

Firmware working parts / protocol

Path to flash-file:

igloo/system/teamprojekt2/designer/impl1/top.pdb

Config:

- * 9600 Baudrate
- * 8 data bits
- * 1 stop bit
- * no parity
- * no handshake

The CLK Pin of the Connector (main) component has to be connected to 1MHz clocksource.

Knowing Bugs

1. The oscillator for the AD Converter has a oscillation bug. In this bug-state the ADC can't convert any Voltage.
 - o A quit fix of this Bug is: Disconnect all ports, connect at first the power supply and then the rest.
2. Caused on en Overvoltage Protection it isn't possible to convert negative Voltages.
 - o If you know that you want to convert negative Voltages, you can change *GND* and *V+* on the chanel and convert the negative Voltage as a positive voltage.

Peripherals

LEDs

LED No.	Indication
LED1	Master busy
LED2	ADT7301 busy
LED3	EEPROM busy
LED4	AD7782 busy
LED5	Watchdog enabled
LED8	System alive (blinking)

Switches

Switch No.	Function
1	En/disable watchdog for debug purposes

Watchdog

If the watchdog is enabled and the busy-flag is active for more than ~130 ms, a software-reset for all components will be triggered.

The watchdog can be disabled via the switch 1 on the board.
Make sure all jumpers are set correctly.

Master

Device ID: 0b0000

get firmware version

can be used for connection pinging

better distinction between firmware versions

TX

0x00
get firmware version command

RX

0xAA	0bHHHHLLLL
OK-byte	H-4 high-bits, L-4 low-bits, eg. 0b10000100 = version 8.4

EEPROM

Device ID: 0b0001

read

TX

0x10	0bxxxxxxxxA	0bAAAAAAAAA
read command	x-don't care, A-address MSB	A-address

RX

0xAA	0bDDDDDDDD
OK-byte	D-byte at address A

read 16bit

TX

0x17	0bAAAAAAAAA
read 16bit command	A-address

RX

0xAA	0bDDDDDDDD	0bddddddd
OK-byte	D-byte at address A	d-byte at address A+1

write

must be handled with care: only 1 000 000 cycles endurance
(should only be called by user, not automatically)
writeprotection is disabled automatically triggered by reset

TX

0x11	0bxxxxxxxA	0bAAAAAAAAA	0bDDDDDDDD
write command	x-don't care, A-address MSB	A-address	D-byte

RX

0xAA	0xBB
OK-byte	Done-byte

write 16bit

must be handled with care: only 1 000 000 cycles endurance
(should only be called by user, not automatically)
writeprotection is disabled automatically triggered by reset

TX

0x18	0bAAAAAAAAA	0bDDDDDDDD	0bddddddd
write 16bit command	A-address	D-byte	d-byte for address A+1

RX

0xAA	0xBB
OK-byte	Done-byte

erase all

erases complete memory (all bits set to 1)

must be handled with care: only 1 000 000 cycles endurance
(should only be called by user, not automatically)
eraseprotection is disabled automatically triggered by reset

TX

0x12
erase all command

RX

0xAA	0xBB
OK-byte	Done-byte

AD Converter

Device ID: 0b0010

HEX Code to Voltage calculation

AIN: analog input (the real voltage you print out)
Vreff: refference voltage = 2.5
rng: range select
N = 24 : number of bits got by ADC (MISO)
dec_input: MISO (24 bit Vector) in Decimal

GAIN = 1 IF rng=2,56V ELSE 16;
v = 1.024 * VReff;
a = 2^(N-1);
AIN = (v*((dec_input/a)-1))/GAIN;

read

Reads all 24 bit seperated in three Bytes (from lowes to highest velued Byte(bit)).
The 24 bit value is Signed!
Highest bit '1': Indicates a zero or positive full-scale voltage.
Highest bit '0': Indicates a negative full-scale voltage.

TX

0x20
read command

RX

0xAA	0bDDDDDDDD	0bDDDDDDDD	0bDDDDDDDD
OK-byte	last Highest Byte	second Byte	first lowest Byte

CH1

Set the Chanal for the next AD Conversion on CH1.

TX

0x23
chanel select command

RX

0xAA
OK-byte

CH2

Set the Chanal for the next AD Conversion on CH2.

TX

0x24
chanel select command

RX

0xAA
OK-byte

RNG1

Set the range for the next AD Conversion on +- 2.56V

TX

0x25
range select command

RX

0xAA
OK-byte

RNG2

Set the range for the next AD Conversion on +- 0.16V

TX

0x26
range select command

RX

0xAA
OK-byte

ADT Temperature sensor

Device ID: 0b0011

temperature is updated on sensor every 1.5 sec

TX

0x30
read temperature command

RX

0xAA	0b00TTTTTT	0bttttttt
OK-byte	T-temperature data (signed, MSB)	t-temperature data (LSB)