W-Input S

S/PDIF to I2S digital audio board with I2C control

FEATURES

- Two S/PDIF inputs and I2S passthrough
- Possibiltiy to add more S/PDIF inputs, including AES/EBU (XLR) and BNC
- Up to 192 kHz / 24-bit S/PDIF audio
- I2S output and S/PDIF output

INPUTS

- Two on-board S/PDIF inputs
  - Isolated Coaxial RCA and Toslink
- Two more S/PDIF inputs with addon board stacked on top; options are:
  - Coaxial RCA and Toslink
  - AES/EBU XLR and Toslink
  - Coaxial BNC and AES/EBU XLR
- Total 8 S/PDIF inputs supported if wired off-board
- On-board I2S input (passthrough)
  - E.g. for external USB to I2S board
  - Can be any sample rate

OUTPUT

- I2S output (W-Input is I2S Master)
- S/PDIF output (3.3V)

APPLICATIONS

- Digital input selector in high performance Hifi DAC
- Use in DIY DAC system:
  - In Wee DAC system with W-DAC, additional baseboards and addons
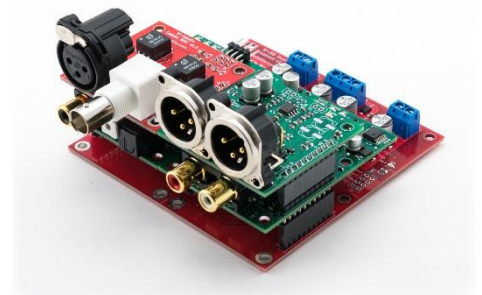 - With any compatible I2S DAC
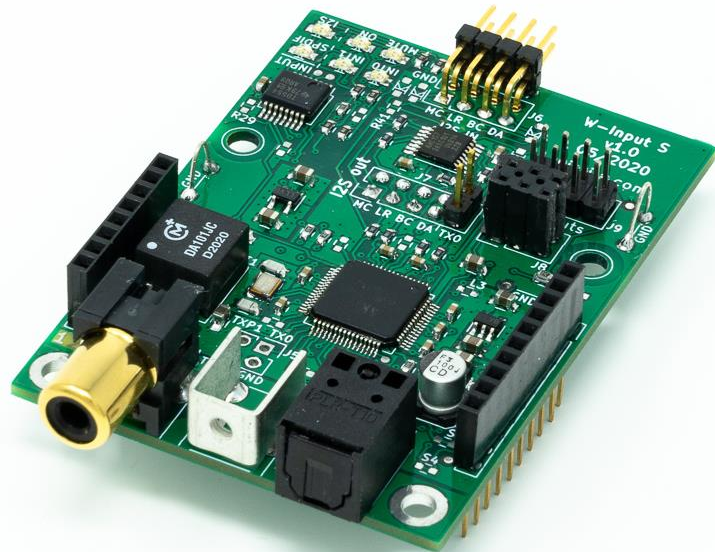
W-Input S is a software/I2C controlled version of W-Input, a compact digital audio input board. W-Input S supports up to 8 S/PDIF inputs with up to 192 kHz / 24-bit audio. In addition, another input offers a direct I2S passthrough supporting any sample rate. This allows for using external I2S source, such as USB to I2S module.

There are two on-board S/PDIF inputs: one galvanically isolated coaxial RCA and one optical Toslink. In addition, two more inputs can be added using one of the addon boards available:

- W-Input+ Combo for 1x RCA and 1x Toslink
- W-Input+ Combo XLR for 1x AES/EBU XLR and 1x Toslink
- W-Input+ Combo BNC for 1x AES/EBU XLR and 1x BNC

Four more inputs can be wired off-board.

Below are photos of W-Input S together with other Wee DAC boards. See nihtila.com for more information.

HARDWARE DETAILS

- AKM AK4115VQ S/PDIF receiver
- Electrical inputs galvanically isolated
- 4-layer PCB
- Design and performance evaluated by comprehensive measurements and with very high-performance DAC

SYSTEM REQUIREMENTS

- I2C control (does not work without)
- I2S Slave device, such as DAC
  - Data, Bit clock, Word clock
  - Master clock
  - 3.3 V logic level
- Power supply:
  - 5 V digital, 20 mA
- For easy system integration use Wee DAC baseboards and addon boards
  - Can also be mixed with non-S boards; contact if in doubt

INFORMATION AND CONTACT

- http://nihtila.com for general up to date information and shop
- Youtube for videos
- Follow Twitter (@nihtilacom)
- Contact (http://nihtila.com/contact/)

DOCUMENT VERSION

v1.0A.0 (12/2020) for board v1.0A

Configuration and settings

W-Input S uses AK4115VQ in SW-mode and configuration is done via I2C bus (SCL and SDA).

TCA9554 I2C I/O expander is used to power up AK4115VQ, select I2S input, and optionally control interrupts and Mute signal.

There are 6 LEDs onboard: S/PDIF or I2S for type of input selected, INT0/INT1 for AK4115VQ interrupts, ON for power, and MUTE for Mute signal.

Mute signal can be taken as output from TCA9554 or driven externally on J1 and read on TCA9554. It can be also tied to INT0 for automatic signalling.

J6 and J7 are I2S input (passthrough) and output, respectively. Four signals are MC (Master Clock), LR (Bit/Frame Clock), BC (Bit Clock), and DA (Data). In J6 all of these are inputs and in J7 all are outputs. J7 also has TX0 for S/PDIF output (S/PDIF mux use).

W-Input+ addon boards add two extra inputs and plug on J8. Four more digital inputs can be wired to J9.

Default I2C address for TCA9554 IO-expander is 0x20 and for AK4115VQ it is 0x10. These can be changed to one of four options with 0R resistors. Note that many AKM ICs use the same I2C address space; thus, for example W-Input S, W-DAC S, and ADC AK5572 all use the same address space and up to four boards can be placed in the same I2C bus.

For very simple board bring-up see pseudo-code examples at nihtila.com. Writing complete control firmware requires good understanding of the circuit and AK4115VQ and TCA9554 datasheets.

Supplies and control signals are on connectors J4 and J1. Only signals used in this board are shown.
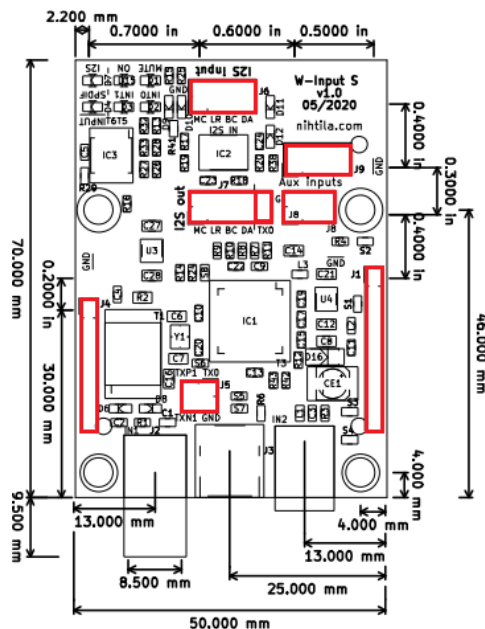
J4 Pin	Description
GND (1)	Ground
GND (3)	Ground
GND (6)	Ground

J1 Pin	Description
GND (1)	Ground
VD (2)	Digital supply, 5 V
GND (3)	Ground
Mut (4)	Mute signal
IRQ (5)	Interrupt (from I2C I/O expander)
SDA (6)	I2C data (pull-up needed)
SCL (7)	I2C clock (pull-up needed)
GND (8)	Ground