

SAW Filter
1090MHz BPF
30MHz BW
-30dB Attenuation OOB

LNA
+30dB Gain

Power Detector

Keep capacitance on V_{OUT} low!
I_{out,max} = 400uA.

LNA Requirements:
AC coupling caps must be <100pF.
22nF decoupling cap must be close to IC.
Use multiple vias for ground.

100k Digital Potentiometer for Adjustable Gain
A_{min} = 0
A_{max} = 101

Comparator Reference Voltages

DC Bias can be adjusted for desired receive power sensitivity.

TestPoint TP1
MTL_LO_PWM R1 10k MTL_LO_BIAS
 $f_c = 159\text{Hz}$
C1 0.1uF
GND

TestPoint TP2
+3V3 C5 0.1uF
GND

TestPoint TP4
MTL_HI_PWM R4 10k MTL_HI_BIAS
 $f_c = 159\text{Hz}$
C11 0.1uF
GND

RF_LEVEL TP5 TestPoint

Signal Comparator

+3V3 C12 0.1uF
GND

U5 MCP6566
PULSES R6 1k
+3V3
Comparator Specs
Propagation Delay ~50ns
Fall Time 200ns

Ideal Peak Detector

U3B TLV3542
20V 1A
RSSI_PEAK

RSSI Sample and Hold

RSSI_DSCHRG B1 3
B2 1
GND

+3V3 C14 0.1uF
GND

SN74LVC1G3157
RSSI_HOLD
TestPoint TP8
22nF C15
GND

R8 200k
GND

DECODE SW2

Discharge RC Time Constant
 $T = 44\text{ns}$
95% discharged = 132ns

Enabled during decode interval to sample RSSI of packet.

Ideal peak detector circuit.
Diode is too big and leaky, but reused from power input.
Peak detector holds lowest trough since using inverted ADB314 output.

Analog switch
 $I_{max} = 128\text{mA}$

[illegible]

ESPFlash 2x3 Programming Header

J3 +3V3

Conn_02x03_Pin

ESP32_ENABLE 1

ESP32_UART0_RX 3

ESP32_UART0_TX 5

ESP32_GPIO0_BOOT 6

NOTE: TX/RX nets refer to pins on host, not ESP32!

GND

$I_{in_max} = 368mA$

802.11b, 20 MHz, 1 Mbps, @19.5dBm

+3V3

U9 ESP32-PICO-MINI-02U

For firmware update and logging only.

+3V3

ESP32_ENABLE R4 10k 8

EN/CHIP_PU

ESP32_SPL_MISO 19

ESP32_SPL_MOSI 20

ESP32_SPL_CLK 21

ESP32_SPL_CS 21

MTDI/GPIO12/ADC2_CH5

MTCK/GPIO13/ADC2_CH4

MTMS/GPIO14/ADC2_CH6

MTDO/GPIO15/ADC2_CH3

VDET_1/GPIO34/ADC1_CH6

VDET_2/GPIO35/ADC1_CH7

SENSOR_VP/GPIO36/ADC1_CH0

SENSOR_CAPP/GPIO37/ADC1_CH1

SENSOR_CAPN/GPIO38/ADC1_CH2

SENSOR_VN/GPIO39/ADC1_CH3

GPIO0_BOOT/ADC2_CH0

GPIO2/ADC2_CH2

GPIO4/ADC2_CH0

GPIO5

GPIO19

GPIO20

GPIO21

GPIO22

GPIO25/ADC2_CHB/DAC_1

GPIO26/ADC2_CH9/ADC2_CH7

GPIO27/ADC2_CH7

SD_DATA_1/GPIO8

SD_DATA_0/GPIO7

Startups:

- Pull GPIO0 DOWN to enable download boot mode for firmware update.
- GPIO0 Pulled up by default.

Run:

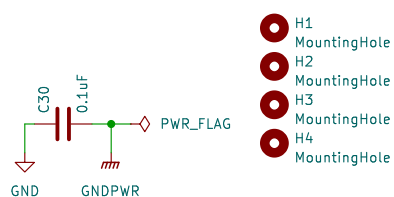
- GPIO0 used for SPI handshake connection.

MTDI must be pulled down (default) to enable 3.3V GPIO voltage.

See ESP-AT user guide for more info:
<https://docs.espressif.com/projects/esp-at/en/latest/esp32/>

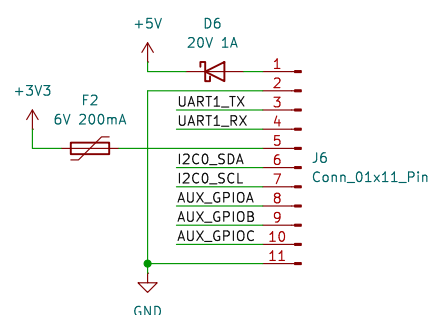
The diagram shows two LED connections. On the left, the STATUS_LED pin is connected to the anode of LED D4 (RED) through a resistor R26 (287R). The cathode of D4 is connected to GND. On the right, the DECODE pin is connected to the anode of LED D5 (GREEN) through a resistor R27 (115R). The cathode of D5 is connected to GND.

$I_{out,max} = 600mA$
 $V_{in,min} = 3.7V$ (max dropout voltage)
 $V_{in,max} = 6.5V$ (max input voltage)



PCB1
adsbee_1090
REV C
PCB
GRAPHIC1
GRAPHIC

TODO: add pmos polarity protection on 3.3V, make single row, add i2c pins



RP2040 Hardware Design Guide:
<https://datasheets.raspberrypi.com/rp2040/hardware-design-with-rp2040.pdf>



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Sheet: /
File: adsbee_1090.kicad_sch

Title: ADSBee

Size: C	Date: 2024-04-23
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Rev: C