

External Header

Input Filtering

The diagram illustrates the input filtering circuit for a microcontroller. It shows the connection of various input signals to the microcontroller pins, including signal conditioning components like resistors, capacitors, and a diode. The circuit is powered by a +12V supply and grounded to GND. The components are labeled with their respective values and pin numbers.

Input Signals and Connections:

- SIG_CRUISE:** Connected to PA5/SP1_MOSI (pin 8) via a 4k7 resistor (R1).
- SIG_START:** Connected to PB6/TIM4_CH1 (pin 8) via a 4k7 resistor (R2).
- SIG_BRAKE:** Connected to PA2/ADC2 (pin 7) via a 4k7 resistor (R3).
- SIG_FORWARD:** Connected to PA4/ADC4 (pin 6) via a 4k7 resistor (R4).
- SIG_REVERSE:** Connected to PA7/TIM3_CH2 (pin 6) via a 4k7 resistor (R5).
- SIG_EMOCYSTOP:** Connected to PA8/TIM3_CH1 (pin 6) via a 4k7 resistor (R6).
- SIG_BMS:** Connected to PC4/ADC14 (pin 6) via a 4k7 resistor (R7).
- ENC_A/S2:** Connected to PC3/ADC13 (pin 6) via a 510 resistor (R8).
- ENC_B/S3:** Connected to PC1/ADC11 (pin 6) via a 510 resistor (R9).
- THROTTLE1:** Connected to PC0/ADC10 (pin 6) via a 10k resistor (R10).
- THROTTLE2:** Connected to PC2/ADC12 (pin 6) via a 10k resistor (R11).
- MTEMP:** Connected to PA5/ADC5 (pin 6) via a 10k resistor (R12).
- I_L1:** Connected to PA5/ADC5 (pin 6) via a 3k3 resistor (R23).
- I_L2:** Connected to PB0/ADC8 (pin 6) via a 3k3 resistor (R24).

Capacitors and Diodes:

- Capacitors:** C9 (1μF), C10 (1μF), C11 (1μF), C12 (1μF), C13 (1μF), C14 (1μF), C15 (1μF), C27 (1μF), C28 (1μF), C29 (1μF), C30 (1μF), C31 (1nF), C32 (1nF), C44 (1nF), C45 (1nF).
- Diode:** S1 (Solder Jumper).

Microcontroller Pins:

- PA5/SP1_MOSI (pin 8)
- PB6/TIM4_CH1 (pin 8)
- PA2/ADC2 (pin 7)
- PA3/ADC3 (pin 7)
- PA4/ADC4 (pin 6)
- PA7/TIM3_CH2 (pin 6)
- PA8/TIM3_CH1 (pin 6)
- PC4/ADC14 (pin 6)
- PC3/ADC13 (pin 6)
- PC1/ADC11 (pin 6)
- PC0/ADC10 (pin 6)
- PC2/ADC12 (pin 6)
- PA5/ADC5 (pin 6)
- PB0/ADC8 (pin 6)

Resistors:

- R1 (4k7)
- R2 (4k7)
- R3 (4k7)
- R4 (4k7)
- R5 (4k7)
- R6 (4k7)
- R7 (4k7)
- R8 (510)
- R9 (510)
- R10 (10k)
- R11 (10k)
- R12 (10k)
- R23 (3k3)
- R24 (3k3)
- R25 (68k)
- R26 (68k)

Main MCU

PA0-PA7

PA0	14
PA1/TIM2_CH2	15
PA2/ADC2	16
PA3/ADC3	17
PA4/ADC4	20
PA5/ADC5	21
PA6/TIM3_CH1	22
PA7/TIM3_CH2	23
PA7	24

PB0-PB7

PB0	26
PB1	27
PB2	28
PB3	55
PB4	56
PB5	57
PB6	58
PB7	59

PC0-PC7

PC0	3
PC1	3
PC2	3
PC3	53
PC4	51
PC5	40
PC6	39
PC7	38

SWDIO/TMS, SWCLK, RESET, NRESET, SWO/TDO, GND

IC4PORTA_H

PA8/TIM4_CH1	41
PA9/TIM4_CH2	42
PA10/TIM4_CH3	43
PA11/CANRX	44
PA12/CANTX	45
PA13	46
PA14	49
PA15	50

IC4PORTB_H

PB8	61
PB9/TIM4_CH4	62
PB10	29
PB11/USART3_TX	30
PB12	33
PB13	34
PB14	35
PB15	36

IC4PORTC_H

PC15	4
PC16	3
PC17	2
PC12	53
PC11	51
PC10	40
PC9	39
PC8	38

IC4PORTC_N

PC15	4
PC16	3
PC17	2
PC12	53
PC11	51
PC10	40
PC9	39
PC8	38

IC4POWER

VDD_1	32
VDD_2	48
VDD_3	64
VDD_4	19
VSS_1	31
VSS_2	47
VSS_3	63
VSS_4	18

IC4ANAL

VBAT	1
VSSA	12
VDDA	13

Reset Circuit

VCCIO (5V0) connected to R8 (100k) and C7 (100nF). R8 is connected to NRESET. C7 is connected to NRESET and GND. NRESET is connected to RESET.

Power and Timing

PD0/OSC<->PD2 connected to C22 (20pF) and C23 (20pF). PD1/OSC<->PD2 connected to C22 (20pF) and C23 (20pF). C22 and C23 are connected to GND. Q1 (8MHz) is connected to PD2 and GND. C26 (100nF) is connected to VSSA and GND. C27 (100nF) is connected to VDDA and GND.

Resolver Excitation

The diagram illustrates a Resolver Excitation circuit. It features two operational amplifiers, IC5A and IC5B, both TDA2822D. IC5A is configured as a voltage follower, with its non-inverting input (+) connected to a voltage divider (R15, R16) and its output (pin 1) connected to its inverting input (-). IC5B is configured as a voltage follower, with its non-inverting input (+) connected to a voltage divider (R17, R18) and its output (pin 3) connected to its inverting input (-). The outputs of IC5A and IC5B are connected to a common point, which is then connected to a load resistor R19 and a capacitor C38. The circuit is powered by a 5V supply (VCC) and ground (GND). Various capacitors (C34, C35, C36, C40, C41, C43, C46) are used for decoupling and timing. A red 'X' symbol is present in the top left corner of the diagram.

Digital Outputs

The diagram illustrates the wiring for two relays, RN1 and RN2, using an open hardware approach. The connections are as follows:

Relay RN1:

- PC13 (Pin 1) connects to OUT_DCSW (Pin 8).
- PB1/ADC9 (Pin 2) connects to OUT_PRE (Pin 7).
- PB3/SPI1_SCK (Pin 3) connects to Pin 6.
- PB4/SPI1_MISO (Pin 4) connects to Pin 5.

Relay RN2:

- PB9/TIM4_CH4 (Pin 1) connects to PWM_USER (Pin 8).
- PC11 (Pin 2) connects to OUT_OUVTG (Pin 7).
- PC5/ADC15 (Pin 3) connects to OUT_BRAKE (Pin 6).
- PC10 (Pin 4) connects to OUT_ERR (Pin 5).

Both relays are labeled with a 470 value, likely indicating a 470 ohm resistor or similar component. The connections for OUT_DCSW and OUT_PRE are shown as green lines, while the others are red. The output pins 5 and 6 of RN2 are connected to ground symbols.

Over Current Protection & HW Shutdown

[illegible]