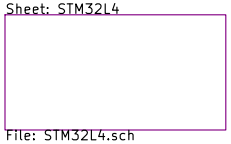


Sheet: /
File: AVIONICS_BOARD.sch

Title:

Size: A	Date: 2020-04-24	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 1/23

Sheet: TEMPERATURE_ADC
Supply with max ADC Voltage
TEMP SENSOR
OUT1 OUT2 OUT3 OUT4 OUT5 OUT6 OUT7 OUT8
ADC1_IN3 ADC1_IN4 ADC1_IN5 ADC1_IN6 ADC1_IN7 ADC1_IN8 ADC1_IN9 ADC1_IN10
VDD GND
TEMP_PWR
GND
File: TEMPERATURE_ADC.sch

Sheet: MAG
VDD: 2.16–3.6V
Logic: 1.62–3.6V
10mA
MAG
CLK MISO MOSI_SDA CS INT
SPI1_SCK SPI1_MISO SPI1_MOSI MAG_CS MAG_INT
VDDIO VDD VSS
3.3V_MAG
GND
File: MAG.sch

Sheet: GYRO
VDD: 1.62–3.6V
Logic: 1.2–3.6V
20mA
GYRO
INT1 INT2 CS MISO MOSI CLK
GYRO_INT_1 GYRO_INT_2 GYRO_CS SPI2_MISO SPI2_MOSI SPI2_SCK
VDD_IO VDD GNDD
3.3V_GYRO
GND
File: GYRO.sch

Sheet: SUNSENSOR_INTERFACE
3.0 to 3.6V
7mA per sensor
SUN SENSOR
SCK MISO MOSI FRAME_RDY_1 CS_1 FRAME_RDY_2 CS_2
SPI3_SCK SPI3_MISO SPI3_MOSI SUN_FRAME_RDY_1 SUN_CS_1 SUN_FRAME_RDY_2 SUN_CS_2
PWR GND
3.3V_SUN_SENSOR
GND
File: SUNSENSOR.sch

Sheet: ACS
COIL: 0–11V, 1A at least
Logic: 1.8–7V, 20mA
Regulate coil voltage for repeatable magnetic performance
ACS ATTITUDE CONTROL SUBSYSTEM
X_nSLEEP X_PH X_EN Y_nSLEEP Y_PH Y_EN Z_nSLEEP Z_PH Z_EN
ACS_X_SLEEP ACS_X_PH TIM16_CH1 ACS_Y_SLEEP ACS_Y_PH TIM15_CH1 ACS_Z_SLEEP ACS_Z_PH TIM17_CH1
PWR_LOGIC_IN PWR_COIL_IN GNDD
3.3V_ACS_LOGIC 5V_ACS_COIL
GND
File: ACS.sch

Sheet: DEBUG_INTERFACE
Input voltage to STM
DEBUG / PROGRAM
LED_GPIO1 LED_GPIO2 LED_GPIO3 LED_GPIO4 LED_GPIO5
LED_1 LED_2 LED_3 LED_4 LED_5
NRST JTAG_TRST JTAG_TCK_SWD_SWCLK JTAG_TDO_SWD_SWO JTAG_TMS_SWD_SWDIO JTAG_TDI
RST NJRST JTCK_SWCLK JTDO_TRACESWO JTMS_SWDIO JTDI
TARGET_UART_RX TARGET_UART_TX
LPUART1_RX LPUART1_TX
TARGET_VDD TARGET_GND
3.3V_STM_CORE
GND
File: DEBUG_INTERFACE.sch

Sheet: WATCHDOG
VDD: 1.8V to 5.5V
WATCH–DOG
RST DONE WAKE VDD VSS
RST WATCHDOG_DONE WATCHDOG_WAKE 3.3V_STM_CORE
GND
File: WATCHDOG.sch

VDD & VDDIO2:
Use one 0.1uF cap per power pin.
Use one 4.7uF cap per power pin group.
VDDA:
Use one 0.01uF & one 1uF
VREF:
Use one 0.1uF & one 1uF

C6 0.1uF 25V
C4 0.1uF 25V
C5 0.1uF 25V
C7 0.1uF 25V
C8 0.1uF 25V
C9 0.1uF 25V
C10 0.1uF 25V
C3 4.7uF 10V
C11 0.1uF 25V
C12 0.1uF 25V
C13 0.01uF 50V
C14 1uF 10V
C15 4.7uF 10V
C16 0.1uF 25V
C17 0.1uF 25V
GND
R1 0
R2 10m VDD
R3 10m VDDA
R4 10m VDDIO2
3.3V_STM_CORE
20mA peak, budget 50mA
6 17 39 52 62 72 84 108 121 144 33 95 131 106
VBAT VDD VDD VDD VDD VDD VDD VDD VDD VDD VDDA VDDIO2 VDDUSB

C1 0.01uF 50V
C2 0.01uF 50V
GND

U1
STM32L496ZGTx
STM32L496ZGT3
is the high (+125) temperature version
STM32L496ZGT6
is the lower (+85) temperature version

NRST 25
VREF+ 32
VREF– 31

PA0 34 ADC1_IN5
PA1 35 ADC1_IN6
PA2 36 ADC1_IN7
PA3 37 ADC1_IN8
PA4 40 ADC1_IN9
PA5 41 ADC1_IN10
PA6 42 ADC1_IN11
PA7 43 ADC1_IN12
PA8 100 CAN_RS
PA9 101 USART1_TX
PA10 102 USART1_RX
PA11 103 CAN1_RX
PA12 104 CAN1_TX
PA13 105 JTMS_SWDIO
PA14 109 JTCK_SWCLK
PA15 110 JTDI
11 & 12 are currently unused
TP3 TP_smt_1x1
TP6 TP_smt_1x1
3.3V_CAN

PB0 46 QUADSPI_BK1_IO1
PB1 47 QUADSPI_BK1_IO0
PB2 48
PB3 133 JTDO_TRACESWO
PB4 134 NJRST
PB5 135
PB6 136 ACS_Z_SLEEP
PB7 137 ACS_Z_PH
PB8 139 TIM16_CH1
PB9 140 TIM17_CH1
PB10 69
PB11 70 SUN_CS_1
PB12 73 SUN_CS_2
PB13 74 SPI2_SCK
PB14 75 SPI2_MISO
PB15 76 SPI2_MOSI

PC0 26 LPUART1_RX
PC1 27 LPUART1_TX
PC2 28 ADC1_IN3
PC3 29 ADC1_IN4
PC4 44 USART3_TX
PC5 45 USART3_RX
PC6 96 MANUAL_RST
PC7 97 EPS_RST
PC8 98 TP12 TP_tht_1x1
PC9 99 TP13 TP_tht_1x1
PC10 111 UART4_TX
PC11 112 UART4_RX
PC12 113
PC13 7
PC14 8 RCC_OSC32_IN
PC15 9
Leave OSC32_OUT as NC when using TCXO

PD0 114
PD1 115
PD2 116 USART3_RTS
PD3 117
PD4 118
PD5 119 USART2_TX
PD6 122 USART2_RX
PD7 123 SUN_FRAME_RDY_2
PD8 77 GPS_RESET
PD9 78 GYRO_CS
PD10 79
PD11 80 USART3_CTS
PD12 81
PD13 82
PD14 85
PD15 86

PH0 23 RCC_OSC_IN
PH1 24
PH3 138

PG0 56 MAG_INT
PG1 57 WATCHDOG_WAKE
PG2 87 GYRO_INT_1
PG3 88 GYRO_INT_2
PG4 89
PG5 90
PG6 91 SUN_FRAME_RDY_1
PG7 92 I2C3_SCL
PG8 93 I2C3_SDA
PG9 124 SPI3_SCK
PG10 125 SPI3_MISO
PG11 126 SPI3_MOSI
PG12 127
PG13 128 I2C1_SDA
PG14 129 I2C1_SCL
PG15 132

PF0 10 I2C2_SDA
PF1 11 I2C2_SCL
PF2 12 LED_1
PF3 13 LED_2
PF4 14 LED_3
PF5 15 LED_4
PF6 18 LED_5
PF7 19
PF8 20
PF9 21 TIM15_CH1
PF10 22 10MHZ_OE
PF11 49
PF12 50 MAG_CS
PF13 53
PF14 54 I2C4_SCL
PF15 55 I2C4_SDA

PE0 141 WATCHDOG_DONE
PE1 142
PE2 1
PE3 2 ACS_X_SLEEP
PE4 3 ACS_X_PH
PE5 4 ACS_Y_SLEEP
PE6 5 ACS_Y_PH
PE7 58 TEMP_PWR
PE8 59
PE9 60
PE10 63 QUADSPI_CLK
PE11 64 QUADSPI_BK1_NCS
PE12 65
PE13 66 SPI1_SCK
PE14 67 SPI1_MISO
PE15 68 SPI1_MOSI

VSS 16 38 51 61 71 83 94 107 120 130 143 VSSA 30
GND

Sheet: OSC_HSE_TCXO
3.3V Power
10MHz TCXO
OUT OE PWR GND
10MHZ_OE 3.3V_CLK
GND
File: OSC_HSE_TCXO.sch

TP_smt_1x1 TP14
TP_smt_1x1 TP15
TP_smt_1x1 TP16
R11 DNP
R12 DNP

TP_tht_1x1 TP7
TP_tht_1x1 TP10
TP_tht_1x1 TP11
R9 DNP
R10 DNP
I2C is currently unused, but left available

Sheet: CAN_TRANSCEIVER
CAN TRANS–CEIVER
3–3.3V Power 20mA
RS CAN_RX CAN_TX PWR GND
CANH CANL
GND
File: CAN_TRANSCEIVER.sch

C19 0.1uF 25V
C20 0.1uF 25V
U11 U12 74LVC1G07
RST MANUAL_RST
3.3V_STM_CORE
AVI_RST
STM Reset Triggers

Sheet: OSC32_TCXO
1.5V–5.5V
32kHz TCXO
OE OUT PWR GND
3.3V_STM_CORE
File: OSC32_TCXO.sch

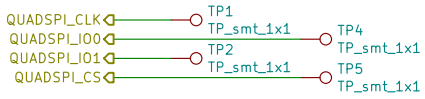
Sheet: Sheet639EBCAF
INTERBOARD CONNECTOR
3.3V_STM_CORE 3.3V_GPS 3.3V_MRAM 3.3V_CAN 3.3V_ACS_LOGIC 3.3V_GYRO 3.3V_MAG 3.3V_CLK 3.3V_SUN_SENSOR
3V3_1 3V3_2 3V3_3 3V3_4 3V3_5 3V3_6 3V3_7 3V3_8 3V3_9 3V3_10 3V3_11 3V3_12
5V_ACS_COIL
5V0_1 5V0_2
CANH CANL
UART4_TX UART4_RX
UART_A_TXO UART_A_RXI
USART3_RX USART3_TX USART3_CTS USART3_RTS
UART_B_RXI UART_B_TXO UART_B_CTS UART_B_RTS
AVI_RST EPS_RST
AVI_RESET EPS_RESET
SPARE_1 SPARE_2 SPARE_3 SPARE_4 SPARE_5 SPARE_6
GND
File: ../eps_board/INTERBOARD_CONNECTOR.sch

H1 MountingHole_Pad
H2 MountingHole_Pad
H3 MountingHole_Pad
H4 MountingHole_Pad
H5 MountingHole
H6 MountingHole
H7 MountingHole

Sheet: GPS_INTERFACE
3.3V Power 200mA
GPS
USART2_TX USART2_RX GPS_RESET 3.3V_GPS
UART_TX UART_RX RESET PWR GND
File: GPS_INTERFACE.sch

Sheet: MRAM
3.0V–3.6V 40mA peak, budget 80mA
MRAM
QUADSPI_CLK QUADSPI_BK1_IO0 QUADSPI_BK1_IO1 QUADSPI_BK1_NCS
QUADSPI_CLK QUADSPI_IO0 QUADSPI_IO1 QUADSPI_CS
3.3V_MRAM
VDD VSS
File: MRAM.sch

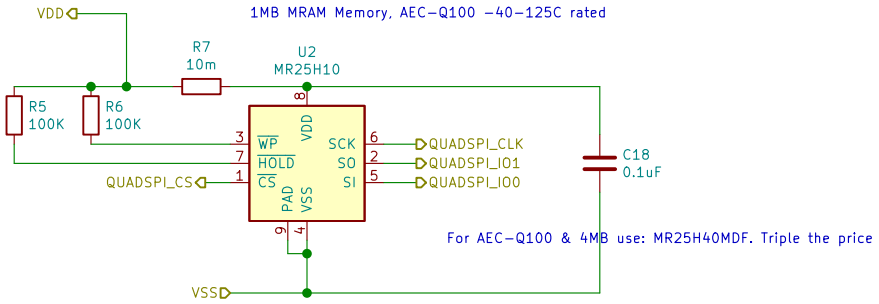
Sheet: /STM32L4/
File: STM32L4.sch
Title: STM32L4
Size: B | Date: 2020–04–24 | Rev:
KiCad E.D.A. kicad 5.1.7–a382d34a888ubuntu16.04.1 | Id: 2/23



WP is write protect. Low active
HOLD suspends operation. Low active. Only available when CS is low
CS is chip select. Low active
SCK is SPI cock
SO is output
SI is input
VDD is from 3.0V to 3.6V
Connect pad only to VSS

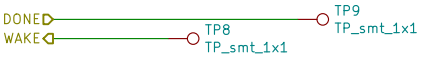
https://www.cypress.com/file/196526/download for layout guide

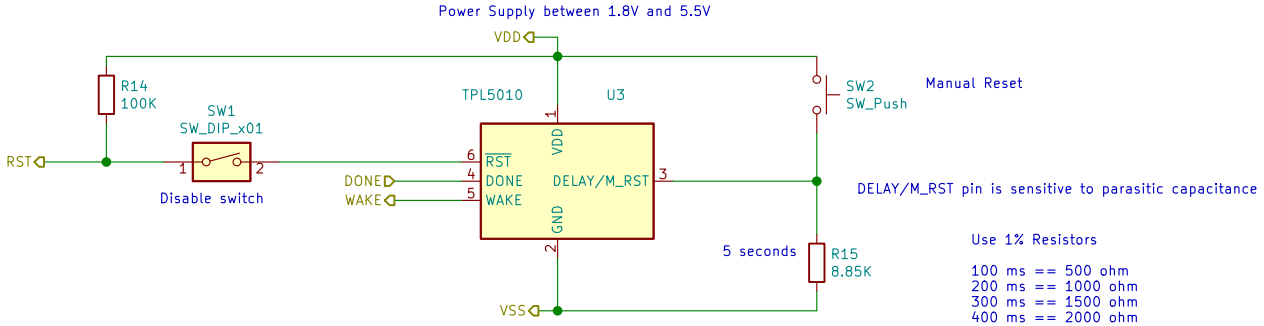
0.1uF decoupling cap



Sheet: /STM32L4/MRAM/		
File: MRAM.sch		
Title: MRAM		
Size: A	Date: 2020-05-03	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 3/23

The DONE, WAKE and RSTn signals are used to implement the watchdog function. The TPL5010−Q1 is programmed to issue a periodic WAKE pulse to a µC which is in sleep or standby mode. After receiving the WAKE pulse, the µC must issue a DONE signal to the TPL5010−Q1 at least 20 ms before the rising edge of the next WAKE pulse. If the DONE signal is not asserted, the TPL5010−Q1 asserts the RSTn signal to reset the µC. A manual reset function is realized by momentarily pulling the DELAY/M_RST pin to VDD

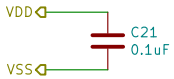




Use 1% Resistors

100 ms == 500 ohm
200 ms == 1000 ohm
300 ms == 1500 ohm
400 ms == 2000 ohm
500 ms == 2500 ohm
1 s == 5.2 Kohm
2 s == 6.79 Kohm
5 s == 8.85 Kohm
10 s == 11.20 Kohm

Layout Note: Decoupling



A multilayer ceramic bypass X7R capacitor of 0.1µF is recommended

Sheet: /STM32L4/WATCHDOG/		
File: WATCHDOG.sch		
Title: EXTERNAL WATCHDOG		
Size: A	Date: 2020−05−02	**Rev:**
KiCad E.D.A. kicad 5.1.7−a382d34a888ubuntu16.04.1		Id: 4/23

For now, just leave open for external modules, no dedicated chip

PWR
GND
UART_TX
UART_RX
RESET

Sparkfun GPS Breakout
ZOE-M8Q
https://www.sparkfun.com/products/15193

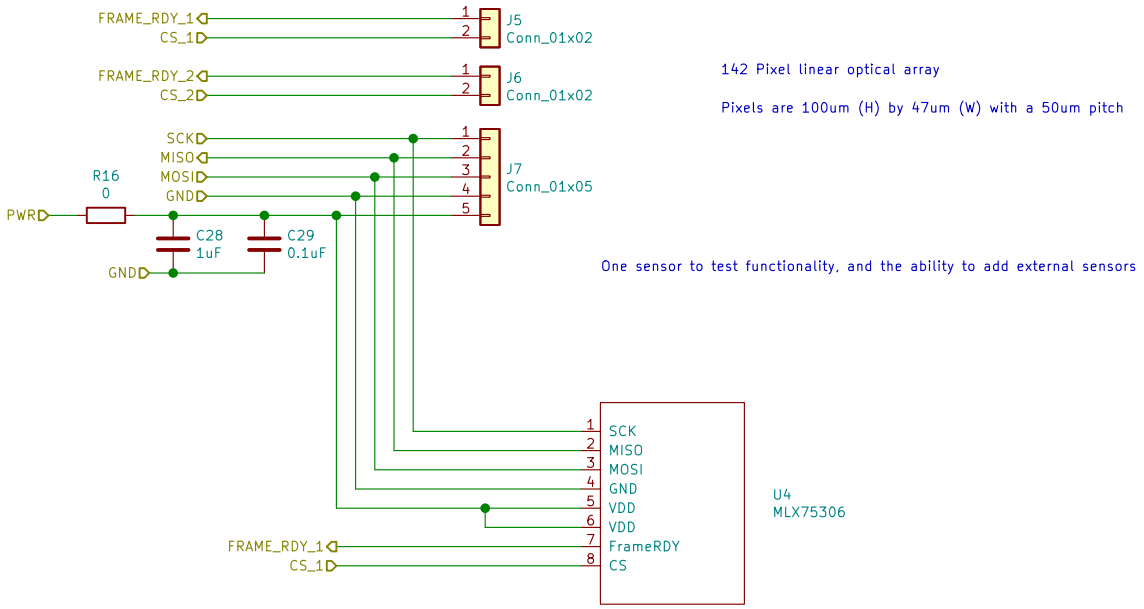
TXO
RXI
3V3
NC
GND

Standard 2.54mm pitch through hole header

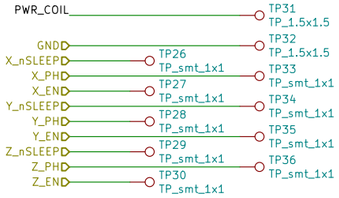
GP-735
https://www.sparkfun.com/products/13670

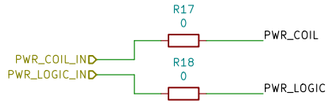
GND
PWR
TXO
RXI
V_BAT (backup)
PWR_CTRL

Sheet: /STM32L4/GPS_INTERFACE/		
File: GPS_INTERFACE.sch		
Title: GPS interface		
Size: A	Date: 2020-05-12	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 5/23

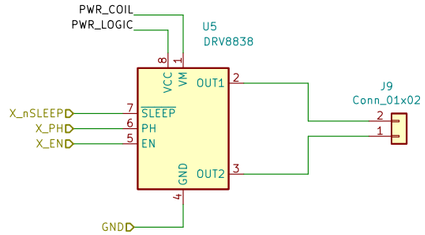


Sheet: /STM32L4/SUNSENSOR_INTERFACE/		
File: SUNSENSOR.sch		
Title: Sun Sensor Interface		
Size: A	Date: 2020-05-17	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 6/23



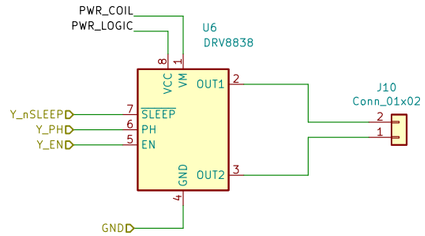


X AXIS

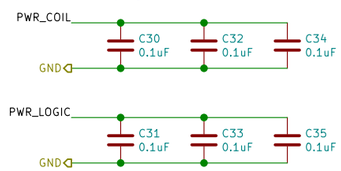


PWR COIL: 0 to 11 V
PWR Logic: 1.8 to 7 V

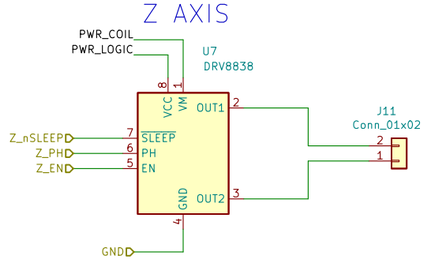
Y AXIS



Layout Note: Decoupling



Z AXIS

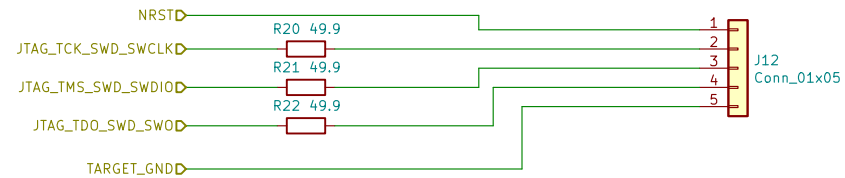


DRV8838

nSLEEP	PH	EN	OUT1	OUT2	Function
0	X	X	Z	Z	Coast
1	X	0	L	L	Brake
1	1	1	L	H	Reverse
1	0	1	H	L	Forward

Sheet: /STM32L4/ACS/		
File: ACS.sch		
Title: Attitude Control System		
Size: B	Date: 2020-05-15	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 7/23

JTAG / SWD



The TDI and TDO pins here match with the target's (the STM32's) TDI and TDO pins.

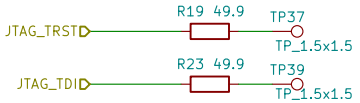
SRST = System Reset
TRST = JTAG specific reset

The series resistors are useful on high-speed traces.
https://electronics.stackexchange.com/questions/7709/why-put-a-resistor-in-series-with-signal-line

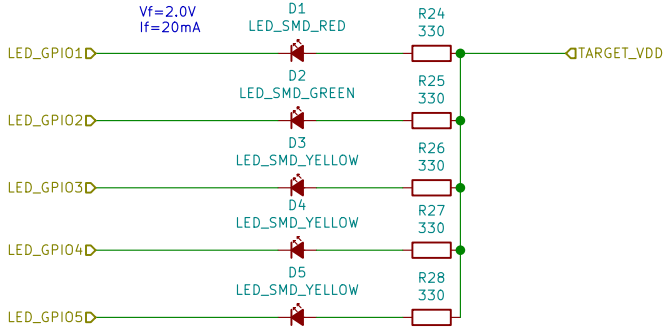
So I'm going with 50 ohm

JTAG
- TDI (Test Data In)
- TDO (Test Data Out)
- TCK (Test Clock)
- TMS (Test Mode Select)
- TRST (Test Reset) optional.

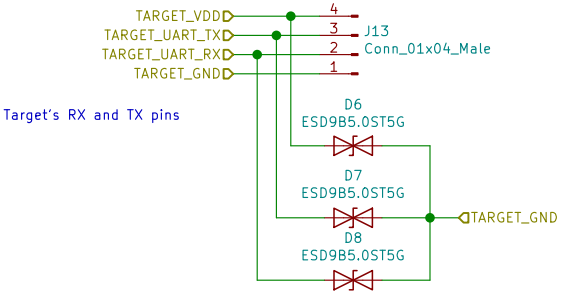
SWD
- SWCLK (Clock signal to target CPU)
- SWDIO (Bi-directional data pin)
- SWO (Serial Wire output) optional



DEBUG LED

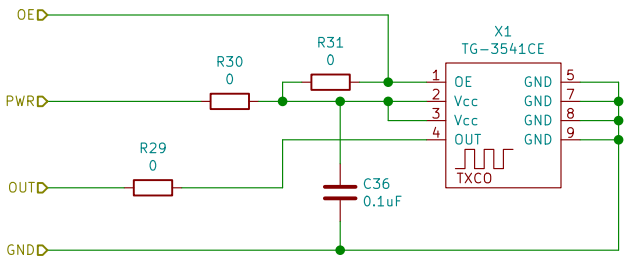


DEBUG UART

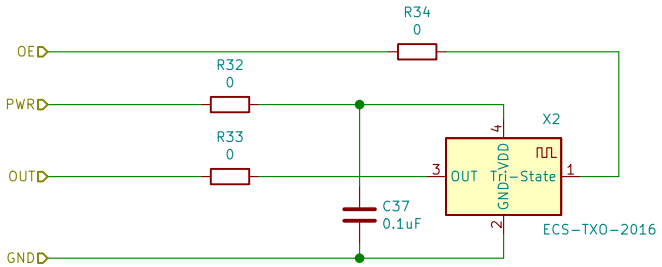


Sheet: /STM32L4/DEBUG_INTERFACE/		
File: DEBUG_INTERFACE.sch		
Title: DEBUG INTERFACE		
Size: A	Date: 2020-05-02	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 8/23

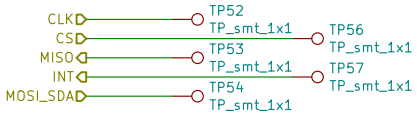
By default, OE is tied high so the chip is enabled immediatly

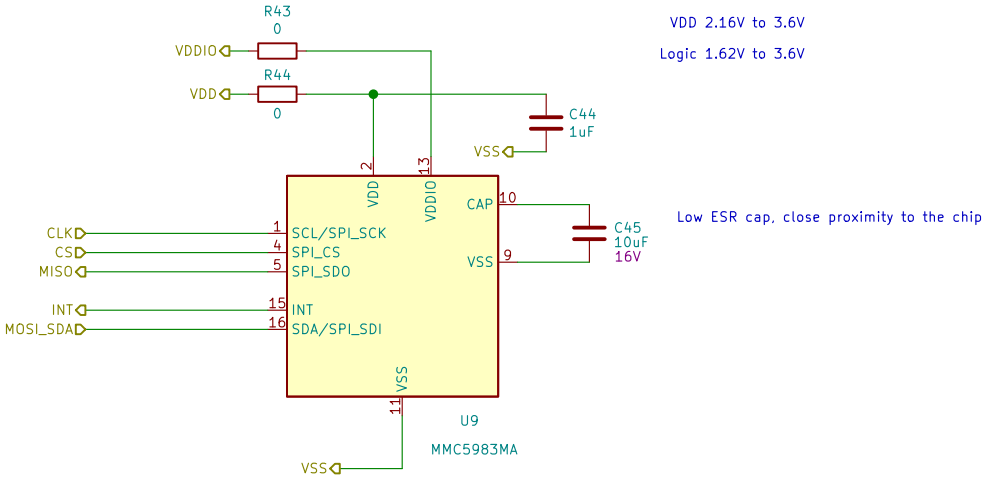


Sheet: /STM32L4/OSC32_TCXO/		
File: OSC32_TCXO.sch		
Title: 32kHz TCXO		
Size: A	Date: 2020-05-25	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 9/23

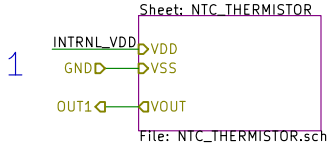


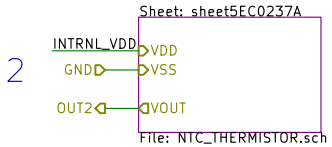
Sheet: /STM32L4/OSC_HSE_TCXO/		
File: OSC_HSE_TCXO.sch		
Title: 10MHz TCXO		
Size: A	Date: 2020-05-25	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 10/23

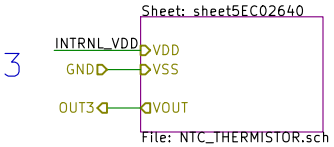


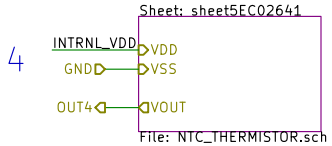


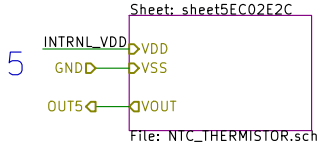
Sheet: /STM32L4/MAG/		
File: MAG.sch		
Title: Magnetic Sensor MMC5983MA		
Size: A	Date: 2020-05-02	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 11/23

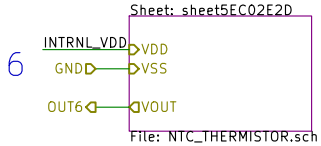


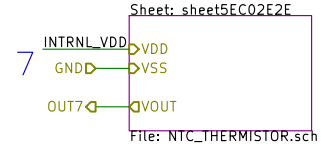


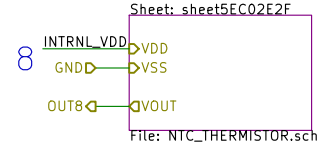








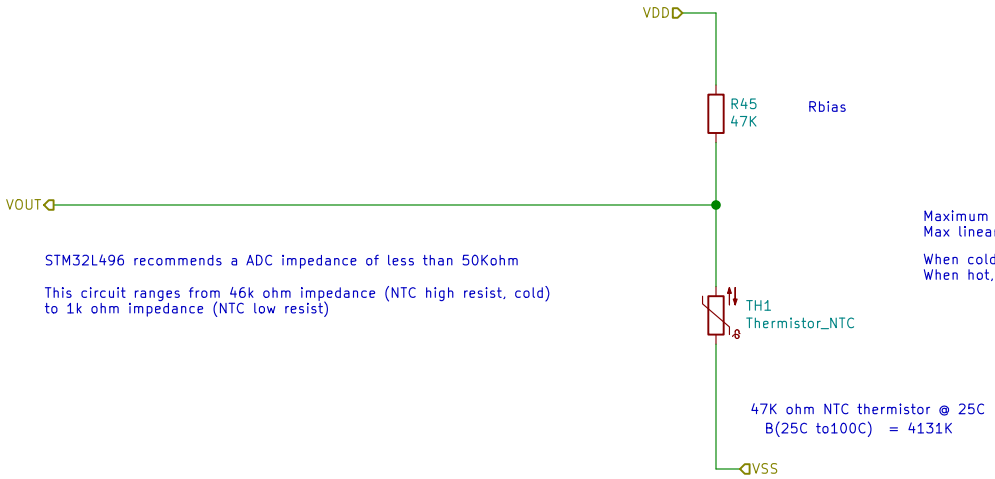




Sheet: /STM32L4/TEMPERATURE_ADC/
File: TEMPERATURE_ADC.sch

Title: Temperature Sensors

Size: A	Date: 2020-05-05	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 12/23



STM32L496 recommends a ADC impedance of less than 50Kohm

This circuit ranges from 46k ohm impedance (NTC high resist, cold)
to 1k ohm impedance (NTC low resist)

Maximum ADC resolution when Rbias is matched with thermistor around temperature of interest.
Max linearity around temperature X when Rbias==Rt @ temperature X.

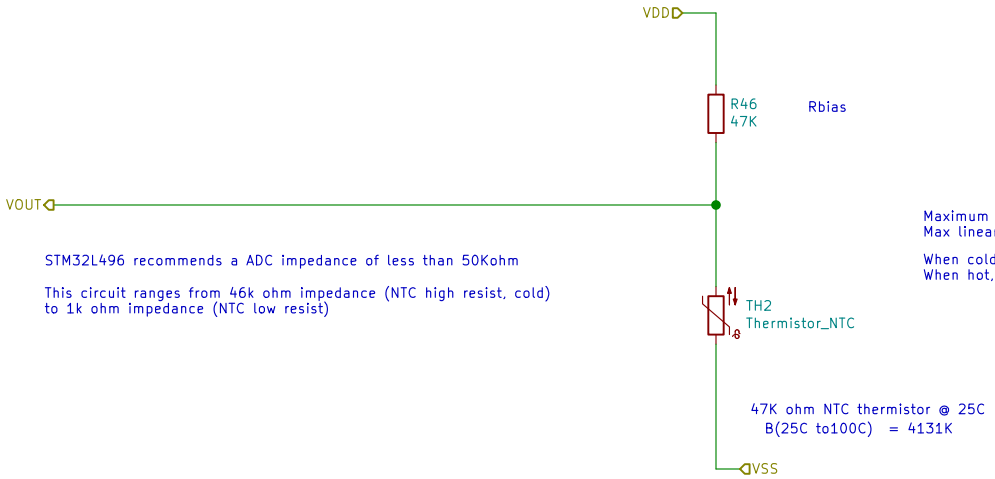
When cold, NTC resistance increases, Vout increases
When hot, NTC resistance decreases, Vout decreases

B (T1/ T2) = ((T2 x T1) / (T2 − T1)) x ln(R1/R2)

T1 = first temp point in Kelvin
T2 = second temp point in Kelvin
R1 = thermistor's resistance at T1 in Ohms
R2 = thermistor's resistance at T2 in Ohms

https://www.electro-tech-online.com/tools/thermistor-resistance-calculator.php

Sheet: /STM32L4/TEMPERATURE_ADC/NTC_THERMISTOR/		
File: NTC_THERMISTOR.sch		
Title: NTC THERMISTOR		
Size: A	Date: 2020-05-05	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 13/23



STM32L496 recommends a ADC impedance of less than 50Kohm

This circuit ranges from 46k ohm impedance (NTC high resist, cold)
to 1k ohm impedance (NTC low resist)

Maximum ADC resolution when Rbias is matched with thermistor around temperature of interest.
Max linearity around temperature X when Rbias==Rt @ temperature X.

When cold, NTC resistance increases, Vout increases
When hot, NTC resistance decreases, Vout decreases

B (T1/ T2) = ((T2 x T1) / (T2 − T1)) x ln(R1/R2)

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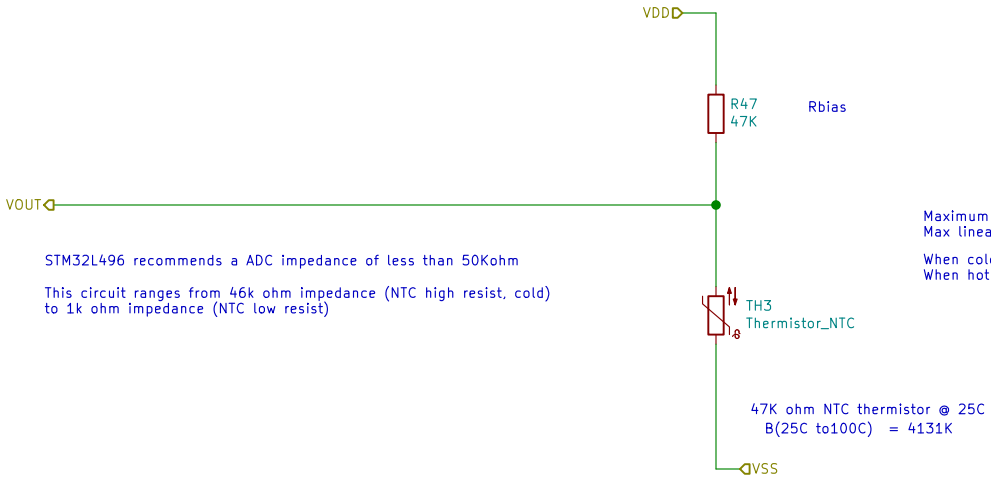
T2 = second temp point in Kelvin
R1 = thermistor's resistance at T1 in Ohms
R2 = thermistor's resistance at T2 in Ohms

https://www.electro-tech-online.com/tools/thermistor-resistance-calculator.php

Sheet: /STM32L4/TEMPERATURE_ADC/sheet5EC0237A/		
File: NTC_THERMISTOR.sch		
Title: NTC THERMISTOR		
Size: A	Date: 2020-05-05	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 14/23



STM32L496 recommends a ADC impedance of less than 50Kohm

This circuit ranges from 46k ohm impedance (NTC high resist, cold)
to 1k ohm impedance (NTC low resist)

Maximum ADC resolution when Rbias is matched with thermistor around temperature of interest.
Max linearity around temperature X when Rbias==Rt @ temperature X.

When cold, NTC resistance increases, Vout increases
When hot, NTC resistance decreases, Vout decreases

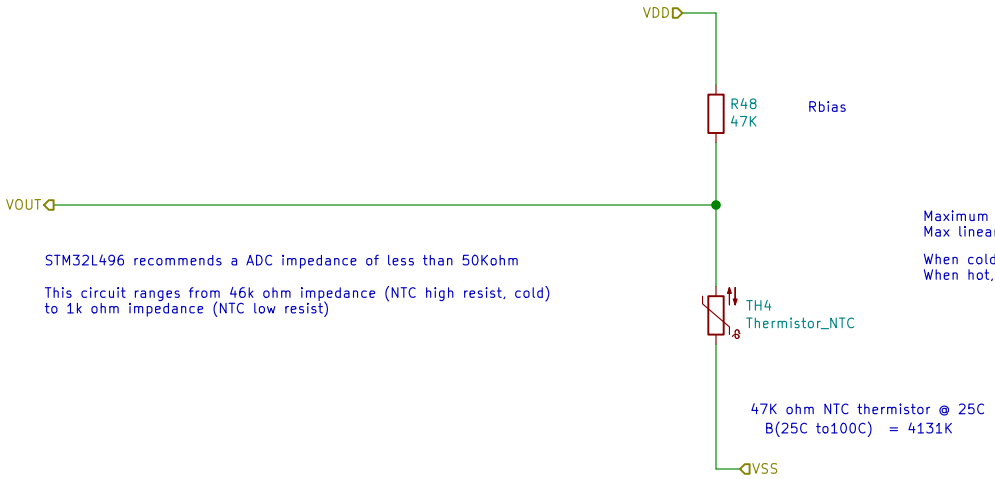
47K ohm NTC thermistor @ 25C
B(25C to100C) = 4131K

B (T1/ T2) = ((T2 x T1) / (T2 − T1)) x ln(R1/R2)

T1 = first temp point in Kelvin
T2 = second temp point in Kelvin
R1 = thermistor's resistance at T1 in Ohms
R2 = thermistor's resistance at T2 in Ohms

https://www.electro-tech-online.com/tools/thermistor-resistance-calculator.php

Sheet: /STM32L4/TEMPERATURE_ADC/sheet5EC02640/		
File: NTC_THERMISTOR.sch		
Title: NTC THERMISTOR		
Size: A	Date: 2020-05-05	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 15/23



STM32L496 recommends a ADC impedance of less than 50Kohm

This circuit ranges from 46k ohm impedance (NTC high resist, cold)
to 1k ohm impedance (NTC low resist)

Maximum ADC resolution when Rbias is matched with thermistor around temperature of interest.
Max linearity around temperature X when Rbias==Rt @ temperature X.

When cold, NTC resistance increases, Vout increases
When hot, NTC resistance decreases, Vout decreases

B (T1/ T2) = ((T2 x T1) / (T2 − T1)) x ln(R1/R2)

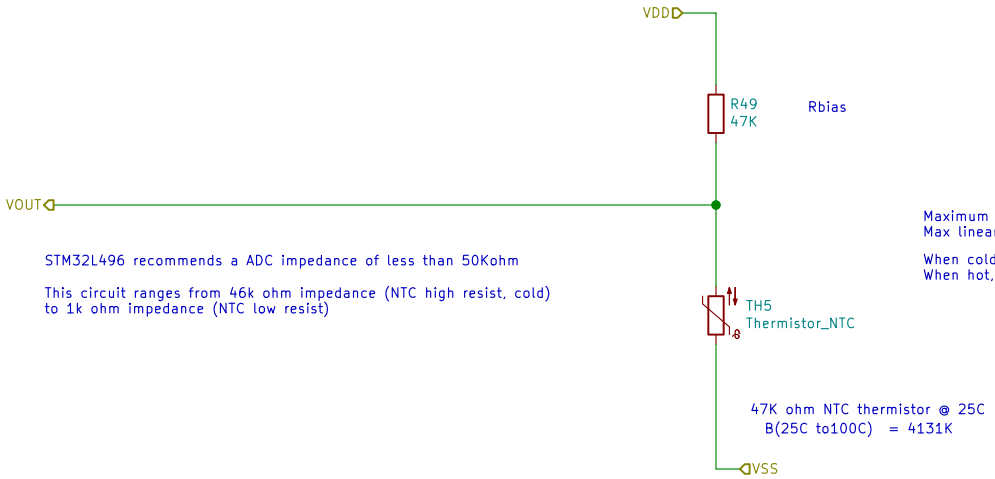
T1 = first temp point in Kelvin
T2 = second temp point in Kelvin
R1 = thermistor's resistance at T1 in Ohms
R2 = thermistor's resistance at T2 in Ohms

https://www.electro-tech-online.com/tools/thermistor-resistance-calculator.php

Sheet: /STM32L4/TEMPERATURE_ADC/sheet5EC02641/
File: NTC_THERMISTOR.sch

Title: NTC THERMISTOR

Size: A	Date: 2020-05-05	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 16/23



STM32L496 recommends a ADC impedance of less than 50Kohm

This circuit ranges from 46k ohm impedance (NTC high resist, cold)
to 1k ohm impedance (NTC low resist)

Maximum ADC resolution when Rbias is matched with thermistor around temperature of interest.
Max linearity around temperature X when Rbias==Rt @ temperature X.

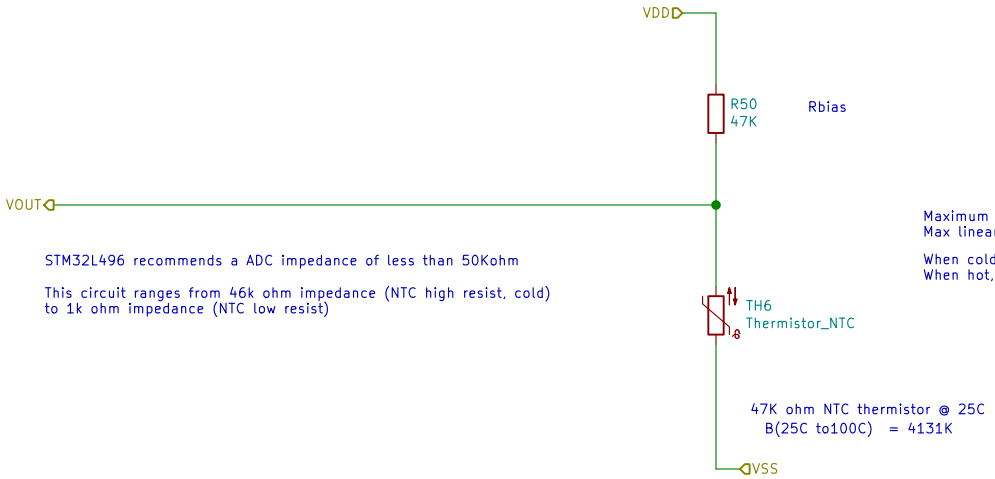
When cold, NTC resistance increases, Vout increases
When hot, NTC resistance decreases, Vout decreases

B (T1/ T2) = ((T2 x T1) / (T2 − T1)) x ln(R1/R2)

T1 = first temp point in Kelvin
T2 = second temp point in Kelvin
R1 = thermistor's resistance at T1 in Ohms
R2 = thermistor's resistance at T2 in Ohms

https://www.electro-tech-online.com/tools/thermistor-resistance-calculator.php

Sheet: /STM32L4/TEMPERATURE_ADC/sheet5EC02E2C/		
File: NTC_THERMISTOR.sch		
Title: NTC THERMISTOR		
Size: A	Date: 2020-05-05	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 17/23



STM32L496 recommends a ADC impedance of less than 50Kohm

This circuit ranges from 46k ohm impedance (NTC high resist, cold)
to 1k ohm impedance (NTC low resist)

Maximum ADC resolution when Rbias is matched with thermistor around temperature of interest.
Max linearity around temperature X when Rbias==Rt @ temperature X.

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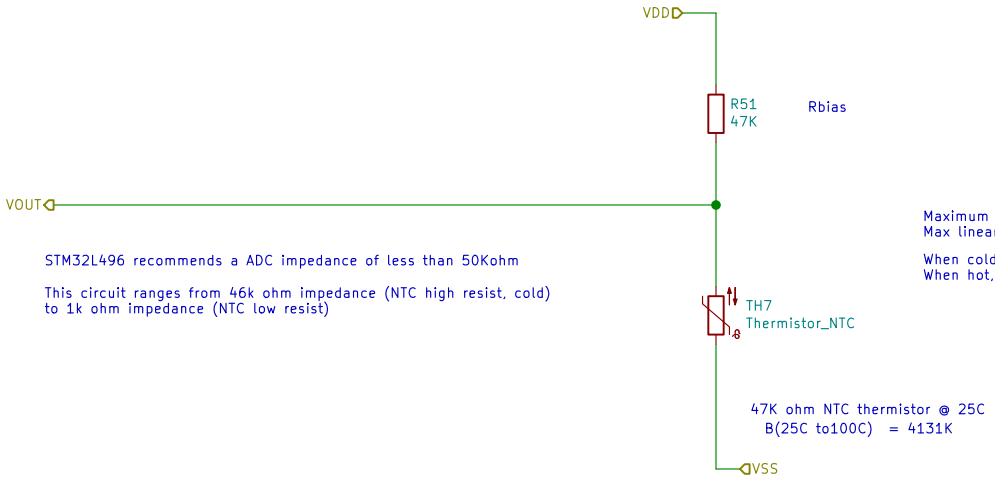
T1 = first temp point in Kelvin
T2 = second temp point in Kelvin
R1 = thermistor's resistance at T1 in Ohms
R2 = thermistor's resistance at T2 in Ohms

https://www.electro-tech-online.com/tools/thermistor-resistance-calculator.php

Sheet: /STM32L4/TEMPERATURE_ADC/sheet5EC02E2D/		
File: NTC_THERMISTOR.sch		
Title: NTC THERMISTOR		
Size: A	Date: 2020-05-05	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 18/23



STM32L496 recommends a ADC impedance of less than 50Kohm

This circuit ranges from 46k ohm impedance (NTC high resist, cold)
to 1k ohm impedance (NTC low resist)

Maximum ADC resolution when Rbias is matched with thermistor around temperature of interest.
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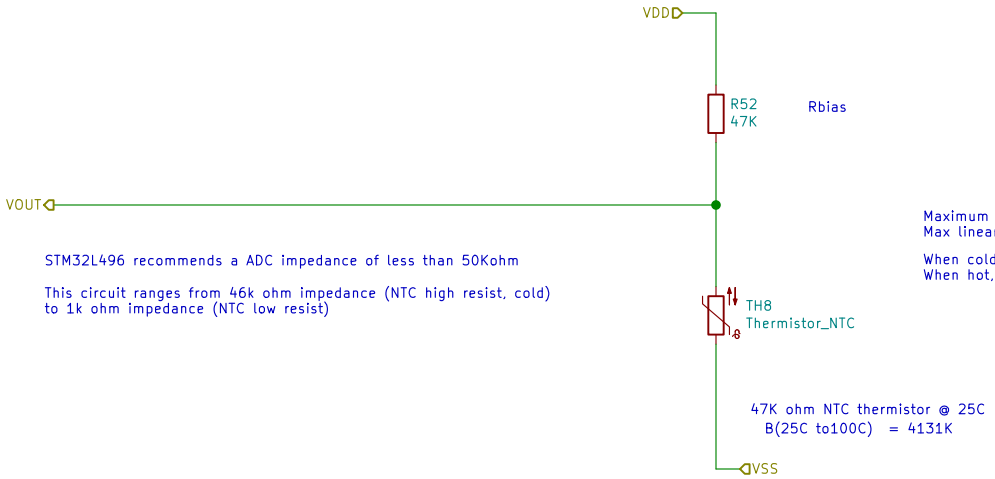
T1 = first temp point in Kelvin
T2 = second temp point in Kelvin
R1 = thermistor's resistance at T1 in Ohms
R2 = thermistor's resistance at T2 in Ohms

https://www.electro-tech-online.com/tools/thermistor-resistance-calculator.php

Sheet: /STM32L4/TEMPERATURE_ADC/sheet5EC02E2E/		
File: NTC_THERMISTOR.sch		
Title: NTC THERMISTOR		
Size: A	Date: 2020-05-05	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 19/23



STM32L496 recommends a ADC impedance of less than 50Kohm

This circuit ranges from 46k ohm impedance (NTC high resist, cold)
to 1k ohm impedance (NTC low resist)

Maximum ADC resolution when Rbias is matched with thermistor around temperature of interest.
Max linearity around temperature X when Rbias==Rt @ temperature X.

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When hot, NTC resistance decreases, Vout decreases

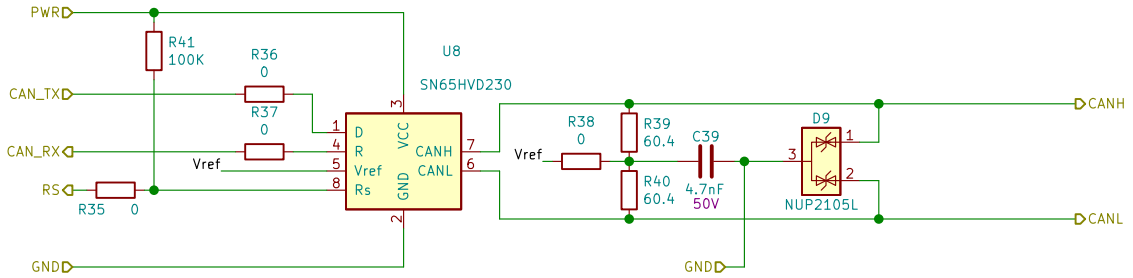
B (T1/ T2) = ((T2 x T1) / (T2 − T1)) x ln(R1/R2)

T1 = first temp point in Kelvin
T2 = second temp point in Kelvin
R1 = thermistor's resistance at T1 in Ohms
R2 = thermistor's resistance at T2 in Ohms

https://www.electro-tech-online.com/tools/thermistor-resistance-calculator.php

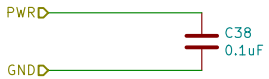
Sheet: /STM32L4/TEMPERATURE_ADC/sheet5EC02E2F/		
File: NTC_THERMISTOR.sch		
Title: NTC THERMISTOR		
Size: A	Date: 2020-05-05	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 20/23

D = CAN transmit data input, also called TXD, driver input
R = CAN receive data output, also called RXD, receiver output
Vref = Vcc/2 reference output pin
RS = Mode select. Strong pull down to GND = high speed mode.
Strong pull up to Vcc= low power mode. 10k to 100k to GND = slope control mode. Strong pull down to GND = High Speed



See SN65VD230 Datasheet for layout & more information about split termination

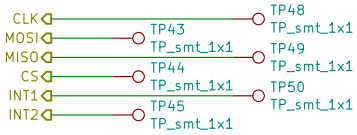
Layout Note: Decoupling

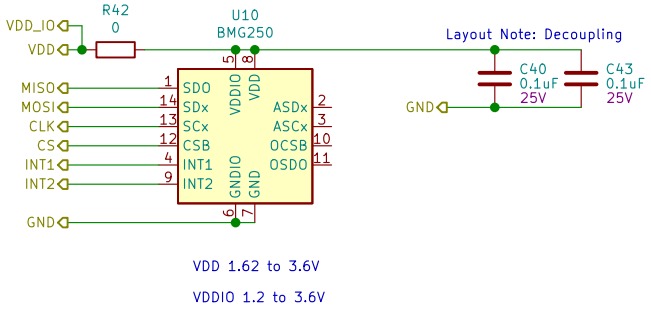


Sheet: /STM32L4/CAN_TRANSCEIVER/
File: CAN_TRANSCEIVER.sch

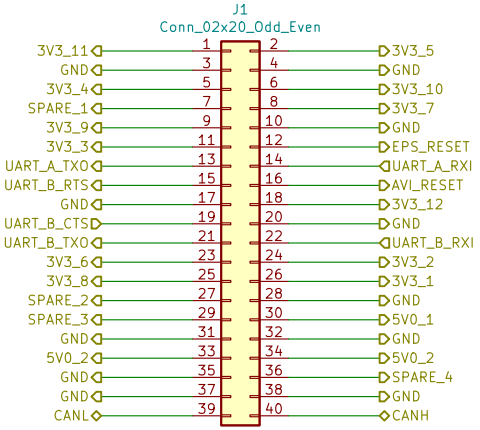
Title: CAN Transceiver

Size: A	Date: 2020-05-25	Rev:
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 21/23





Sheet: /STM32L4/GYRO/		
File: GYRO.sch		
Title: I3G4250D 3-axis digital gyroscope		
Size: A	Date: 2020-04-27	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 22/23



There are a lot of options that could work:
https://www.digikey.com/short/znc31r

Sheet: /STM32L4/Sheet639EBCAF/
File: INTERBOARD_CONNECTOR.sch

Title: Current Monitor

Size: A	Date: 2020-05-25	**Rev:**
KiCad E.D.A. kicad 5.1.7-a382d34a888ubuntu16.04.1		Id: 23/23