DACSYS

**D**igital **A**nalog **C**onverter **Sys**tem

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# Introduction

The DACSYS operates as a standalone audio system, providing high resolution audio and minimalistic interface.

Audio can either be streamed via Bluetooth, WLAN (DLNA) or USB to the DACSYS and will then be converted to analog stereo audio.

The system is designed to offer the highest flexibility regarding further development to perfectly integrate the system in its environment while offering unexceptional high-quality hardware components.

# Characteristics

|  |  |  |  |
| --- | --- | --- | --- |
|  | Minimum | Average | Maximum |
| Bandwidth [Hz] (-3dB) | 1 |  | 30k |
| Output voltage [mv] (RMS) | 0 |  | 2100 |
| Resolution [bit] | 16 |  | 32 |
| Sampling rate [kHz] | 8 |  | 384 |
| Dynamic Range [dB] |  | 112 |  |
| Line Out Resistance [Ω] | 1k |  |  |
| Total Harmonic Distortion [dB] |  | -93 |  |
| Signal Noise Ratio [dB] |  | 112 |  |
|  |  |  |  |
| Latency (WIFI)\* |  |  |  |
| Latency (Bluetooth)\* |  |  |  |
| Latency (USB)\* |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| Power Consumption |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
| \*Values based on measurements, which may be influenced by individual setup | | | |

Table 0‑1

# Overview

The following figure gives a general overview about the system modules.

## Raspberry Pi Zero W

The following section describes the functionality and software architecture of the main control unit (MCU) and their interaction with other modules.

# Technical Information

## Configuration

The DACSYS is a Linux/Debian based operating sysem. Therefore it can be configured and modified via SSH. The login information are:

Username: pi

Password: dacsys

## I2C Register Mapping

The DACSYS uses an I2C bus to communicate between the main control unit (MCU), the peripheral control unit (PCU) and other modules.

### Addressing

The following table shows address and registers of the several devices.

|  |  |  |
| --- | --- | --- |
| Device | Address | Register |
| Raspberry PI Zero | 0x71 | [Master] |
| ATMega168-PU | 0x72 | 0x00-0x3 |
| DS1086L | 0x58 |  |
| ATTiny28 | 0x74 |  |
| SS1780D | 0x3c |  |

Table 0‑1

### Register Summary

#### ATMega168-PU

The following table shows the register allocation for the human interface and peripheral control device ATMega168-PU.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Register* | *Binary* | | | | | | | | *Description* |
| *0x00* | X | X | X | X | X | X | X | X | SYSINF |
| *0x01* | P1 | P2 | P3 | P4 | P5 | P6 | P7 | P8 | PERIPHCTRL |
| *0x02* | b0 | b1 | b2 | b3 | b4 | b5 | b6 | b7 | RELENC |
| *0x03* | S1 | S2 | X | X | X | X | X | X | ABSSW |
| *0x04* | 1b0 | 1b1 | 1b2 | 1b3 | 2b0 | 2b1 | 2b2 | 2b3 | RELNUMSW |

Table 0‑2

#### DS1086L

The following table shows the register allocation for the clocking device DS1086L.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Register* | *Binary* | | | | | | | | | | | | | | | *Description* |
| *0x02* | JS4 | | JS3 | | JS2 | | JS1 | | | JS0 | | LO/HiZ | | P3 | P2 | PRESCALER |
|  | P1 | | P0 | | X\_x | | X\_x | | | X\_x | | X\_x | | X\_x | X\_x | PRESCALER |
| *0x08* | b9 | | v8 | | b7 | | b6 | | | b5 | | b4 | | b3 | b2 | DAC(MSB) |
|  | b1 | | b0 | | X\_0 | | X\_0 | | | X\_0 | | X\_0 | | X\_0 | X\_0 | DAC(LSB) |
| *0x0E* | X\_1 | | X1 | | X1 | | b4 | | | b3 | | b2 | | b1 | b0 | OFFSET |
| *0x0D* | X\_1 | | X\_1 | | X\_1 | | X\_1 | | | WC | | a2 | | a1 | a0 | ADDR |
| *0x37* | X\_x | | X\_x | | X\_x | | b4 | | | b3 | | b2 | | b1 | b0 | RANGE |
| *0x3F* |  |  | |  | |  | |  |  | |  | |  | | | WRITE EE |

Table ‑

#### ATTiny78

The following table shows the register allocation for the power supply control device ATTiny78.

#### SS1780D

(See datasheet for detailed description)

# Schematics

## Circuit

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[Table 0‑1 - 6 -](#_Toc502161938)

[Table 0‑2 - 6 -](#_Toc502161939)

[Table 0‑3 - 6 -](#_Toc502161940)