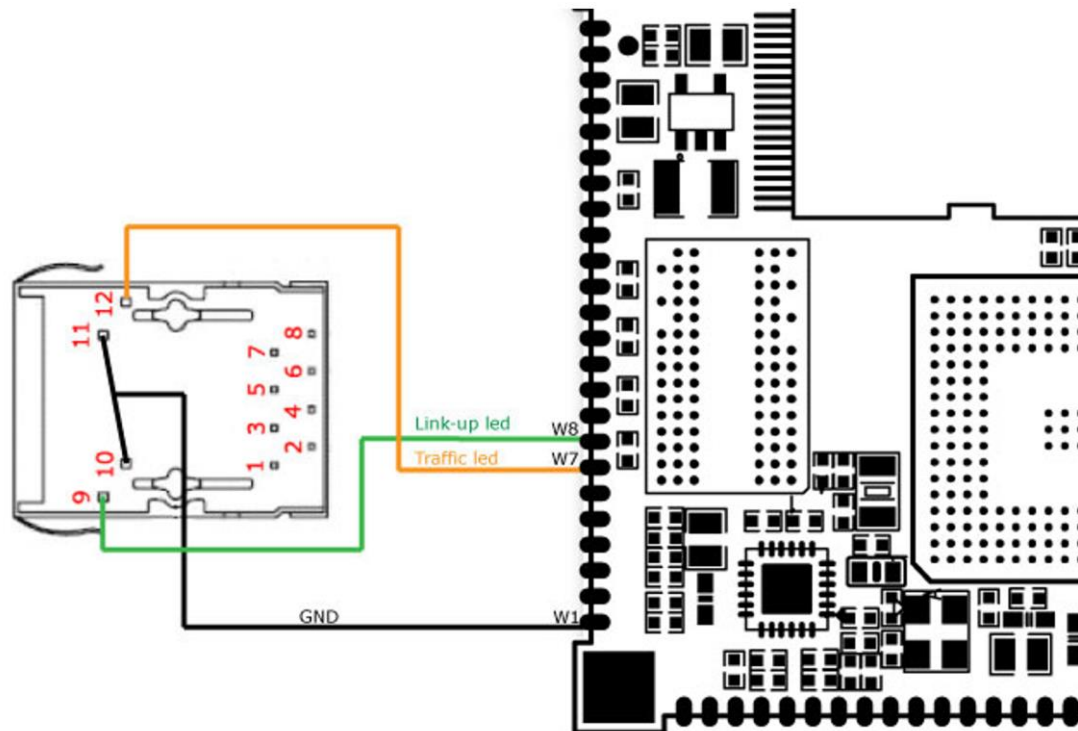


Pin	Ethernet connector pins
W2 (ETH RX+)	3 (TX+)
W3 (ETH RX-)	6 (TX+)
W4 (ETH TX+)	1 (RX+)
W5 (ETH TX-)	2 (RX-)
W6 (ETH 3V3)	4 (RCT) and 5 (TCT)

Note: Do not use the LAN connector without transformers.

- **Link / Activity LED**

The other 3-wires of RJ45 are link-up and Activity LEDs. On this scheme is illustrated how to wire the LEDs integrated in LAN connector. It can also be replaced with universal LED. (resistor not required).



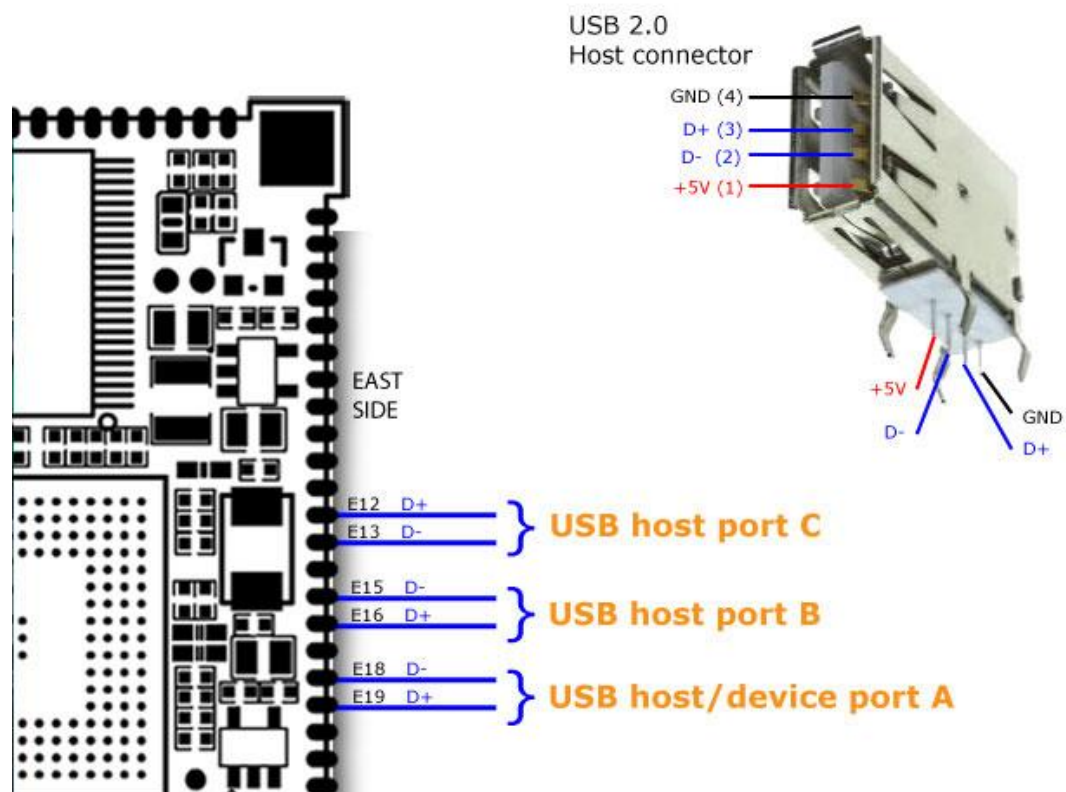
pin	Ethernet connector pins
W8 (ETH green link led)	9 (Green led)
W7 (ETH yellow active led)	12 (Yellow led)
W1 (GND)	10 (Green led) and 11 (Yellow led)

2.2 USB Ports

3x USB 2.0 host ports are available on MINI9G25 module.

- ◆ *Two hi-speed port at 480 Mbps*
- ◆ *One full speed at 12 Mbps*
- ◆ *One of the hi-speed port can be used as device port*

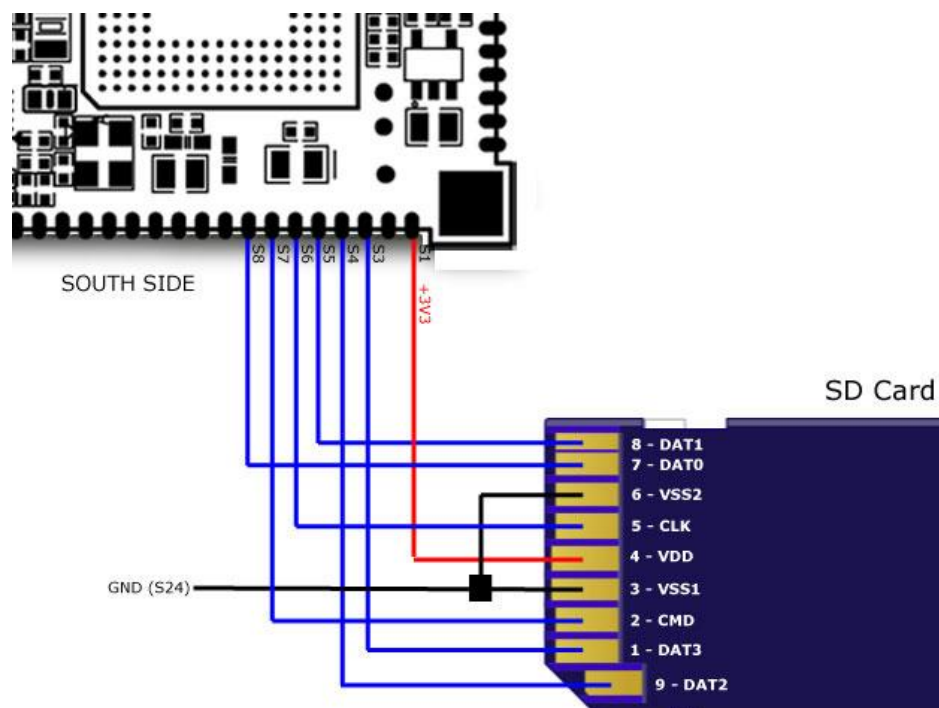
Pin	Port	Description	Mode
E18 (D-), E19 (D+)	Port A	High Speed (480 Mbps)	Host or Device
E15 (D-), E16 (D+)	Port B	High Speed (480 Mbps)	Host
E12 (D+), E13 (D-)	Port C	Full Speed (12 Mbps)	Host



2.3 SD Card

MINI9G25 supports download from Standard SD / Micro SD card

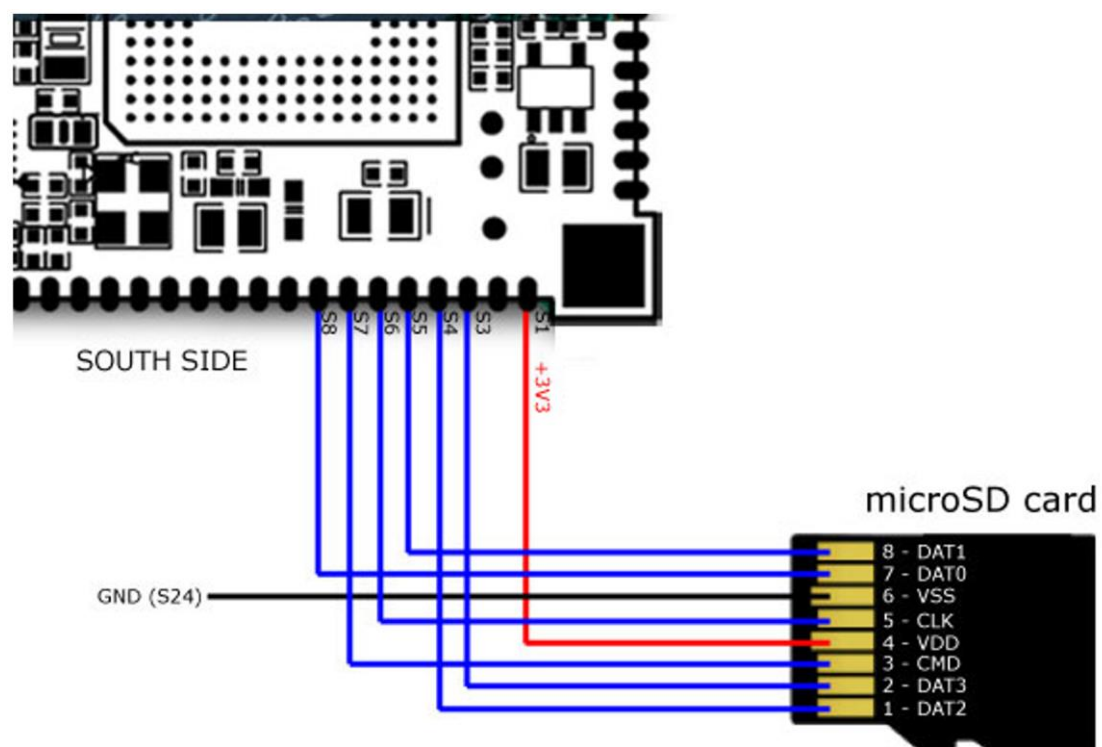
- **Standard SD Card**





Pin	SD card pins
S1 (3V3)	4 (VDD)
S3 (DA3)	1 (DAT3)
S4 (DA2)	9 (DAT2)
S5 (DA1)	8 (DAT1)
S6 (CK)	5 (CLK)
S7 (CDA)	2 (CMD)
S8 (DA0)	7 (DAT0)
S24 (GND)	3 (VSS1) and 6 (VSS2)

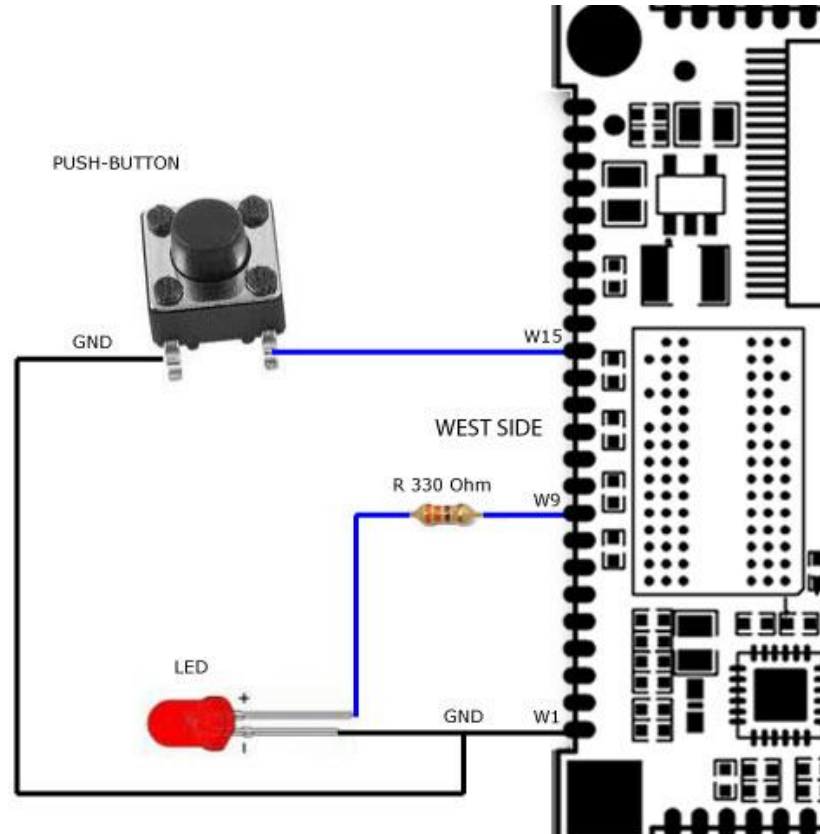
• **Micro SD Card**



Pin	SD card pins
S1 (3V3)	4 (VDD)
S3 (DA3)	1 (DAT3)
S4 (DA2)	9 (DAT2)
S5 (DA1)	8 (DAT1)
S6 (CK)	5 (CLK)
S7 (CDA)	2 (CMD)
S8 (DA0)	7 (DAT0)
S24 (GND)	3 (VSS1) and 6 (VSS2)

2.4 GPIO

Wire a led or push-button for example.

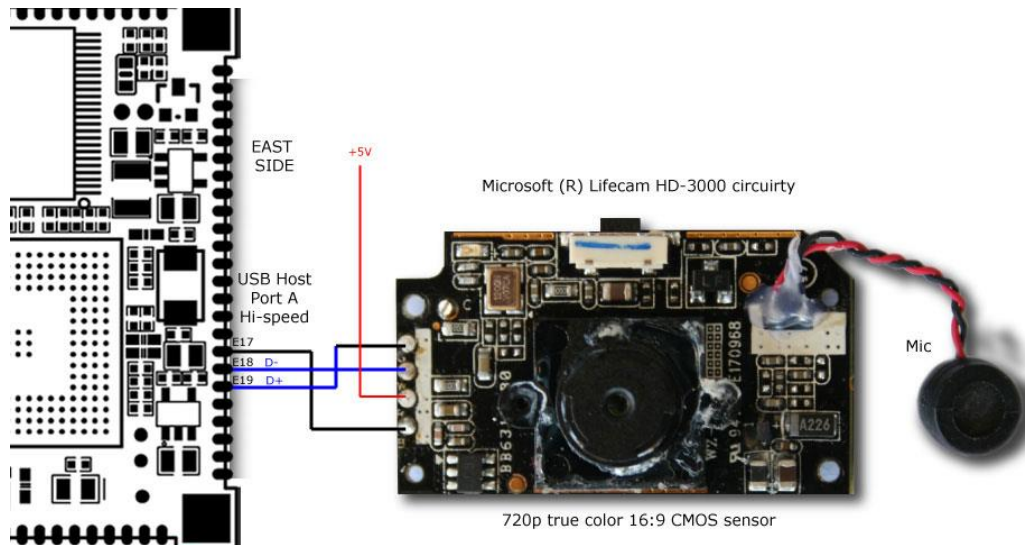


Note: All lines are 3.3V. Do not connect 5V to avoid damages.

2.5 USB Webcam

The Microsoft Lifecam HD3000 is a 720p HD 16:9 hi-res webcam with integrated mic. The size is only 34x20x6mm after remove the plastic shield and usb cable.

Pin	HD-3000
E19 (D+)	Green (D+)
E18 (D-)	White (D-)
	Red (+5V)
E17 (GND)	Black (GND)



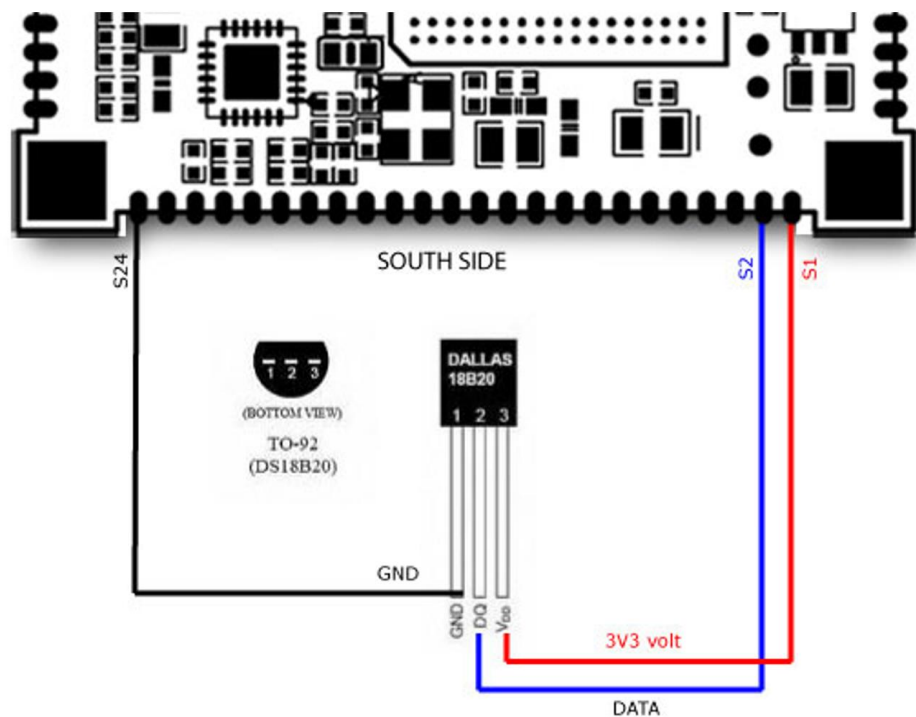
- Video streaming over HTTP
- Time-laps video

2.6 Temperature Sensor

The DS18B20 digital thermometer provides 9-bit to 12-bit Celsius temperature measurements.

Operating Temperature: -55°C to +125°C

Measurement accuracy: $\pm 0.5^\circ\text{C}$ (in -10°C to $+85^\circ\text{C}$.)

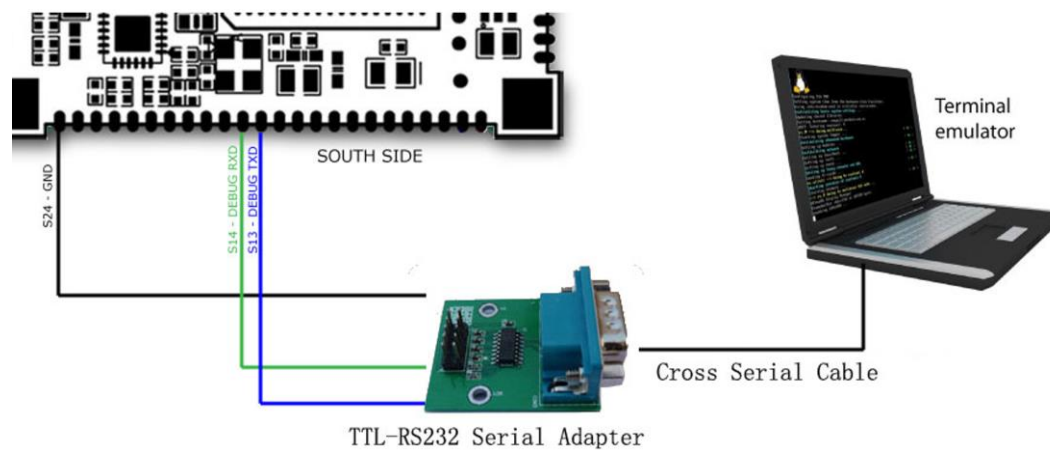


Pin	Signals
S1	3V3
S2	1-wire data
S24	GND

2.7 Debug Serial Port

The debug port outputs the messages during the boot loader and Linux Kernel loaded from the SD card. It is used also in low-level access to the system

Pin	Signals
S13	Debug port TXD
S14	Debug port RXD
S24	GND



2.8 RTC

RTC (Real Time Clock) will activate after the power is turned off. The Lithium battery is CR1220.

