Serial interfaces SOLID

Table of Contents

version 0.1
last modified date : May 30, 2016

I2C devices on the analogue board

The analogue board has two independent I2C buses.
Bus 1 and bus 2.
For normal operations the

devices om I2C bus 1

Device	ref nr	"fix address"	address	address ("8 bits")	set by	manfr device
DAC bias	u4	110000x	1100001	C1	resistor high	MCP4725A0
DAC trim1	u1	1100PPP	1100100	C4	pcb test	MCP4728
DAC trim2	u2	1100PPP	1100101	C5	pcb test	MCP4728
DAC trim3	U6	1100PPP	1100110	C6	pcb test	MCP4728
DAC trim4	U7	1100PPP	1100111	C7	pcb test	MCP4728
IO general		0100xxx	'0100000	80	resistor gnd	MCP23009

Functional description

- DAC bias single channel
  Set the bias for the board.
  startup output voltage can be programmed.
  The base address 1100MMx where M is defined is set during manufacturing. As default the version where MM is set to 00 is ordered. (MCP4725A0 <--)
  link to data sheet
  readout-system\analogboard\pcb\SOL_AMP2\datasheets\MCP4725_1470577.pdf
- DAC trimX Quad channel DAC
  The base address 1100PPP
  The sub addresses PPP are set during the PCB test procedure. Eventual address can be different from the table above. To be verified in the test report of the board.
  Set the trim voltages for a group of 4 input channels
  readout-system\analogboard\pcb\SOL_AMP2\datasheets\MPC4728.pdf
- IO general purpose
  General purpose IO device.
  This device is used to switch on the LV power supplies of the board and to enable the on board I2C devices.
  This device is powered from an external 3.3V (via the DIN
  The address is set via a analogue level. The address pin is set to gnd so effectively set to sub address 0.
  readout-system\analogboard\pcb\SOL_AMP3\doc\MCP23009

Devices on I2C bus 2

Device	ref nr	"fix address"	address	address ("8 bits")	set by	manfr device
DAC trim5		1100PPP	1100100	C4	pcb test	MCP4728
DAC trim6		1100PPP	1100101	C5	pcb test	MCP4728
DAC trim7		1100PPP	1100110	C6	pcb test	MCP4728
DAC trim8		1100PPP	1100111	C7	pcb test	MCP4728
temp sens ID EEPROM sw write prot general call		1010xxx 1001xxx 0110xxx 0000000	1010000 1001000 0110000 0000000	A0 90 60 00	resistors	AT30TSE752A

- DAC trim X see bus 1
- temperature sensor ID sensor
  details see external sensors
  Sensor can read temperature and has an EEPROM. EEPROM will be programmed and locked during analogue board assembly .
  very cheap.

I2C devices on the I2C interface board and external cables

Sensirion SHT21

details see external sensors

connected to the external I2C 1bus.

Not located on an "active" board to limit the heating up via the PCB.

External I2C bus

The external I2C bus will be connected to temperature sensors and eventual temperature sensors.

The bus will be powered off most of the time

electrical characteristics:

cable resistance ~ .2 ohm/m

Voltage : nominal 3.4 V voltage drop estimate 2x .07 @ 100mA

current : max 100mA , (10 mA / device)

max lenght cable 3.5m

4 wires

wire	function
1	Vdd
2	SCL
3	SDA
4	GND

I2C :

pullup resistor 2.7 K at the source

max frequency 100 kHz (to be confirmed)

External sensors

temperature (and ID)

Atmel AT30TSE752A

voltage : 1.7 .. 5.5V

current : < 5mA

(< 1mA for normal operation. 4.5mA for writing EEPROM)

address :

1001xxx temeperature

1010xxx serial EEPROM

0110xxx software write protect

The EEPROM can be locked during "assembly"

Need 7V for locking .
data sheet:
readout-system\analogboard\pcb\SOL_AMP3\doc\AT30TSE752A_temperature_eeprom.pdf

humidity sensor

Sensirion SHT21

voltage **3.0V ,** max 3.6 (min 2.1)

current normal operation .3mA
(current with heater ~ 2.5 mA)

relative humidity 0.. 80 % +/- 6% (@ 5 C)

temperature -40 .. 125 .

has unique ID

I2C address : 1000000 (0x80 8 bits address)

(no sub address options)

datasheet :

readout-system\analogboard\pcb\SOL_AMP3\doc\SHT21_humiditysens.pdf
(~ 3.5 Euro)

ST HTS221

voltage 1.7 ..3.6 V

current << 1mA

relative humidity 0.. 80 % +/- 5% (@ 25 C)

address (0xBE 8 bits) (no sub address options)

datasheet :

readout-system\analogboard\pcb\SOL_AMP3\doc\HTS221_humiditysens.pdf
(~ 4 Euro)

comparison HTS221 , SHT21

both have only one address (so one device / bus 0)
relative complex I2C protocols (== software actions) .

SHT21 seems to be more accurate but needs detail understanding of the spec. Is also slightly cheaper. But 3.0V

HTS221 seems to be easier to integrate (3.3 V compatible)

I2C devices on the ADC board

SPI devices on the ADC board

I2C addresses total overview

Device	location	"fix address"	address	address ("8 bits")	set by	manfr device
DAC bias	analogue	110000x	1100001	C1	resistor high	MCP4725A0
DAC trim1,5	analogue	1100PPP	1100100	C4	pcb test	MCP4728
DAC trim2,6	analogue	1100PPP	1100101	C5	pcb test	MCP4728
DAC trim3,7	analogue	1100PPP	1100110	C6	pcb test	MCP4728
DAC trim4,8	analogue	1100PPP	1100111	C7	pcb test	MCP4728
IO general	analogue	0100xxx	'0100000	80	resistor gnd	MCP23009
temp sens ID EEPROM sw write prot general call	analogue extern	1010xxx 1001xxx 0110xxx 0000000	1010000 1001000 0110000 0000000	A0 90 60 00	resistors	AT30TSE752A

humidity 1	extern	1000000	100000	80		SH21
humidity 2	extern	1011111	10111110	BE		HTS221