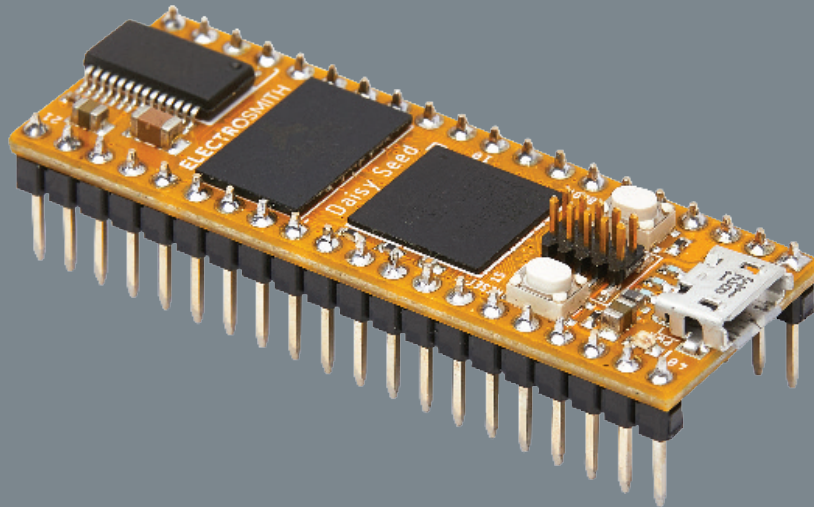


Daisy Seed

Embedded DSP Platform



Features:

- Embedded platform for audio applications
- 96kHz / 24-bit audio hardware
- 64MB of SDRAM for up to 10 minute long audio buffers
- ARM Cortex-M7 MCU, running at 480MHz
- 31 total GPIO pins with configurable functionality
- 12-bit Digital to Analog Converters (x2)
- SD card interfaces
- PWM outputs
- Serial Protocols for connecting external sensors and devices (SPI, UART, I2s, I2C)
- Dedicated VIN pin for power
- Micro USB port, and additional USB pins for full OTG-support as host and device

Description:

Daisy is an embedded platform for music. It features everything you need for creating high fidelity audio hardware devices. Just plug in a USB cable and start making sound!

Programming the Daisy is a breeze with support for a number of languages including C++, Arduino, and Max/MSP Gen~. To get started, simply upload an example program over USB, and start tweaking!

Documentation, and examples are hosted on our Github repository for easy download. All firmware that we develop is released for free under a permissive open source license (MIT).

Applications:

- Electronic Instruments (Eurorack modules, synthesizers, samplers, drum machines)
- Effects Units (Desktop Effects, Effects Pedals)
- Audio Playback (Sound Installations, Audio Feedback Devices)



Colophon

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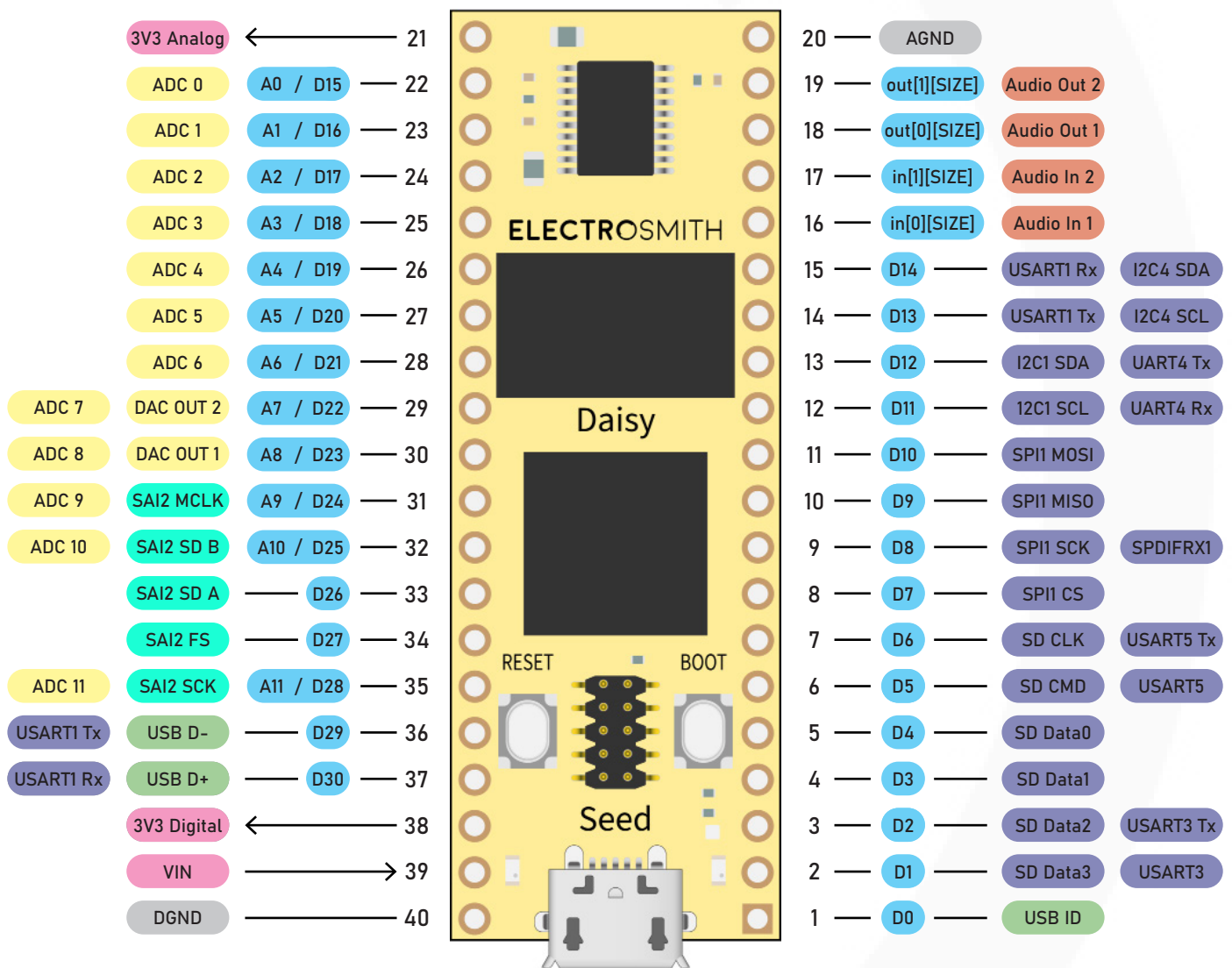
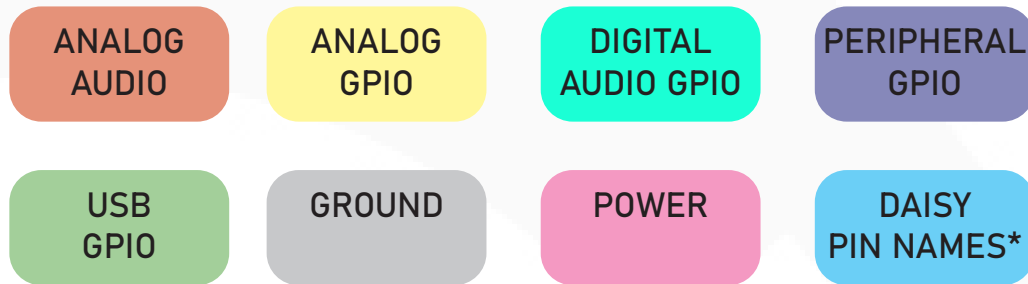


Table of Contents

Pinout	1
Pinout Tables	
• Absolute Maximum Ratings [Table 1]	2
• Pin Functions [Table 2]	3
• Electrical Characteristics [Table 3]	4
Performance	
• Noise Floor	5
• SNR : 1 kHz Reference Sine Wave	5
Typical Applications	
• 1.0 Power	6
• 1.1 AGND to DGND	6
• 1.2 Stereo Audio Input	6
• 1.3 Potentiometers	7
• 1.4 Toggle Switch	7
• 1.5 Tactile Switch	7
• 1.6 Micro SD	8
• 1.7 Stereo Audio Output	8
• 1.8 LED	8
• 1.9 On-Off-On Toggle	9
• 2.0 External Audio Codec	9
Technical Drawing	10
Landing Pattern	11
Audio Codec	12
Onboard LED	13
Hardware Revisions	13
The Fine Print (Certifications/Compliances)	14
Changelog	15



Pinout



* "D" for Digital GPIO or "A" for Analog I/O, depending on use case.

PIN TYPE	MIN	MAX	UNIT
VIN Range	+5	+17	V
GPIO	0	+5	V
Audio Inputs	-1.8V	+1.8V	V

Audio inputs are AC coupled and 3.6Vpp, or approx. 1Vrms.

All GPIO Pins are 5V tolerant I/O except for the following pins which are 3.3V tolerant I/O:

Pin 24 - (A2/D17, PB1, ADC2)
Pin 25 - (A3/D17, PA7, ADC3)
Pin 28 - (A6/D21, PC4, ADC6)
Pin 29 - (A7/D22, PA5, ADC7)
Pin 30 - (A8/D23, PA4, ADC8)

Powering The Daisy Seed via VIN and USB: It is safe to power the Daisy Seed from both the VIN inputs and the USB port simultaneously.

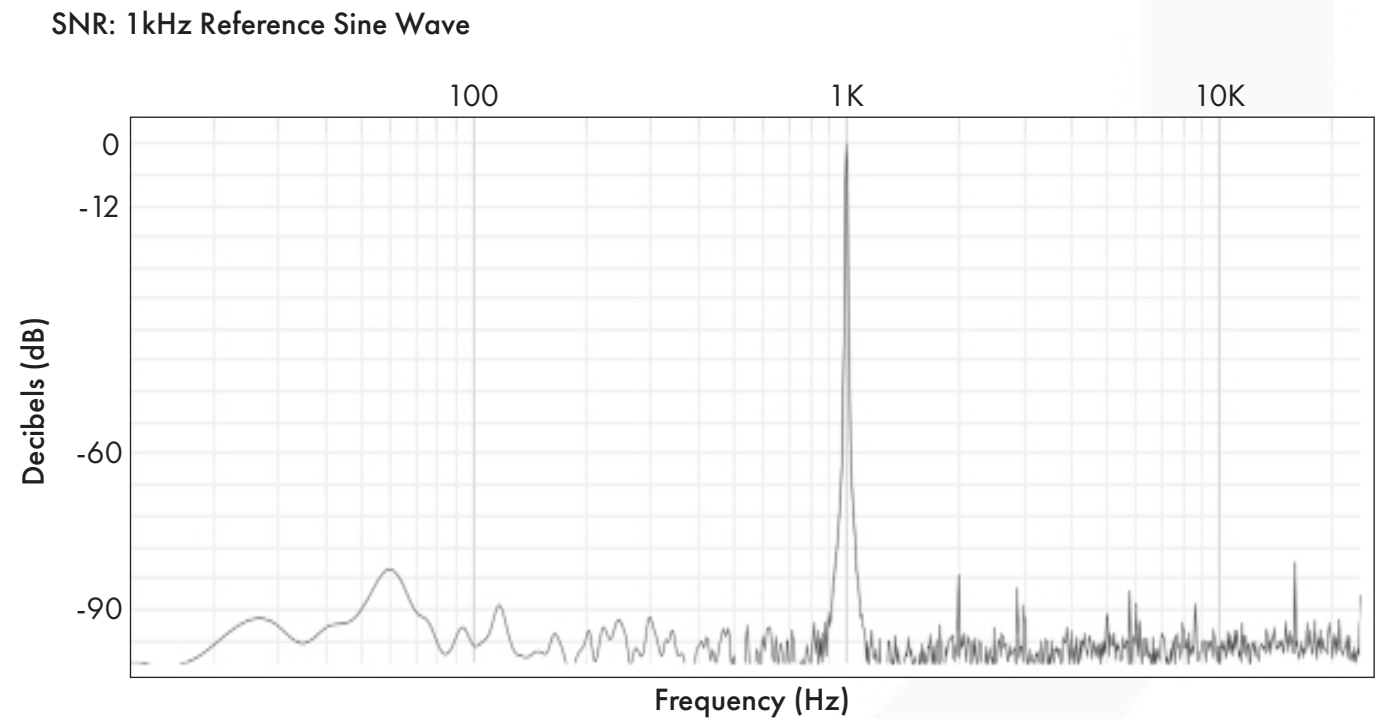
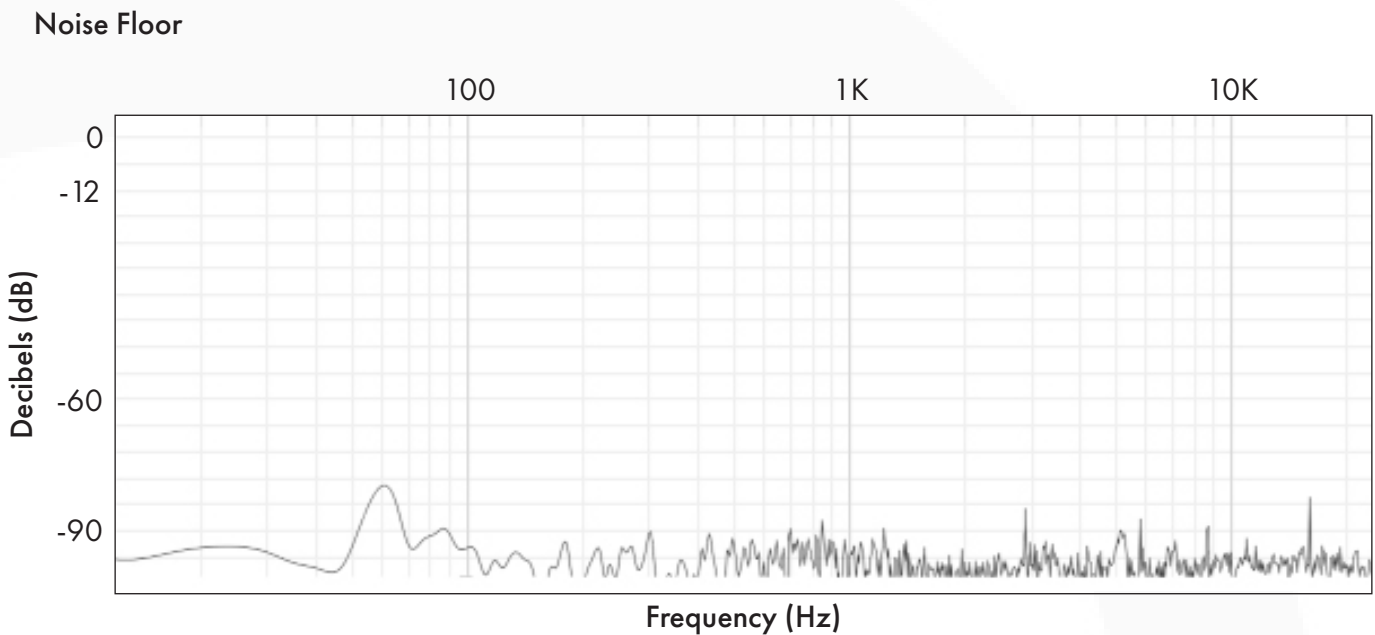
PINOUT	DAISY PIN NAME*	STM32 PIN NAME	PRIMARY FUNCTION	ALT. FUNCTIONS 1	ALT. FUNCTIONS 2
1	D0	PB12	GPIO	USB_HS_ID/UART5_RX/ USART3_CK	TIM1_BKIN
2	D1	PC11	GPIO	SDMMC1_D3/USART3_RX/UART4_RX	SPI3_MISO/I2S3_SDI/HRTIM_FLT2
3	D2	PC10	GPIO	SDMMC1_D2/USART3_TX/UART4_TX	SPI3_SCK/I2S3_CK/HRTIM_EEV1
4	D3	PC9	GPIO	SDMMC1_D1/UART5_CTS	I2S_CKIN/MCO2
5	D4	PC8	GPIO	SDMMC1_D0/UART5_RTS	
6	D5	PD2	GPIO	SDMMC1_CMD/UART5_RX	
7	D6	PC12	GPIO	SDMMC1_CK/UART5_TX/ USART3_CK	SPI3_MOSI/I2S3_SDO
8	D7	PG10	GPIO	SPI1_NSS/I2S1_WS	HRTIM_FLT5
9	D8	PG11	GPIO	SPI1_SCK/I2S1_CK	LPTIM1_IN2/HRTIM_EEV4
10	D9	PB4	GPIO	SPI1_MISO/UART7_TX	SPI1_MISO/I2S1_SDI/SPI3_MISO/I2S3_SDI/SPI6_MISO
11	D10	PB5	GPIO	SPI1_MOSI/UART5_RX	SPI1_MOSI/I2S1_SDO/SPI3_MOSI/I2S3_SDO/SPI6_MOSI/I2C4_SMBA/ TIM17_BKIN
12	D11	PB8	GPIO	I2C1_SCL/UART4_RX	I2C4_SCL/TIM16_CH1/TIM4_CH3
13	D12	PB9	GPIO	I2C1_SDA/UART4_TX/ SPI2_NSS/I2S2_WS	I2C4_SDA/I2C4_SMBA/TIM17_CH1/TIM4_CH4
14	D13	PB6	GPIO	USART1_TX/LPUART1_TX/UART5_TX	I2C1_SCL/I2C4_SCL/ TIM16_CH1N/TIM4_CH1
15	D14	PB7	GPIO	USART1_RX/LPUART1_RX	I2C1_SDA/I2C4_SDA/TIM17_CH1N/TIM4_CH2
16	NC	x	AUDIO IN L		
17	NC	x	AUDIO IN R		
18	NC	x	AUDIO OUT L		
19	NC	x	AUDIO OUT R		
20	NC	x	AGND		
21	NC	x	+3V3A		
22	A0, D15	PC0	GPIO	ADC0/SAI2_FS_B	
23	A1, D16	PA3	GPIO	ADC1/USART2_RX	TIM2_CH4/TIM5_CH4
24	A2, D17	PB1	GPIO	ADC2	TIM1_CH3N/TIM3_CH4
25	A3, D18	PA7	GPIO	ADC3/SPI1_MOSI/I2S1_SDO/SPI6_MOSI	TIM1_CH1N/TIM3_CH2
26	A4, D19	PA6	GPIO	ADC4/SPI1_MISO/I2S1_SDI/SPI6_MISO	TIM1_BKIN/TIM3_CH1
27	A5, D20	PC1	GPIO	ADC5	
28	A6, D21	PC4	GPIO	ADC6/I2S1_MCK	
29	A7, D22	PA5	GPIO	ADC7/DAC1_OUT2	SPI1_SCK/I2S1_CK/SPI6_SCK/D2PWREN/TIM2_CH1
30	A8, D23	PA4	GPIO	ADC8/DAC1_OUT1	SPI1_NSS/I2S1_WS/SPI3_NSS/I2S3_WS/SPI6_NSS/D1PWREN
31	A9, D24	PA1	GPIO	ADC9/SAI2_MCLK_B	UART4_RX/TIM2_CH2/TIM5_CH2
32	A10, D25	PA0	GPIO	ADC10/SAI2_SD_B	UART4_TX/TIM2_CH1/TIM2_ETR/TIM5_CH1
33	D26	PD11	GPIO	SAI2_SD_A/I2C4_SMBA	LPTIM2_IN2
34	D27	PG9	GPIO	SAI2_FS_B/USART6_RX	SPI1_MISO/I2S1_SDI
35	A11, D28	PA2	GPIO	ADC11/SAI2_SCK_B	USART2_TX/TIM2_CH3/TIM5_CH3
36	D29	PB14	GPIO	USB_HS_D-/USART1_TX	TIM1_CH2N
37	D30	PB15	GPIO	USB_HS_D+/USART1_RX	
38	N/A	x	+3V3D		
39	N/A	x	VIN		
40	N/A	x	GND		

* The min/max rating in this table represents the expected operating range for the device. Signals outside of this range will not necessarily damage the Daisy Seed. See [Table 1](#) for Absolute min/max ratings.

PINOUT	DAISY PIN NAME	MIN	MAX	TYPICAL
1	D0	0V	+3V3	0 to +3V3
2	D1	0V	+3V3	0 to +3V3
3	D2	0V	+3V3	0 to +3V3
4	D3	0V	+3V3	0 to +3V3
5	D4	0V	+3V3	0 to +3V3
6	D5	0V	+3V3	0 to +3V3
7	D6	0V	+3V3	0 to +3V3
8	D7	0V	+3V3	0 to +3V3
9	D8	0V	+3V3	0 to +3V3
10	D9	0V	+3V3	0 to +3V3
11	D10	0V	+3V3	0 to +3V3
12	D11	0	+3V3	0 to +3V3
13	D12	0	+3V3	0 to +3V3
14	D13	0	+3V3	0 to +3V3
15	D14	0	+3V3	0 to +3V3
16	NC	-1V8	+1V8	3.6Vpp
17	NC	-1V8	+1V8	3.6Vpp
18	NC			0dBfs @ 1Vrms
19	NC			0dBfs @ 1Vrms
20	NC			GND
21	NC			+3V3 (output only)
22	A0, D15	0V	+3V3	0 to +3V3
23	A1, D16	0V	+3V3	0 to +3V3
24	A2, D17	0V	+3V3	0 to +3V3
25	A3, D18	0V	+3V3	0 to +3V3
26	A4, D19	0V	+3V3	0 to +3V3
27	A5, D20	0V	+3V3	0 to +3V3
28	A6, D21	0V	+3V3	0 to +3V3
29	A7, D22	0V	+3V3	0 to +3V3
30	A8, D23	0V	+3V3	0 to +3V3
31	A9, D24	0V	+3V3	0 to +3V3
32	A10, D25	0V	+3V3	0 to +3V3
33	D26	0	+3V3	0 to +3V3
34	D27	0	+3V3	0 to +3V3
35	A11, D28	0	+3V3	0 to +3V3
36	D29	0	+3V3	0 to +3V3
37	D30	0	+3V3	0 to +3V3
38	N/A			+3V3 (output only)
39	N/A	+5V	+17V	+5V to +17V
40	N/A			GND



Audio Performance





Typical Applications

For electrical characteristics, see Table 2

Figure 1.0 - Connecting Power

* +5V to +17V

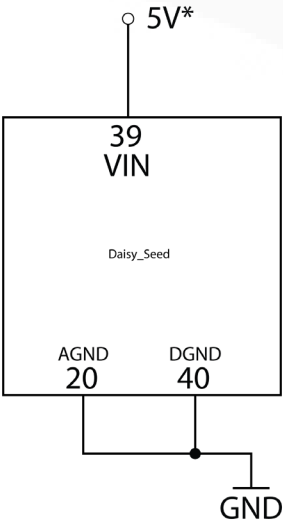


Figure 1.1 - Connecting AGND to DGND

Note: For all applications, AGND must be connected to DGND.

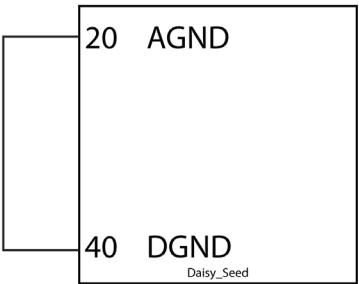
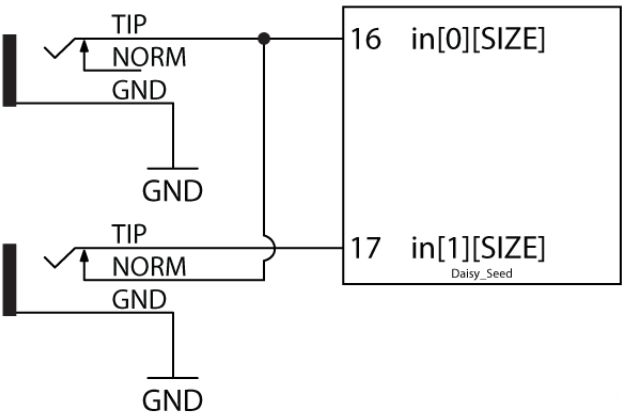


Figure 1.2 - Stereo Line Level Audio Input

Input Impedence: 30K ohm (typ.)



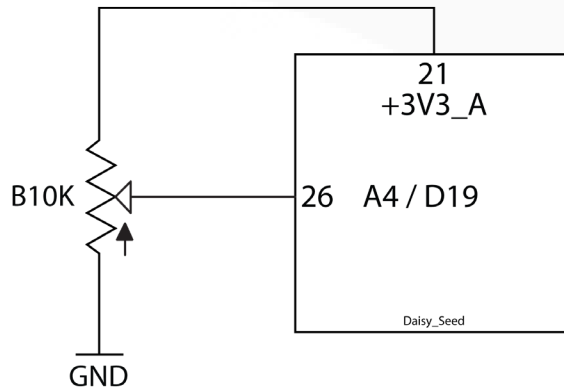
Example Parts:
[Thonkiconn 3.5mm Mono Eurorack Jack](#)
MPN: PJ398SM



Typical Applications

For electrical characteristics, see Table 2

Figure 1.3 - Potentiometer



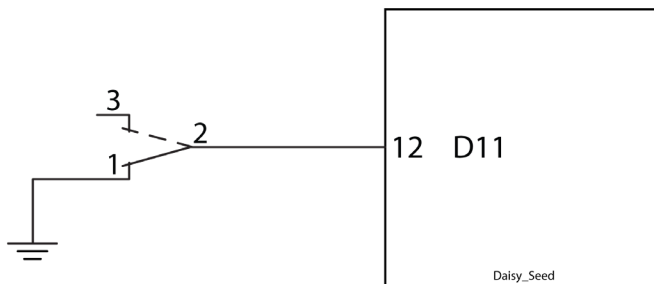
Available Pins: Any ADC

Example Parts:

[Alpha 9mm Linear 10K D Shaft](#)

MPN: RD901F-40-15F-B10K-00D70

Figure 1.4 - Toggle Switch



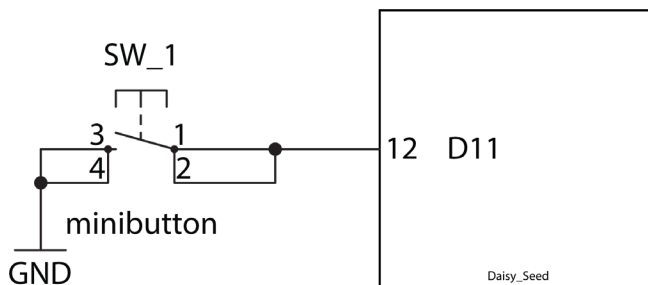
Available Pins: Any GPIO

Example Parts:

[Toggle Switch](#)

MPN: 2MS1T1B1M2QES

Figure 1.5 - Tactile Switch



Available Pins: Any GPIO

Example Parts:

[Tactile Switch](#)

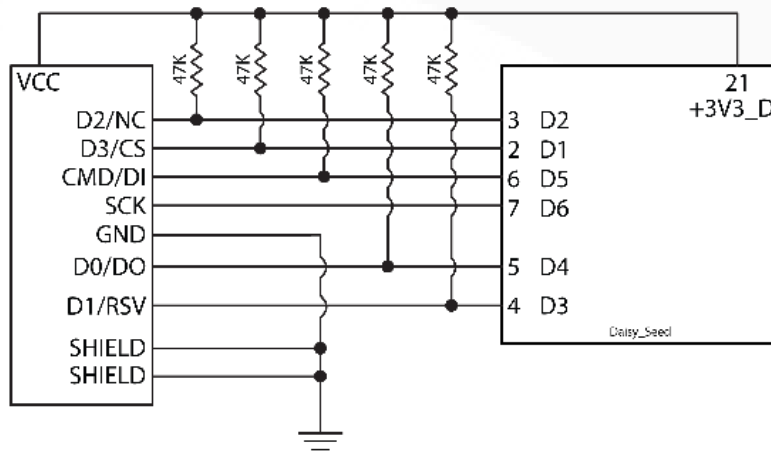
MPN: TL1105SPF250Q



Typical Applications

For electrical characteristics, see Table 2

Figure 1.6 - Micro SD



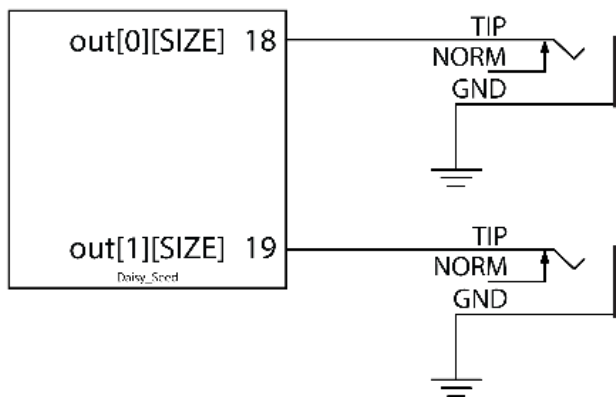
47K pullup resistors necessary, except for Pin 7.

Example Parts:

[Vertical MicroSD Card Connector](#)

MPN: PJS008U-3000-0

Figure 1.7 - Stereo Line Level Audio Output



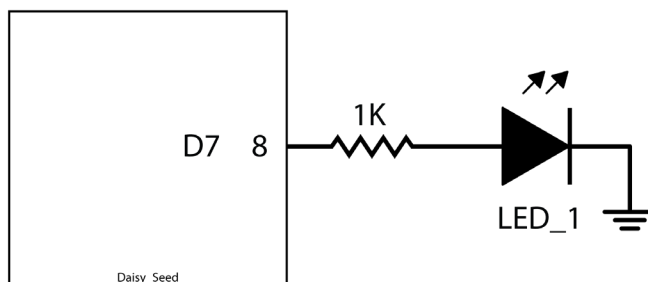
Output Impedance: 100R

Example Parts:

[Thonkiconn 3.5mm Mono Eurorack Jack](#)

MPN: PJ398SM

Figure 1.8 - LED



Available Pins: Any GPIO

Example Parts:

[3mm LED](#)

MPN: WP132XND

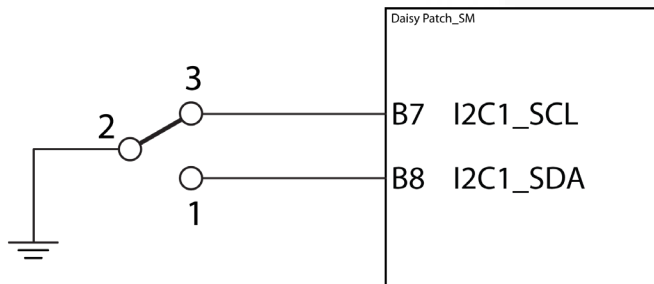
Note: Resistor value is dependent on desired brightness and/or LED part



Typical Applications

For electrical characteristics, see Table 2

Figure 1.9 - On-Off-On Toggle Switch



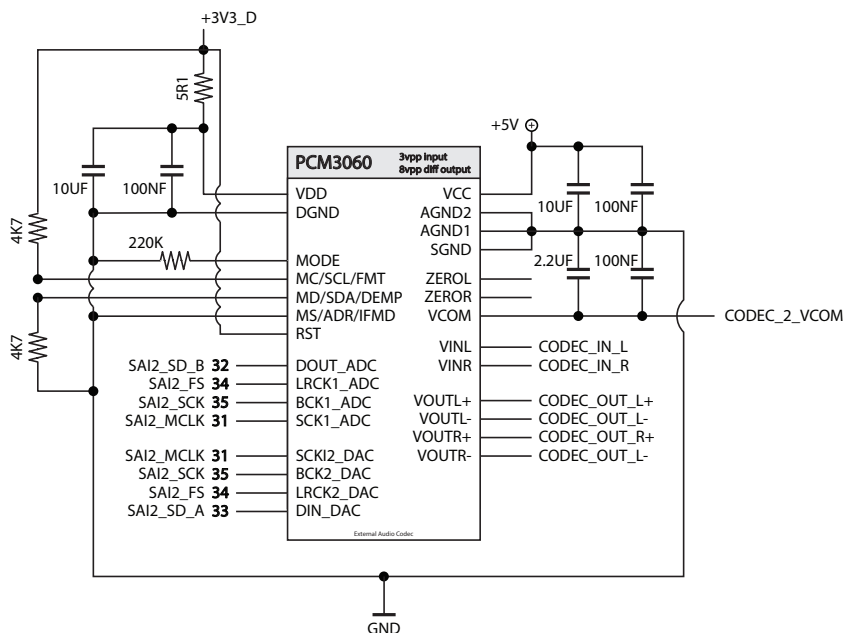
Available Pins: Any GPIO

Example Parts:

[Toggle Switch](#)

MPN: 2MS3T1B1M2QES

Figure 2.0 - External Audio Codec



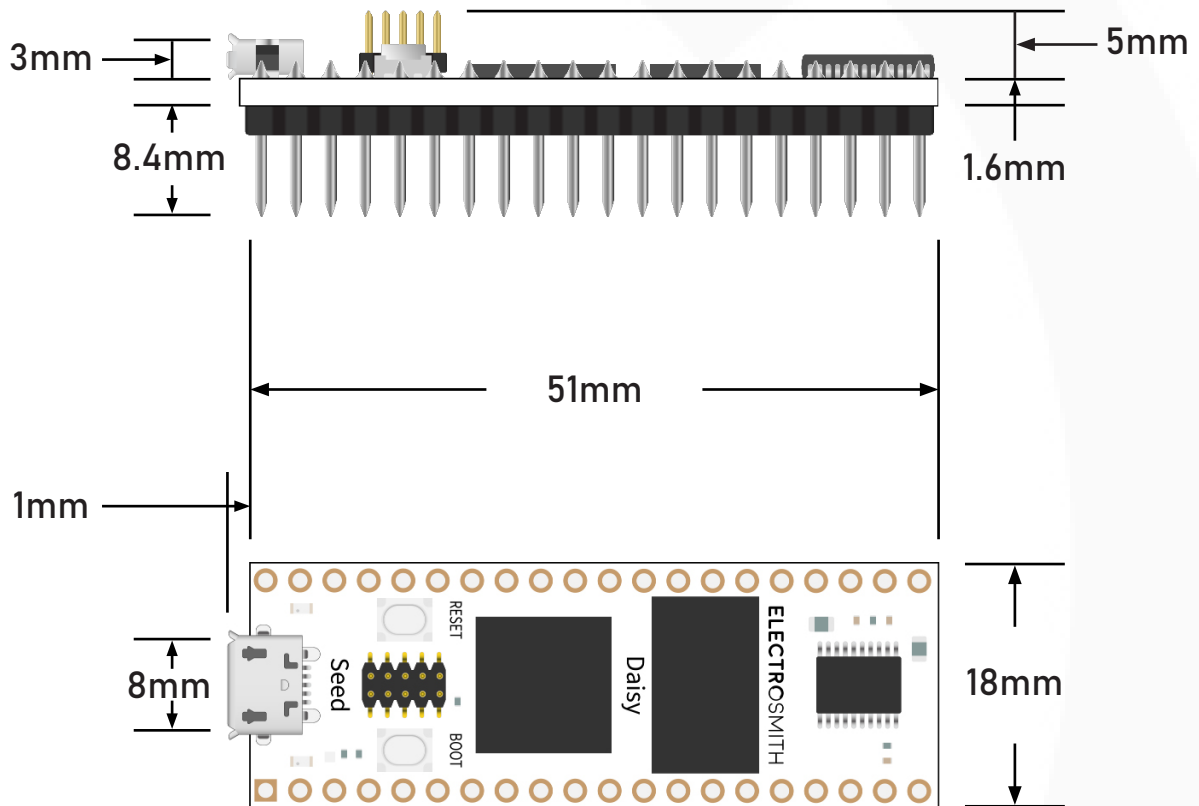
Example Parts:

[PCM3060](#)

MPN: PCM3060PWR

Power Requirement: +5V*

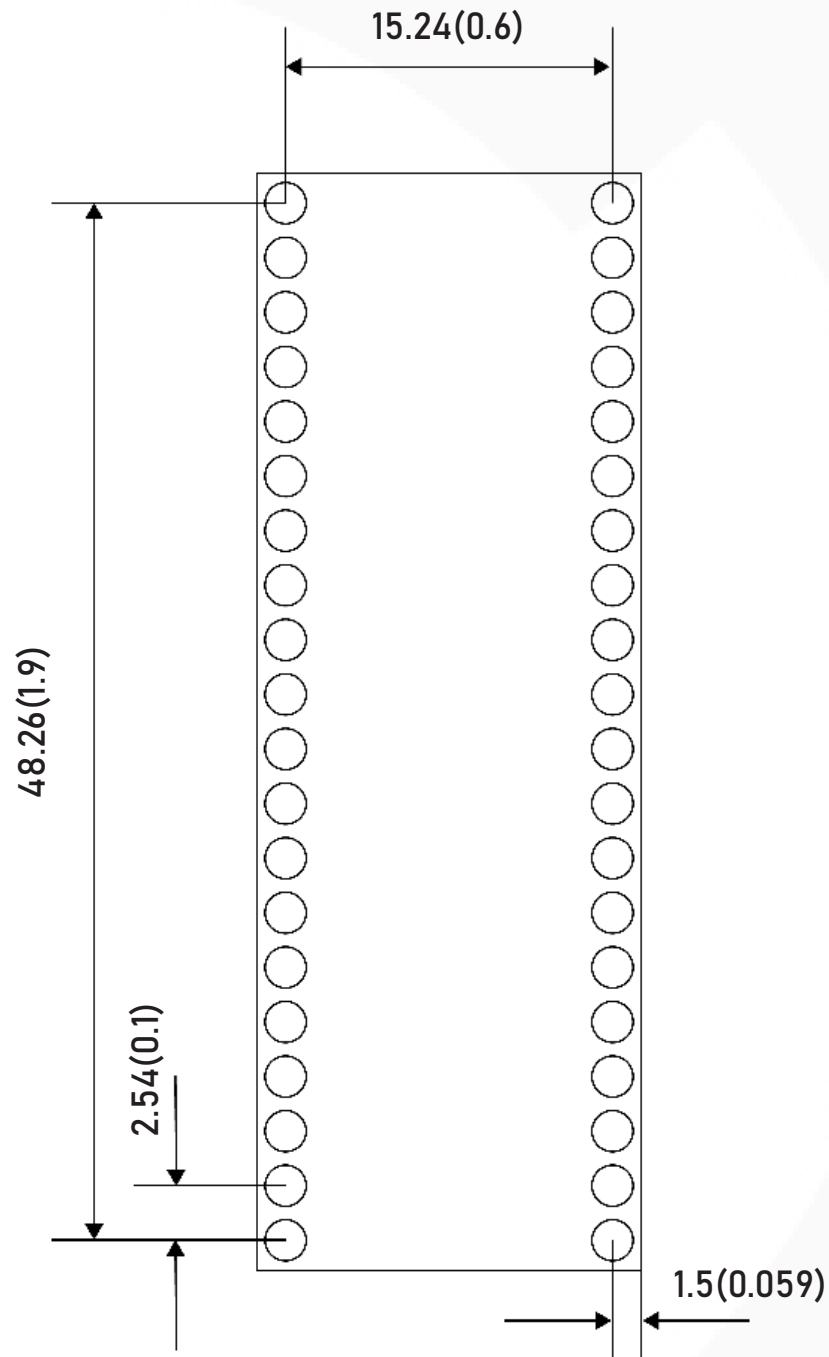
*+5V not provided by Daisy Seed.





Landing Pattern

Dimensions in mm (inches)



Find the EAGLE device [here](#).



Internal Codec Details

Codec	PCM3060
Mode Control	H/W Mode, Single-ended VoutX
FMT (Interface Format)	24-bit left-justified for ADC and DAC
DEMP(De-emphasis)	De-emphasis off
IFMD (Interface Mode)	Slave mode for ADC, slave mode for DAC
Digital VDD	3.3V (Filtered from Daisy +3v3_D)
Analog VCC	4.5V provided by on board LDO

The STM32 SAI1 peripheral is used to communicate digital audio to the codec. The following pins are connected:

STM32 Pin Name	STM32 Function	PCM3060 Pin(s)
PE2	SAI1 MCLK A	SCKI1 SCKI2
PE3	SAI1 SD B	DOUT
PE4	SAI1 FS A	LRCK1 LRCK2
PE5	SAI1 SCK A	BCK1 BCK2
PE6	SAI1 SD A	DIN

All three clocks coming from the STM32 SAI1 peripheral (FS, SCK, and MCLK) are shared between the ADC and DAC on the PCM3060.

The Codec VCOM is filtered per datasheet recommended values, and is not exposed for use. The PCM3060 is configured by the hardware, and is not connected via I2C for serial control.



Onboard LED

The Daisy Seed carries an onboard, programmable LED that is connected directly to the MCU. Follow our [LED Blink tutorial](#) to learn how to program Daisy's onboard LED.

Component	STM32 Pin	Arduino Pin
Red LED	PC7	D31

Hardware Revisions

The Daisy Seed has received a handful of hardware revisions over its lifetime. These revisions are a result of deprecated parts, and massive chip shortages that have affected the global electronics supply chain. Regardless of your revision, each Daisy Seed is pin to pin compatible with one another. See a full list of changes below for each revision.

Revision	Active Years	Changes	Reason For Revision
Rev 4	2020-2021	None	Original Kickstarter Seed
Rev 5	2021-2023	Audio Codec - WM8731	AKM factory fire, AK4556 discontinued
Rev 7	2023 -	Audio Codec - PCM3060	WM8731 discontinued

Notes:

- Rev4/Rev7 do not use I2C pins. Auto-software detects hardware as Rev 4 Daisy in libDaisy, so it can remain backwards compatible with existing firmware. See table below for which pin each rev uses for its version check.
- For each STM32 Pin, the board's "version pin" will be shorted to GND, and therefore unable to be pulled up.

Revision	STM32 Pin
Rev 4	PD3
Rev 7	PD5



Why The Daisy Seed?

Made In The USA

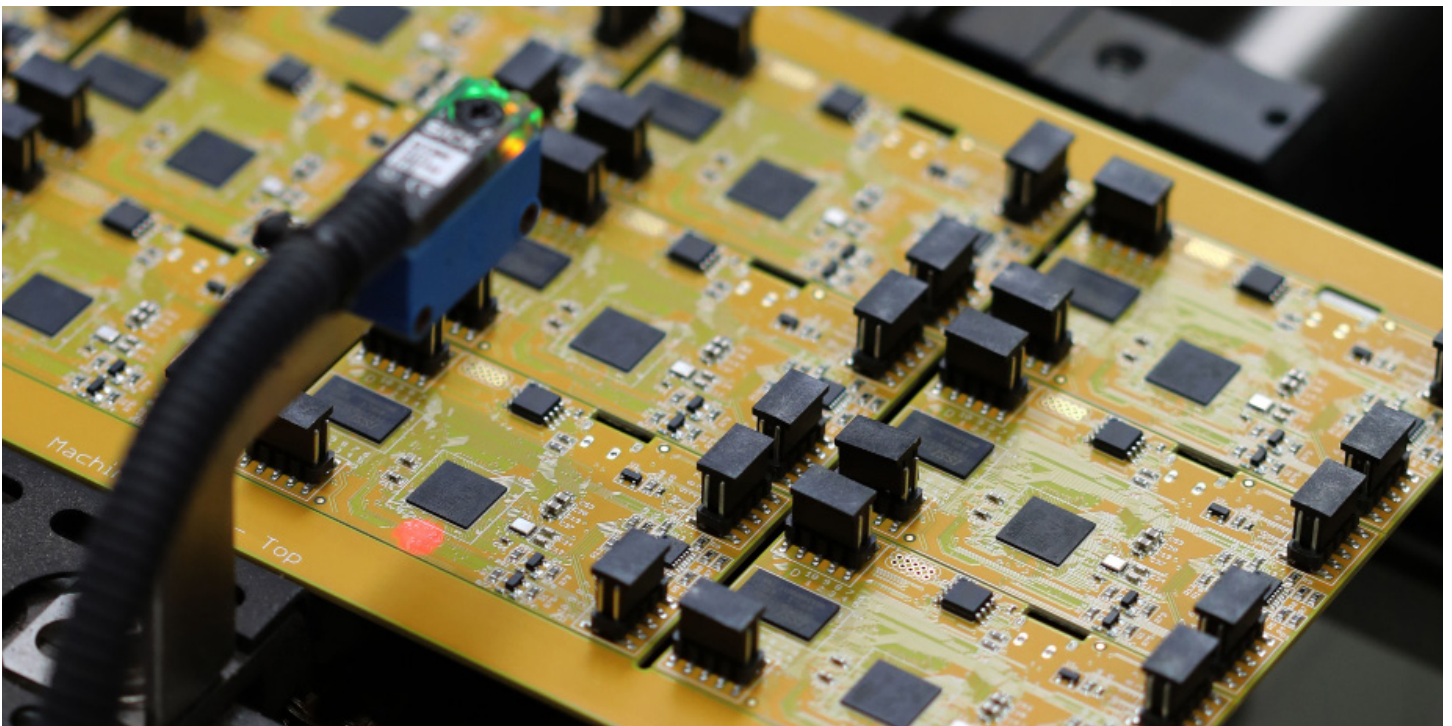
The Daisy Seed is built by the Electrosmith team in San Clemente, CA. We take pride in knowing that each stage of our manufacturing process is handled in house so that we can provide the best quality, lead time, and pricing.

RoHS Compliant

Electrosmith manufacturing is 100% RoHS compliant. All Electrosmith products are free from RoHS defined hazardous materials.

CE/REACH Compliant

The Daisy Seed is assembled with parts and materials that are compliant with CE/REACH standards. Design with the Seed knowing that it upholds the highest environmental standards for electronic products.





Changelog

RELEASE	DATE	DESCRIPTION
v1.0	15/DEC/2021	<ul style="list-style-type: none">Initial release
v1.0.1	14/JAN/2022	<ul style="list-style-type: none">Included pricing/support information
v1.0.2	14/FEB/2022	<ul style="list-style-type: none">Added Power Typical Application
v1.0.3	8/MAR/2022	<ul style="list-style-type: none">updated schematic to Rev5
v1.0.4	15/MAR/2022	<ul style="list-style-type: none">added On-Off-On Toggle Switch typical application
v1.0.5	25/JAN/2023	<ul style="list-style-type: none">Added disclaimer to Absolute Maximum Ratings TableUpdated pin designator in tables
v1.0.6	23/OCT/2023	<ul style="list-style-type: none">Added hardware revision page
v1.1	2/FEB/2024	<ul style="list-style-type: none">Added external audio codecRemoved Rev5 schematic
v1.1.1	13/FEB/2024	<ul style="list-style-type: none">Added Audio Codec Information pageAdded onboard LED section
v1.1.2	15/FEB/2024	<ul style="list-style-type: none">Onboard LED and Hardware Revision typo fixesadded onboard LED Arduino Pin