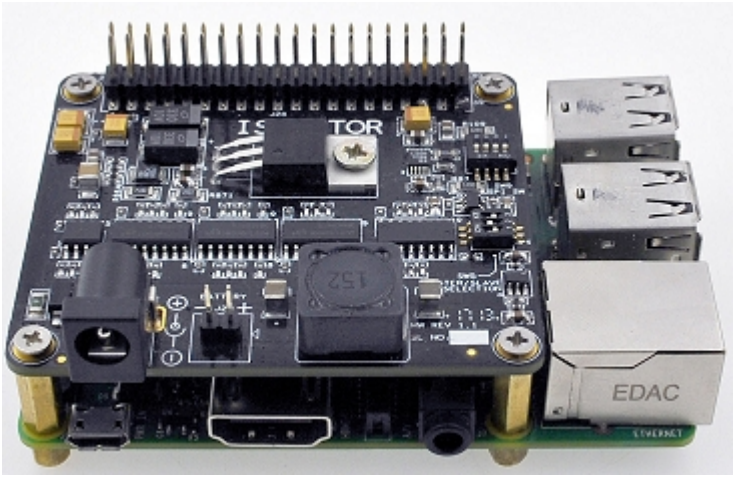
ISOLATOR

TECHNICAL MANUAL

ISOLATOR

Isolator HAT has been designed for isolating between SBC and DAC.And it works on both master and slave DAC's.By isolating the SBC board from the DAC board, using separate GND and Power supply lines, all possible noise and jitter coming from the source can be stopped and completely isolated prior to the DAC board.



Isolator HAT Features:

- Full galvanic isolator between SBC/DAC
- Works on both master and slave DACs
- Switch selection for Master/Slave.
- Switch selection for SPI isolation.
- Isolated the I2C ,SPI ,I2S and GPIO's
- We recommend using LIFEPO4 batteries, and the Isolator will in turn provide 5v/06A using LT3042 and 3.3V using LT3042 LDOs.
- Sampling Frequency ranges from 8 kHz to 384 kHz.
- Ultra-low-noise voltage regulators & LPF for optimal audio performance.
- Operating Temperature : 0C to 70C
- Board Size : LWH = 59.1mm * 65mm * 22.2mm
- Board Weight: 32g

Isolator HAT is a fully HAT size add-on isolator card for SBC/DAC.

The Isolator will work on I2S Master Mode and Slave Mode by switch(SW5) selection on board.

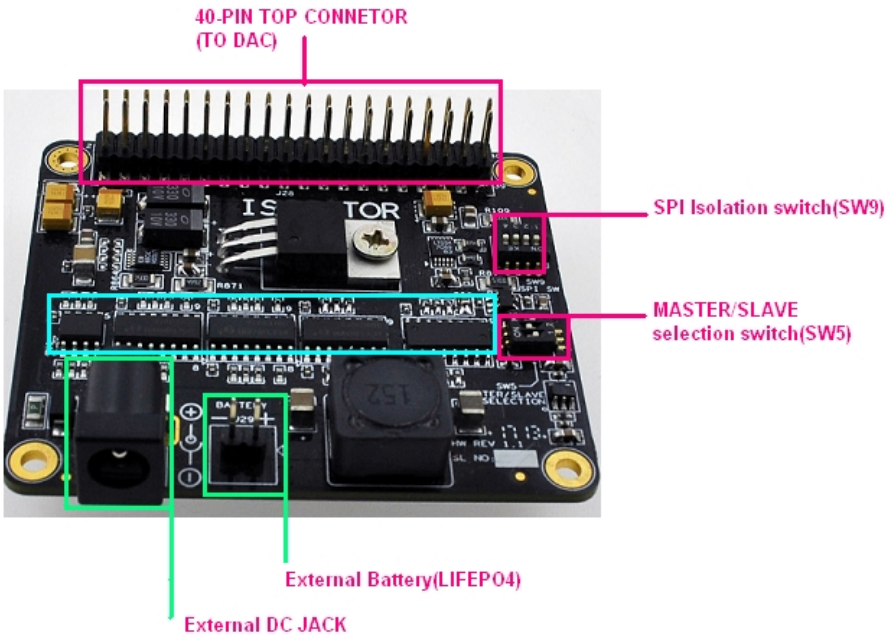
In Slave Mode,It takes the signals(I2C,I2S and GPIO's) from SBC through 40 pin bottom connector. And isolating through Silicon lab Digital Isolator IC's. Then the isolating signals are feed to DAC through 40 pin top connector.

In Master Mode,It takes the signals(I2C,I2S(DATA) and GPIO's) from SBC through 40 pin bottom connector and isolating by Silicon lab Digital Isolator IC's. Then the isolated signals are feed to DAC through 40 pin top connector. And same time, it takes the I2S(LRCLK & BCLK) from DAC through 40 pin top connector and isolating by Silicon Lab Digital Isolator. Then the isolated signals are feed to SBC.

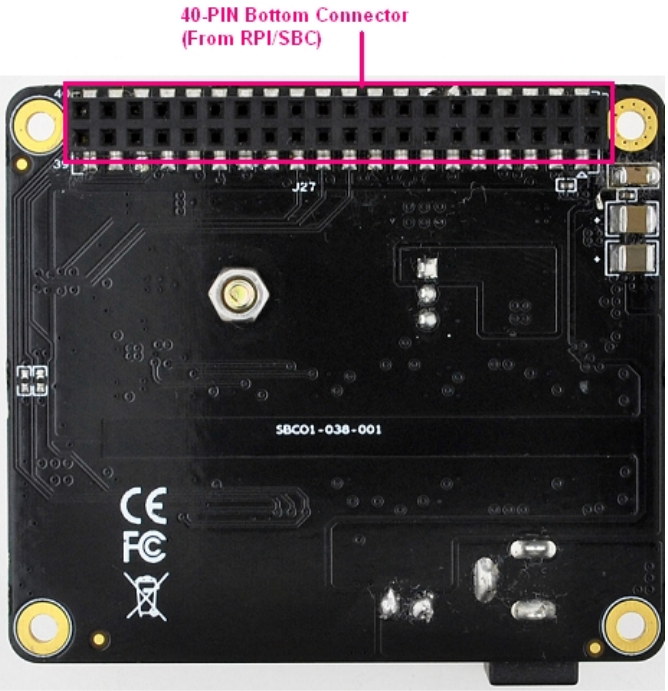
The Isolator HAT can be connected to the RPI compatible 40 way header without any additional cable or soldering.

Component selection and track layout have been in the forefront of our design to ensure noise immunity and best possible audio playback with the Isolator board.

TOP VIEW OF ISOLATOR



BOTTOM VIEW OF ISOLATOR



POWER :

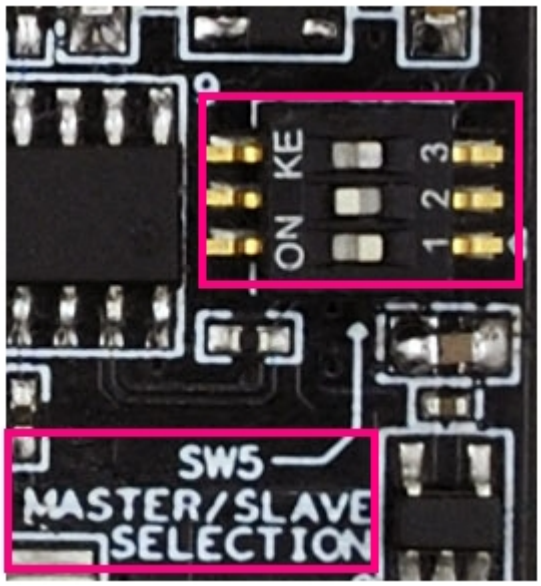
For the Primary Side of Digital Isolator Power(3.3V_A side)) will source from RPI(5V) convert to 3.3V through LDO. For the Secondary Side of the Digital Isolator Power (3.3V_B side) will source from the external DC Jack(JP2) or External Battery Connector(J29).
And the Isolator will in turn provide 5v/06A using LT3042 and 3.3V using LT3042 LDOs.

Secondary Power Supply rating : +6V to +15V ~ 3A

Power Sequence : First Power on the Secondary Power(DC JACK or Battery). Then Power on the RPI/SBC power.

SWITCHES:

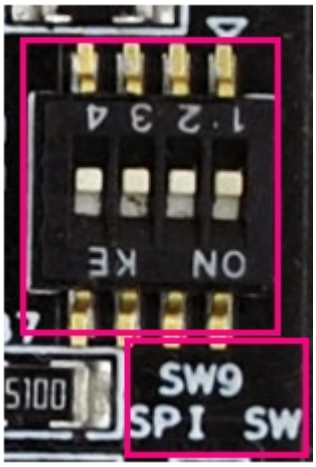
Master/Slave selection switch (SW5):



For Master Mode, change the 2nd Position to ON side and 1st and 3rd Position to other side(numbers marking).

For Slave Mode, change the 1st and 3rd Position to ON side. And 2nd Position to other side(numbers marking).

SPI Isolating Switch:(SW9)



For Isolating SPI ,Change all the switch position towards numbers side. For Non Isolation change the switch position towards ON side.

Isolator Header(J27) PIN Out Details(FROM SBC) ON BOTTOM

SPARKY	RPI	PIN	PIN	RPI	SPARKY
NC	NC	1	2	DC +5V	DCIN +5V
I2C -2 SDA	SDA1-I2C	3	4	DC +5V	DCIN +5V
I2C -2 SCLK	SCL1-I2C	5	6	GNDA	GNDA
GPIOB14	GPIO4	7	8	UART_TX	UART_TX
GNDA	GNDA	9	10	UART_RX	UART_RX
GPIOB15	GPIO17	11	12	I2S_BCLK	I2S_BCLK0
GPIOB16	GPIO27	13	14	GND	GND
GPIOB17	GPIO22	15	16	GPIO23	GPIOB31
NC	NC	17	18	GPIO24	GPIOB30
SPI0_MOSI	SPI_MOSI	19	20	GNDA	GNDA
SPI0_MISO	SPI_MISO	21	22	GPIO25	GPIOB12
SPIO_CLK	SPI_CLK	23	24	SPI-CS	SPI-CS
GNDA	GNDA	25	26	GPIO7	SPDIF
I2C-1 SDA	ID_SD	27	28	ID_SC	I2C -1 SCLK
I2S_MCLK0	GPIO5	29	30	GNDA	GNDA
GPIOB18	GPIO6	31	32	GPIO12	GPIOB3
GPIOB4	GPIO13	33	34	GNDA	GNDA
I2S_LRCLK	I2S_LRCLK	35	36	GPIO16	GPIOB13
GPIOB19	GPIO26	37	38	I2S_DIN	I2S_DIN_2
GNDA	GNDA	39	40	I2S_DOUT	I2S_DOUT_2

* Highlighted Blue color signals are Isolated signals .

* Remaining are Non- Isolated

Isolator Header(J28) PIN Out Details(TO DAC) ON TOP

Source from Isolator HAT

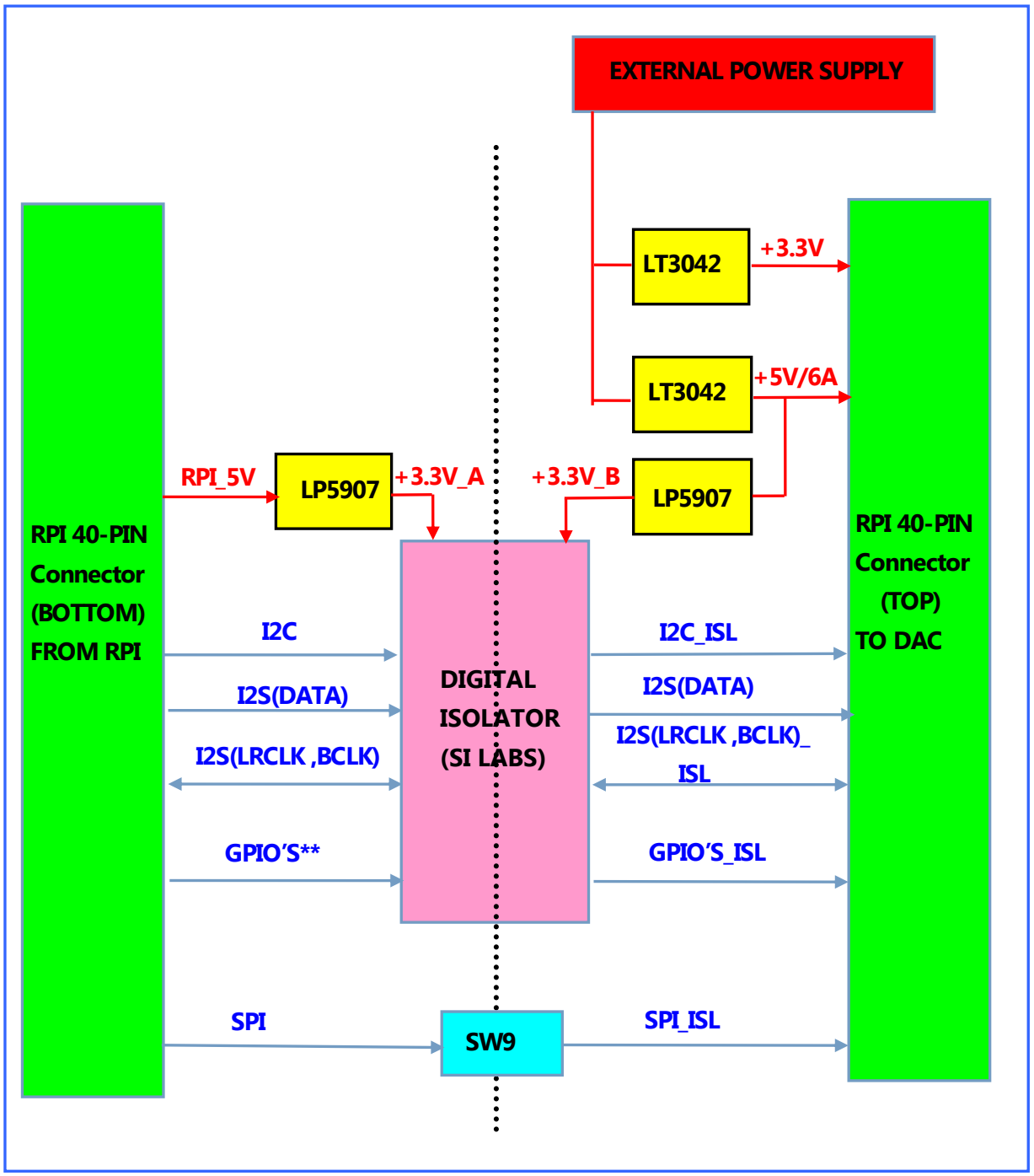
Source from Isolator HAT

SPARKY	RPI	PIN	PIN	RPI	SPARKY
+3.3V_DAC	+3.3V_DAC	1	2	+5V_DAC	+5V_DAC
I2-2 SDA_ISL	SDA1-I2C_ISL	3	4	+5V_DAC	+5V_DAC
I2C-2SCLK_ISL	SCL1-I2C_ISL	5	6	GNDB	GNDB
GPIOB14	GPIO4	7	8	UART_TX	UART_TX
GNDB	GNDB	9	10	UART_RX	UART_RX
GPIOB15	GPIO17	11	12	I2S_BCLK_ISL	I2S_BCLK0_ISL
GPIOB16	GPIO27	13	14	GND	GND
GPIOB17_ISL	GPIO22_ISL	15	16	GPIO23_ISL	GPIOB31_ISL
+3.3V_DAC	+3.3V_DAC	17	18	GPIO24	GPIOB30
SPI0_MOSI_ISL	SPI_MOSI_ISL	19	20	GNDB	GNDB
SPI0_MISO_ISL	SPI_MISO_ISL	21	22	GPIO25_ISL	GPIOB12_ISL
SPIO_CLK_ISL	SPI_CLK_ISL	23	24	SPI-CS_ISL	SPI-CS_ISL
GNDB	GNDB	25	26	GPIO7	SPDIF
I2C-1 SDA	ID_SD	27	28	ID_SC	I2C -1 SCLK
I2S_MCLK0	GPIO5	29	30	GNDB	GNDB
GPIOB18_ISL	GPIO6_ISL	31	32	GPIO12	GPIOB3
GPIOB4	GPIO13	33	34	GNDB	GNDB
I2S_LRCLK_ISL	I2S_LRCLK_ISL	35	36	GPIO16_ISL	GPIOB13_ISL
GPIOB19_ISL	GPIO26_ISL	37	38	I2S_DIN	I2S_DIN_2
GNDB	GNDB	39	40	I2S_DOUT_ISL	I2S_DOUT_2_ISL

* Highlighted Blue color signals are Isolated signals .

* Remaining are Non- Isolated

ISOLATOR HAT BLOCK DIAGRAM



** - SPARKY GPIO 'S - GPIOB17, GPIOB18, GPIOB19, GPIOB12, GPIOB13, GPIOB31

, RPI GPIO'S - GPIO22, GPIO6, GPIO26, GPIO16, GPIO23, GPIO25