Hardware documentation

for armStoneA8

Version 1.10
(2012-02-13)

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

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

1   Dimensions

Figure 1: mechanical dimensions

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

2 Technical Data armStoneA8

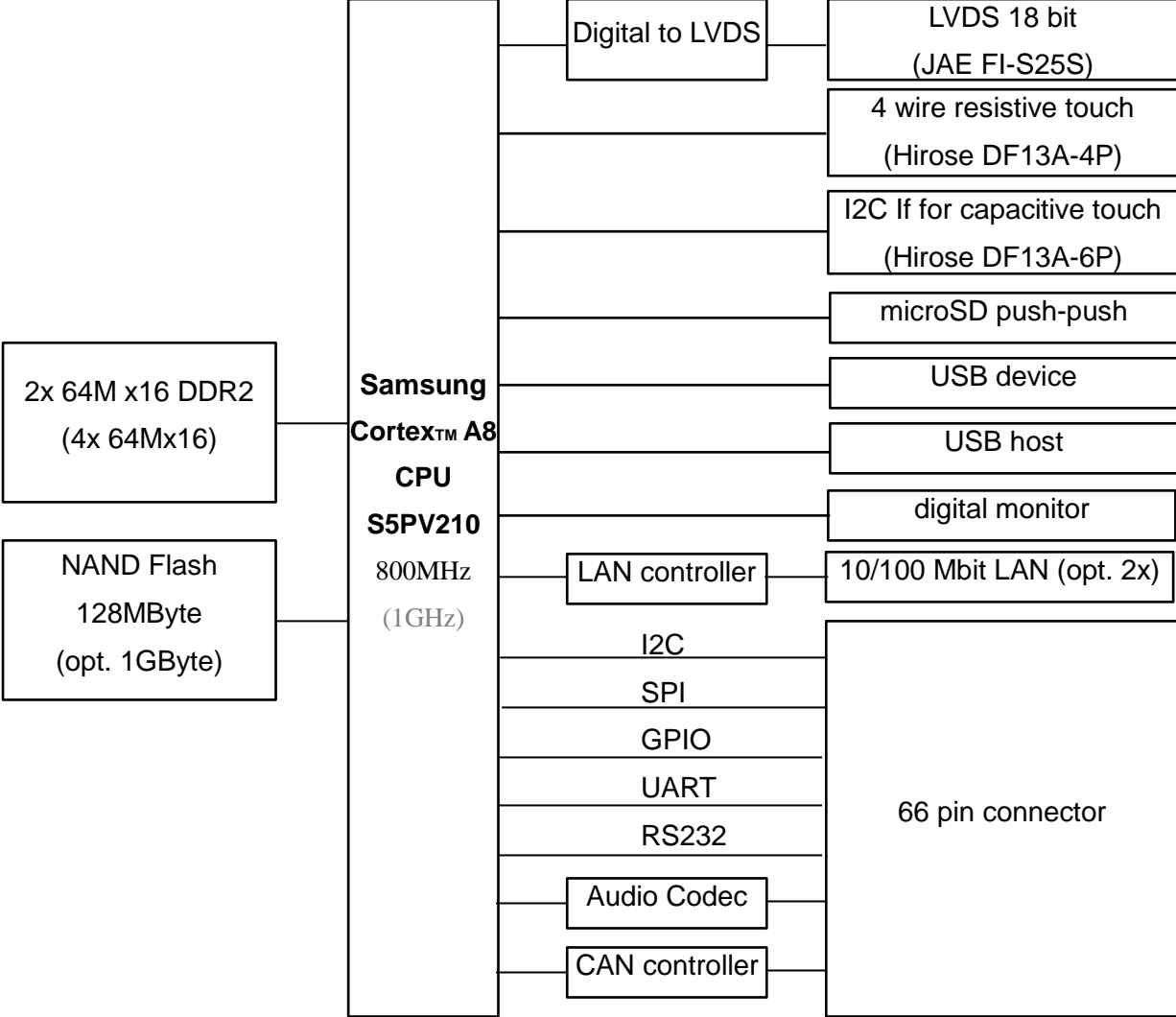|	
Power supply:	5V DC ±5%
Interfaces:	1x Ethernet 10/100Mbit (optional 2x)
	1x USB 1.0 Host
	1x USB 2.0 Device
	1x digital monitor
	1x microSD card connector push-push
	1x 4 wire resistive touch
	1x I2C for capacitive touch module
	1x serial port RS232
	1x stereo Audio Linein, Lineout, Mic
	2x serial 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 800MHz CPU (optional 1GHz)
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	CFL on signal (3.3V high active)
25	CFL 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 QBlissA8 module. Pin 1 is marked on PCB.

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

```
TOUCH_YM     1
TOUCH_YP     2
TOUCH_XM     3
TOUCH_XP     4
```
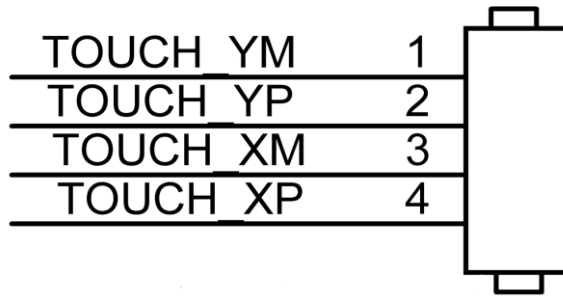
Unused signals should be left unconnected.

Figure 3: Touch connection

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 QBlissA8 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.

!! IMPORTAND NOTE !!

To make using of this connector easier this pinout will be changed in next revision.

Please refer the addendum.

XGPIO18 (J5 pin1)	1	2	XGPIO17/COL7
XGPIO16/COL6	3	4	XGPIO15/COL5
XGPIO14/COL4	5	6	XGPIO13/COL3
XGPIO12/COL2	7	8	XGPIO11/COL1
XGPIO10/COL0	9	10	I2DAT/SPI_MISO/GPIO2
I2CLK/SPI_MOSI	11	12	RX1/GPIO1
XGPIO9/SPI_CSn	13	14	TX1/GPIO0
XGPIO8/SPI_CLK	15	16	GND
XGPIO7/ROW7	17	18	XGPIO6/ROW6
XGPIO5/ROW5	19	20	XGPIO4/ROW4
XGPIO3/ROW3	21	22	XGPIO2/ROW2
XGPIO1/ROW1	23	24	XGPIO0/ROW0
VCC5	25	26	VCC3.3
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
GND	37	38	TXD2
VCC5	39	40	nc
MIC1	41	42	GND
nc	43	44	LINEIN_R
LINEOUT_R	45	46	GND
GND	47	48	LINEIN_L
LINEOUT_L	49	50	GND
GND	51	52	VCC5
GND	53	54	VCC5
nc	55	56	nc
TX0	57	58	CTS0
RX0	59	60	RTS0
nc (COM adapter pin 1)	61	62	nc
CANRX/CANL	63	64	CANTX/CANH
BOOTSEL	65	66	VCC3.3

!! IMPORTAND NOTE !!

To make using of this connector easier this pinout will be changed in next revision.

Please refer the addendum.

4.9.1 Audio

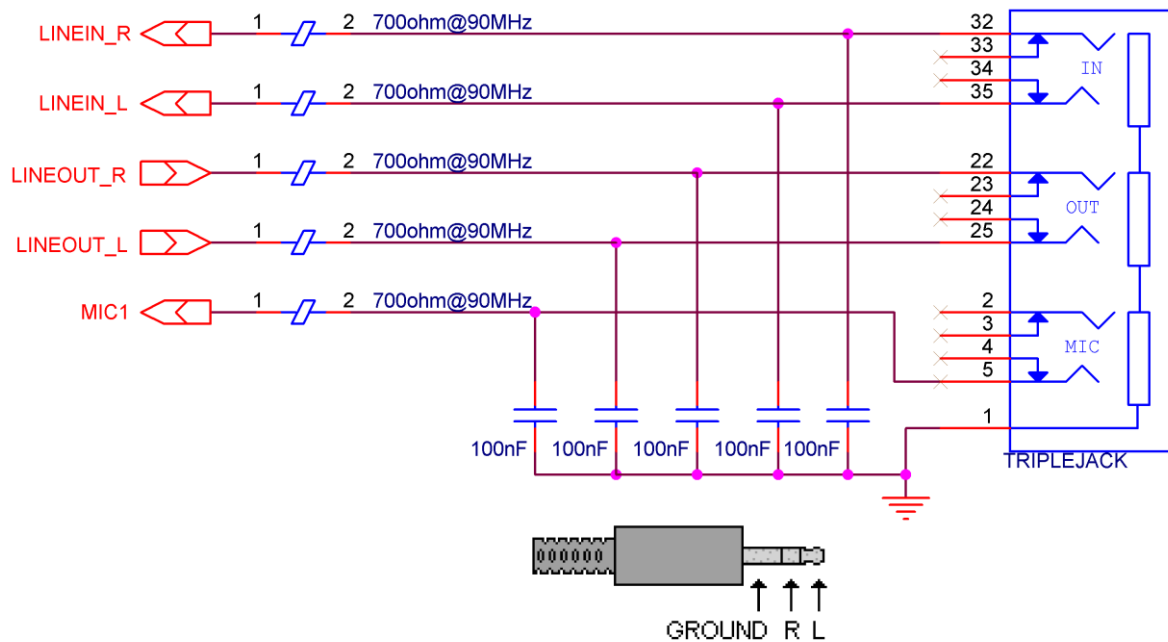The connector does provide Stereo Line in, Stereo Line out and microphon.

Figure 4: Audio connection

4.9.2 RS232 COM port

A 5 pin single row connector is mounted in pin 53,55,57,59,61. That allow to attach a standard 9pin to DSUB9 adapter cable for debug output of bootloader and kernel with TX and RX to a terminal. Using RTS and CTS too needs a special cable adapter.

Pin 1 of this adapter should connect on pin 62 of the 66 pin connector. The second 4 pin row of the adapter cable is not in use.

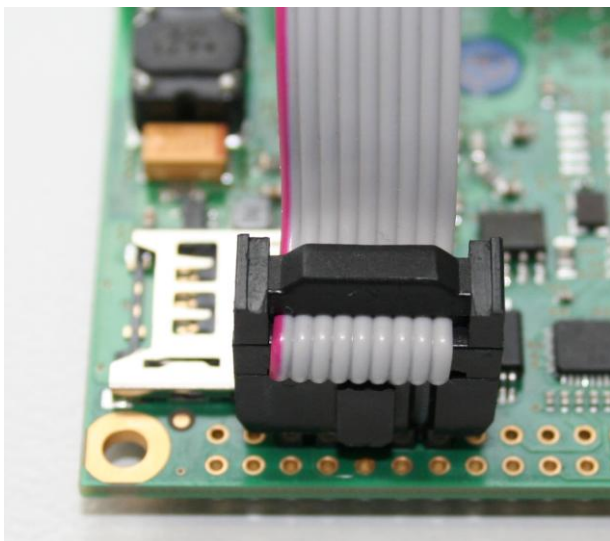**To make using of this signals easier this pinout will be changed in next revision.**

Figure 5: RS232 adapter mounting

4.9.3 TTL COM port

There are additional 2 serial ports with 3.3V TTL level (RXD1/TXD1 and RXD2/TXD2).

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.

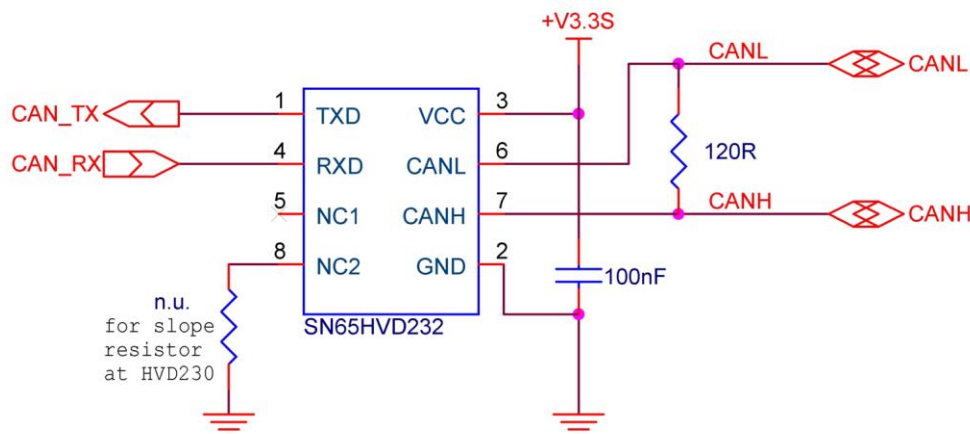Needs a interface chip to the CAN bus showing below. If not used, please left signals unconnected.

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 thrue 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 !

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

6 Appendix

List of figures

Important Notice

The information in this publication has been carefully checked and is believed to be entirely accurate at the time of publication. F&S Elektronik Systeme assumes no responsibility, however, for possible errors or omissions, or for any consequences resulting from the use of the information contained in this documentation.

F&S Elektronik Systeme reserves the right to make changes in its products or product specifications or product documentation with the intent to improve function or design at any time and without notice and is not required to update this documentation to reflect such changes.

F&S Elektronik Systeme makes no warranty or guarantee regarding the suitability of its products for any particular purpose, nor does F&S Elektronik Systeme assume any liability arising out of the documentation or use of any product and specifically disclaims any and all liability, including without limitation any consequential or incidental damages.

Products are not designed, intended, or authorised for use as components in systems intended for applications intended to support or sustain life, or for any other application in which the failure of the product from F&S Elektronik Systeme could create a situation where personal injury or death may occur. Should the Buyer purchase or use a F&S Elektronik Systeme product for any such unintended or unauthorised application, the Buyer shall indemnify and hold F&S Elektronik Systeme and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, expenses, and reasonable attorney fees arising out of, either directly or indirectly, any claim of personal injury or death that may be associated with such unintended or unauthorised use, even if such claim alleges that F&S Elektronik Systeme was negligent regarding the design or manufacture of said product.

7 Addendum

On Redesign Step **1.10 to 1.20** the 66 Pin Feature connector will change to the following pinout:

VCC3.3	1	2	VCC5
XGPIO0/ROW0	3	4	XGPIO1/ROW1
XGPIO2/ROW2	5	6	XGPIO3/ROW3
XGPIO4/ROW4	7	8	XGPIO5/ROW5
XGPIO6/ROW6	9	10	XGPIO7/ROW7
GND	11	12	XGPIO8/SPI_CLK
TX1/GPIO0	13	14	XGPIO9/SPI_CSn
RX1/GPIO1	15	16	I2CLK/SPI_MOSI
I2DAT/SPI_MISO/GPIO2	17	18	XGPIO10/COL0
XGPIO11/COL1	19	20	XGPIO12/COL2
XGPIO13/COL3	21	22	XGPIO14/COL4
XGPIO15/COL5	23	24	XGPIO16/COL6
XGPIO17/COL7	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
GND	37	38	TXD2
VCC3.3	39	40	VCC5
GND	41	42	LINEOUT_L
LINEIN_L	43	44	GND
GND	45	46	LINEOUT_R
LINEIN_R	47	48	nc
GND	49	50	MIC1 (Audio pin1)
RESETBTN	51	52	VCC3.3
VCC5	53	54	GND
nc	55	56	nc
CTS0	57	58	TX0
RTS0	59	60	RX0
nc	61	62	nc (COM pin1)
CANRX/CANL	63	64	CANTX/CANH
BOOTSEL	65	66	VCC3.3

On default a 9 pin connector is mounted on pin 54..62 to use a COM port standard adapter cable.