

Hardware documentation

for armStoneA8

Version 1.6

(2014-01-07)



armStoneA8

About This Document

This document describes how to use the armStoneA8 board with mechanical and electrical informations. The latest version of this document can be found at <http://www.fs-net.de>.

Please also refer the design guide by using this module for your application.

History

Date	V	Platform	A,M,R	Chapter	Description	Au
07.02.2012	0.1	All	A	-	Build the document	KW
13.02.2012	1.0	All	A,M		First final release	KW
16.03.2012	1.1	All	M		Correct addendum	KW
04.04.2012	1.2	All	M		Correct product name on some points, correct HW overview USB host to 2.0	KW
26.04.2012	1.3	All	M M A	1 4 5.3	Correct mounting hole Change description for board Rev 1.2 Add Shield to GND for EMV	KW
21.06.2012	1.4	All	M	4.7	Correct pinout resistive touch	KW
02.07.2013	1.5	All	M	7	Remove addendum for HW Rev 1.10	KW
07.01.2014	1.6	All	M	5.1	Add 3.3V current limit	KW

V Version
A,M,R Added, Modified, Removed
Au Author

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1 Dimensions

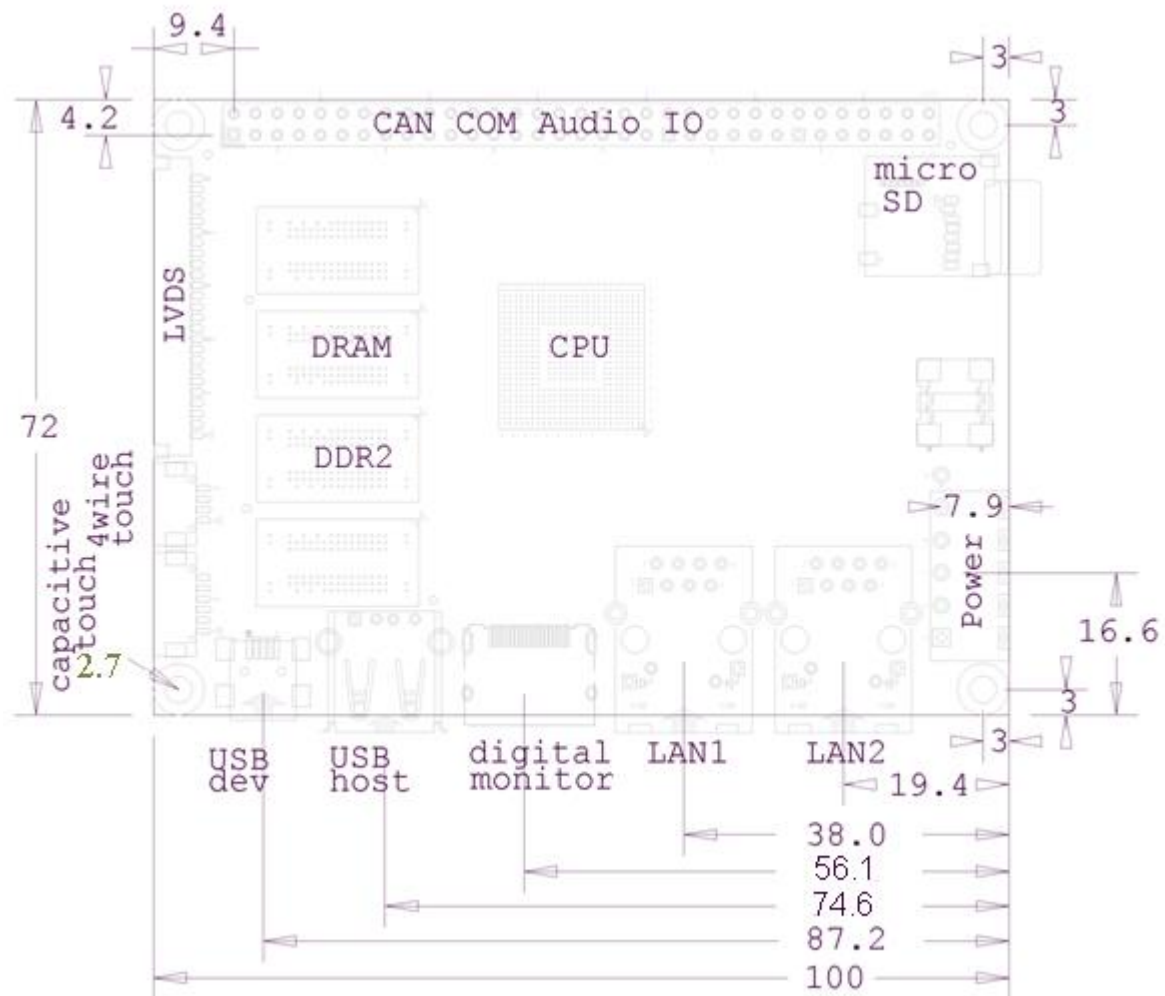


Figure 1: mechanical dimensions

PCB thickness	1.5 mm $\pm 10\%$
PCB size	72x100 mm (picolTX)
Height of parts on top side	15 mm
Height of parts on bottom side	5 mm
Weight:	55g

2 Technical Data armStoneA8

Power supply:	5V DC $\pm 5\%$
Interfaces:	1x Ethernet 10/100Mbit (optional 2x) 1x USB 2.0 Host high speed 1x USB 2.0 Device high speed 1x digital monitor 1x microSD card connector push-push 1x 4 wire resistive touch 1x I2C for capacitive touch module 1x serial port RS232 1x stereo Audio Linein, Lineout, Mic 2x serial port RS232 4x ADC In (10 bit, 500kSPS) 3x PWM out 1x I2C 1x SPI 17x GPIO
LCD-interfaces:	1x 18bit LVDS
Memory:	256 MByte DDR2 DRAM (optional 512MB) 128 MByte NAND Flash (optional 1 GByte)
CPU:	Samsung S5PV210 1GHz CPU
Operating temperature:	0°C...+70°C (optional -20...+85°C)

3 Block diagram

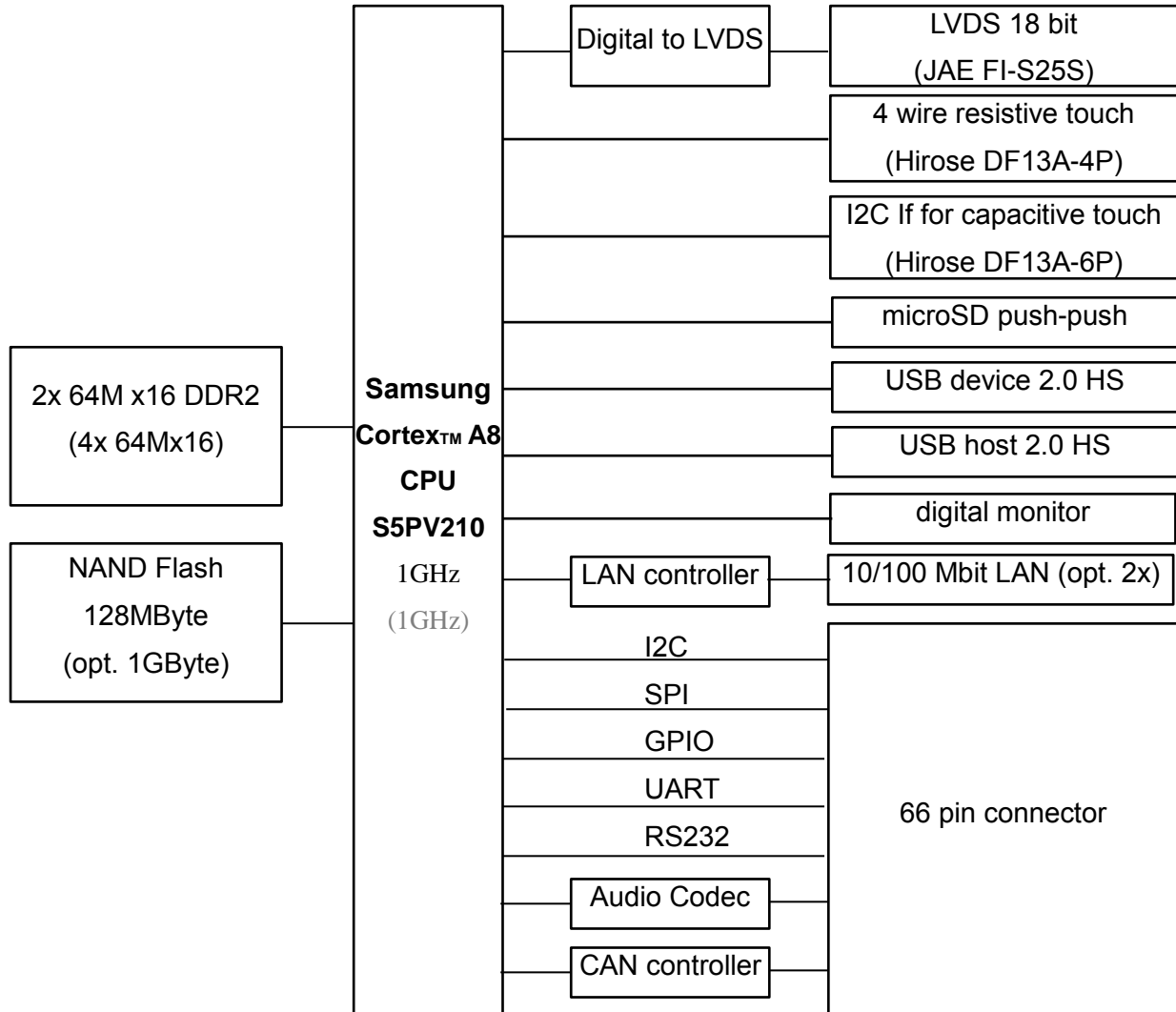


Figure 2: block diagram

4 Interface and signal description

4.1 Fast Ethernet LAN

The LAN1 and the optional LAN2 connector does support 10 and 100 Mbit LAN.

4.2 USB host

The single USB Host connector does support USB2.0 connection with High speed up to 480Mbit/s and also Full and Low speed devices.

The power on the 5V line is equipped with a resetable fuse with 500mA.

4.3 USB device

The USB device allows to connect the armStoneA8 as device on a PC.

4.4 Digital monitor

A digital monitor can connected to the board. This interface supports up to 1080p 60Hz.

4.5 microSD

The microSD push-push connector supports the SD Standard Host Specification Version 2.0 standard.

4.6 LVDS port connector

The single channel LVDS display port can be direct connected to a LVDS 18 bit display.

The VLCD voltage is 3.3V and switched on the baseboard. **The current limit is 1.2 A.**

Connector is a JAE FI-S25P-HFE. Matching connector on display cable is a crimp connector FI-S25S housing and a cable with FI-C3-A1-15000 crimp contacts.

This connector is used because a wide range of displays does have a JAE FI-S series connector (with different pinouts) and it's easy to handle identical crimp contacts for the cable manufacturer.

LCD connector pinout

1,2,23,24	VLCD (3.3V switched)
3,4,7,10,13,16,19..22	GND
14	LVDS_CLK-
15	LVDS_CLK+
5	LVDS_DATA0-
6	LVDS_DATA0+
8	LVDS_DATA1-
9	LVDS_DATA1+
11	LVDS_DATA2-
12	LVDS_DATA2+
17	n.c.
18	n.c.
24	BL ON signal (3.3V high active)
25	BL PWM signal (3.3V level)

Pin 1 is marked on the connector with an arrow and also marked on PCB.

The single channel LVDS port can be direct connected to a LVDS 18 bit display.

Unused signals should be left unconnected.

4.7 4 wire resistive touch

The integrated resistive touch controller will support 4 wire analog resistive touch panels.

The connector is a Hirose 4 pin connector, model no. DF13A-4P-1.25H, mounted on the armStoneA8 module. Pin 1 is marked on PCB.

Matching connector is a Hirose DF13-4S-1.25C with DF13-2630SCF crimping contacts.

Pin	Function
1	X+
2	Y+
3	X-
4	Y-

If unused this signals should be left unconnected.

4.8 I2C connector for capacitive touch module

This connector is to connect the F&S SINTF-ADP-CT. This module is based on Atmel mXT224 maxTouch chip working with several capacitive touch glasses

The connector is a Hirose 6 pin connector, model no. DF13A-6P-1.25H, mounted on the armStoneA8 module. Pin 1 is marked on PCB.

Matching connector is a Hirose DF13-6S-1.25C with DF13-2630SCF crimping contacts.

Unused signals should be left unconnected.

Pin	Signal
1	VCC 3.3V
2	I2C data, 3.3V TTL
3	I2C clock, 3.3V TTL
4	Reset Output, 3.3V TTL
5	I2C Interrupt Input, 3.3V TTL
6	GND

4.9 66 Pin Feature connector

This 2.54mm connector supports CAN, RS232, Audio, ADC Input, PWM output, TTL serial ports, keyboard matrix and GPIOs.

To make using of this connector easier this pinout was changed in previous revision.

Please refer the addendum by using Board Rev. 1.0 or 1.1.

VCC3.3 (J5 pin 26)	1	2	VCC5
XGPIO0/COL0	3	4	XGPIO1/COL1
XGPIO2/COL2	5	6	XGPIO3/COL3
XGPIO4/COL4	7	8	XGPIO5/COL5
XGPIO6/COL6	9	10	XGPIO7/COL7
GND	11	12	XGPIO8/SPI_CLK
TX1/GPIO0	13	14	XGPIO9/SPI_CS _n
RX1/GPIO1	15	16	I2CLK/SPI_MOSI
I2DAT/SPI_MISO	17	18	XGPIO10/ROW0
XGPIO11/ROW1	19	20	XGPIO12/ROW2
XGPIO13/ROW3	21	22	XGPIO14/ROW4
XGPIO15/ROW5	23	24	XGPIO16/ROW6
XGPIO17/ROW7	25	26	XGPIO18 (J5 pin1)
GND	27	28	PWMOUT0
ADC_IN0	29	30	PWMOUT1
ADC_IN1	31	32	PWMOUT2
ADC_IN2	33	34	VCFL_ON
ADC_IN3	35	36	RXD2 rs232
GND	37	38	TXD2 rs232
VCC3.3	39	40	VCC5
MIC1 (Audio pin 1)	41	42	GND
nc	43	44	LINEIN_R
LINEOUT_R	45	46	GND
GND	47	48	LINEIN_L
LINEOUT_L	49	50	GND
RESETBTN	51	52	VCC3.3
nc (COM pin1)	53	54	nc
RX0	55	56	RTS0
TX0	57	58	CTS0
nc	59	60	nc
GND	61	62	VCC5 (COM keypin)
CANRX/CANL	63	64	CANTX/CANH
BOOTSEL	65	66	VCC3.3

On default a 9 pin connector is mounted on pin 53..61 to use a COM port standard adapter cable. *Italic signals does have a 4k7 pullup on the module.*

!! IMPORTANT NOTE !!

To make using of this connector easier this pinout was changed in previous revision.

Please refer the addendum.

4.9.1 Audio

The connector does provide Stereo Line in, Stereo Line out and microphone.

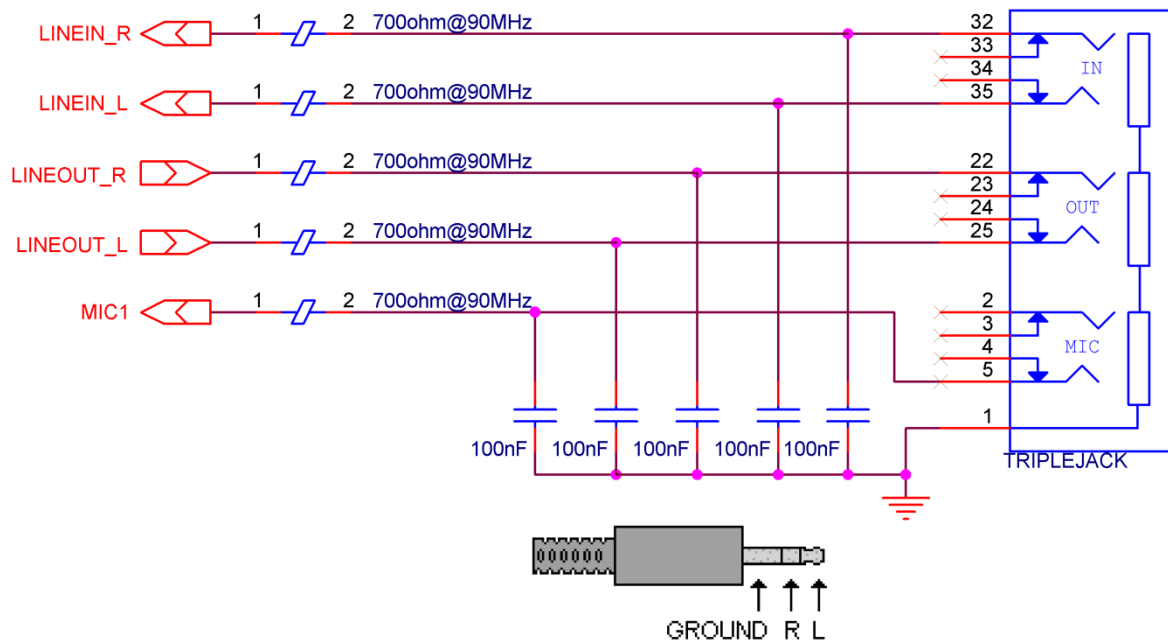


Figure 4: Audio connection

4.9.2 RS232 COM port

A 9 pin double row connector is mounted in pin 53..61. That allow to attach a standard 9pin to DSUB9 adapter cable for debug output of bootloader and kernel with TX, RX, RTS and CTS to a terminal.

Pin 1 of this adapter should connect on pin 53 of the 66 pin connector. Pin 62 is the keypin and should be removed.

On pin 36 & 38 is a second RS232 COM port (RXD2/TXD2).

4.9.3 TTL COM port

There is additional serial port with 3.3V TTL level (RXD1/TXD1).

4.9.4 SPI

The module supports a HS SPI (Serial Peripheral Interface) with 2 chip selects. Signals are 3.3V compliant and does have 4.7k pullups on module.

4.9.5 I2C

The module supports a I2C interface as I2C master. Signals are 3.3V compliant and does have 4.7k pullups on module.

4.9.6 ADC In

4 ADC inputs (ADC_IN0..3)

- Resolution: 10-bit
- Differential Nonlinearity Error: ± 1.0 LSB (Max.)
- Integral Nonlinearity Error: ± 4.0 LSB (Max.)
- Maximum Conversion Rate: 0.5 MSPS
- Analog Input Range: 0 ~ 3.3V
- On-chip sample-and-hold function

4.9.7 PWM out

3 programmable PWM outputs (PWMOUT0..2) with 3.3V level in 16.1kHz up to 33 MHz frequency range

4.9.8 Matrix keyboard

8x8 keyboard matrix (ROW0..7, COL0..1) with 3.3V level. The ROW signals does have 4.7k pullups on module.

4.9.9 GPIOs

GPIOs are programmable as Input or Output with 3.3V TTL level. The default maximum driver current is 10mA (sink and source).

XGPIO0..9 does have 4.7k pullup on module.

4.9.10 MISC signals, power

RESETBTN	3.3V TTL low active RESET input; use pushbutton to GND or open collector driver to pull low. Don't drive with high level.
VCC3.3, VCC5	voltage outputs for external logic, max. 100mA per pin for external chips and functions

4.9.11 CAN Bus

As an optional feature the module does provide the CAN bus transmit and receive TTL signal without any termination in standard version (CANRX, CANTX). Both signals are working with 3.3V level.

Needs a interface chip to the CAN bus showing below. If not used, please left signals unconnected.

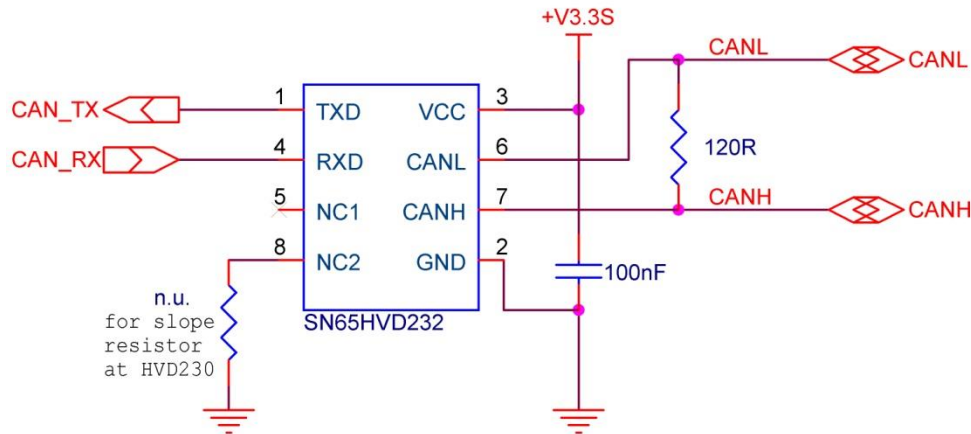


Figure 6: CAN transceiver circuit

Custom version with mounted transceiver is possible, please contact your sales channel for minimal order quantity and pricing.

4.10 Power connector

A 5 pin power connector is mounted on the module.

Connector type

- [Phoenix contact](#) MC 1,5/ 5-G-3,81 1803303
- [Würth Elektronik](#) order no. 691 322 310 005

For matching connectors please refer the connector manufacturer website.

pin	function	description
1	n.c.	-
2	RTC Battery	for RTC battery, don't connect if not used
3	VCC In 5.0 V	5 V power supply
4	GND	
5	VCC Out 3.3V	3.3V power output for external logic, max. current 50mA

If a external 3.3V power supply is used for external logic, we recommend to use the "VCC Out 3.3V" as enable signal for this power supply to avoid backdrive leak current thru IO pins..

5 Electrical Data

5.1 Power supply

Power supply 5V 5V +/- 5%
Power supply BATT 2.0 ... 3.6 V

power consumption

typical current consumption BATT: 3 uA

maximum power consumption BATT: t.b.d.

maximum power consumption 5V (summary all chips): 4 A (with 1GHz CPU)

Power consumption of connected devices like display, USB devices, SD card has to be added !

External current limit 3.3V (incl. VLCD) 1.2A

5.2 DC electrical characteristics for 3.3V IO pins

VDD= 3.3V +/- 5%

Parameter	Description	Condition	Min	Max	Unit
Vih	High Level Input Voltage		0.7*VDD	VDD+0.3	V
Vil	Low Level Input Voltage		-0.3	0.3*VDD	V
Voh	High Level Output Voltage	Ioh=-100µA	VDD-0.2		V
Vol	Low Level Output Voltage	Ioh=100µA		0.2	V
Io	Output current	VDD=3.3V		2.6	mA

5.3 Shield to GND connection

There is the possibility to add a Shield to Signalground connection on both mounting holes on front side. There are 0603 shapes on the solder side of the board to add a connection. This give customer the possibility to change EMV characteristic. On default this parts are not mounted and the Shield is not connected to the Signalground.

6 Appendix

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Important Notice

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7 **Addendum**

On older Version **1.10** the 66 Pin Feature connector will have a different pinout.
Please contact our technical support for informations.