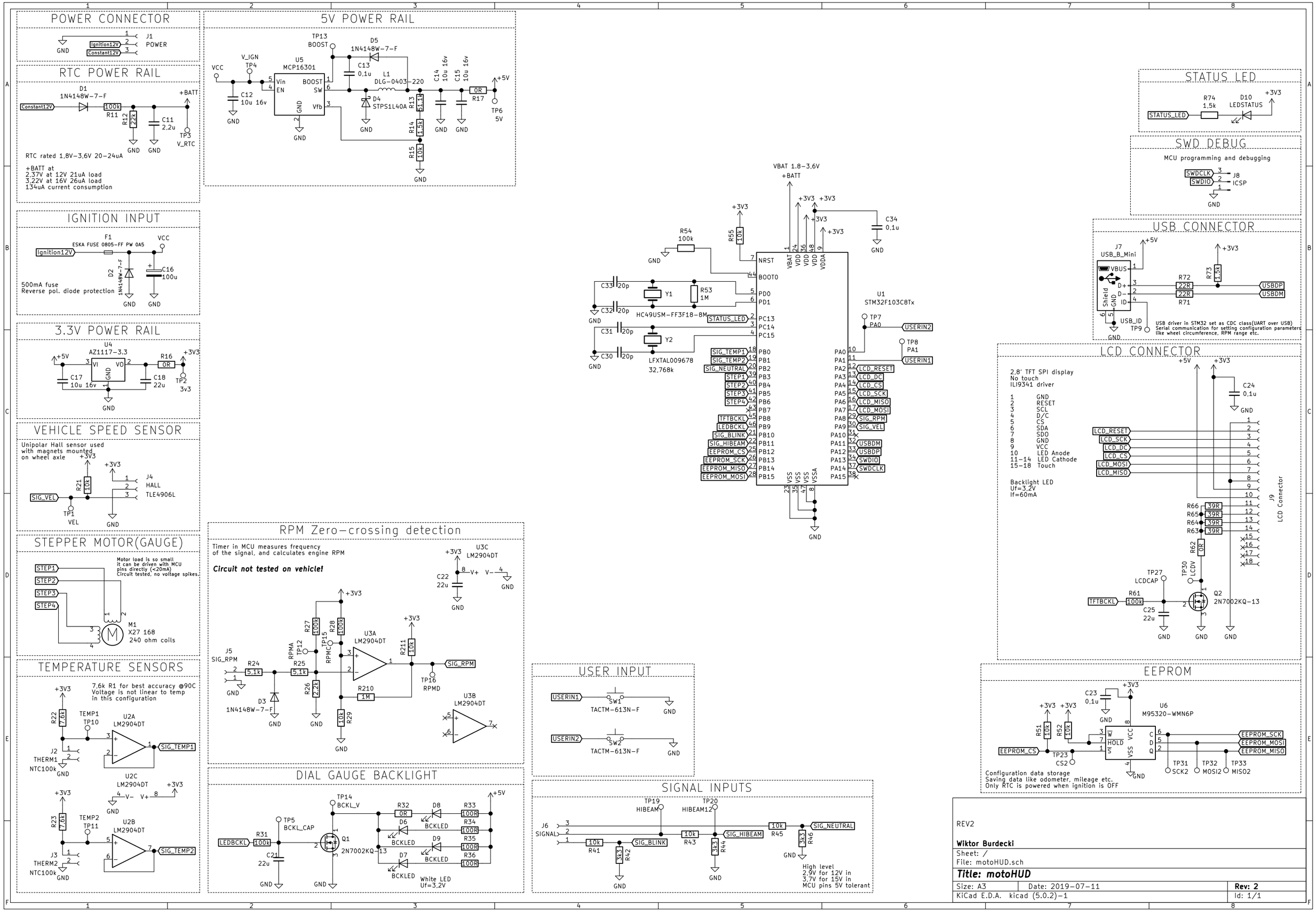
POWER CONNECTOR
J1
POWER
Ignition12V
Constant12V
GND
RTC POWER RAIL
D1
1N4148W-7-F
Constant12V
R11 100k
R12 22k
C11 2,2u
+BATT
TP3
V_RTC
RTC rated 1,8V-3,6V 20-24uA
+BATT at
2,37V at 12V 21uA load
3,22V at 16V 26uA load
134uA current consumption
IGNITION INPUT
F1
ESKA FUSE 0805-FF PW 0A5
Ignition12V
VCC
D2
1N4148W-7-F
C16
100u
500mA fuse
Reverse pol. diode protection
3.3V POWER RAIL
U4
AZ1117-3.3
+5V
VI
VO
GND
R16 0R
+3V3
C17
10u 16v
C18
22u
TP2
3v3
VEHICLE SPEED SENSOR
Unipolar Hall sensor used
with magnets mounted
on wheel axle
+3V3
R21 10k
SIG_VEL
TP1
VEL
J4
HALL
TLE4906L
STEPPER MOTOR(GAUGE)
STEP1
STEP2
STEP3
STEP4
Motor load is so small
it can be driven with MCU
pins directly (<20mA)
Circuit tested, no voltage spikes.
M1
X27 168
240 ohm coils
TEMPERATURE SENSORS
7,6k R1 for best accuracy @90C
Voltage is not linear to temp
in this configuration
R22 7,6k
TEMP1
TP10
U2A
LM2904DT
SIG_TEMP1
J2
THERM1
NTC100k
R23 7,6k
TEMP2
TP11
U2B
LM2904DT
SIG_TEMP2
J3
THERM2
NTC100k
U2C
LM2904DT
5V POWER RAIL
TP13
BOOST
D5
1N4148W-7-F
VCC
V_IGN
TP4
U5
MCP16301
Vin
EN
BOOST
SW
GND
Vfb
C12
10u 16v
C13
0,1u
L1
DLG-0403-220
D4
STPS1L40A
R13 5,1k
R14 1,5k
R15 10k
C14
10u 16v
C15
10u 16v
0R
R17
+5V
TP6
5V
RPM Zero-crossing detection
Timer in MCU measures frequency
of the signal, and calculates engine RPM
Circuit not tested on vehicle!
U3C
LM2904DT
C22
22u
J5
SIG_RPM
R24 5,1k
R25 5,1k
R26 2,2k
R27 100k
R28 100k
RPMA
TP12
TP15
RPMC
U3A
LM2904DT
R211 10k
SIG_RPM
TP16
RPMD
R210 1M
R29 10k
D3
1N4148W-7-F
U3B
LM2904DT
DIAL GAUGE BACKLIGHT
TP14
BCKL_V
TP5
BCKL_CAP
LEDBCKL
R31 100k
C21
22u
Q1
2N7002KQ-13
R32 0R
D8
R33 100R
D6
BCKLED
R34 100R
D9
R35 100R
D7
R36 100R
White LED
Uf=3,2V
VBAT 1.8-3,6V
+BATT
+3V3
R54 100k
R55 10k
C33 20p
C32 20p
C31 20p
C30 20p
Y1
R53 1M
HC49USM-FF3F18-8M
Y2
LFXTAL009678
32,768k
STATUS_LED
NRST
BOOT0
PD0
PD1
PC13
PC14
PC15
VBAT
VDD
VDDA
VSS
VSSA
C34
0,1u
U1
STM32F103C8Tx
TP7
PA0
USERIN2
TP8
PA1
USERIN1
SIG_TEMP1
SIG_TEMP2
SIG_NEUTRAL
STEP1
STEP2
STEP3
STEP4
TFTBCKL
LEDBCKL
SIG_BLINK
SIG_HIBEAM
EEPROM_CS
EEPROM_SCK
EEPROM_MISO
EEPROM_MOSI
LCD_RESET
LCD_DC
LCD_CS
LCD_SCK
LCD_MISO
LCD_MOSI
SIG_RPM
SIG_VEL
USBDM
USBDP
SWDIO
SWDCLK
USER INPUT
USERIN1
SW1
TACTM-613N-F
USERIN2
SW2
TACTM-613N-F
SIGNAL INPUTS
J6
SIGNAL
TP19
HIBEAM
TP20
HIBEAM12
10k R41
SIG_BLINK
3k3 R42
10k R43
SIG_HIBEAM
3k3 R44
10k R45
SIG_NEUTRAL
3k3 R46
High level
2,9V for 12V in
3,7V for 15V in
MCU pins 5V tolerant
STATUS LED
R74 1,5k
D10
LEDSTATUS
+3V3
SWD DEBUG
MCU programming and debugging
SWDCLK
SWDIO
J8
ICSP
USB CONNECTOR
J7
USB_B_Mini
VBUS
D+
D-
ID
Shield
GND
+5V
+3V3
R72 22R
R71 22R
R73 1,5k
USBDP
USBDM
USB_ID
TP9
USB driver in STM32 set as CDC class(UART over USB)
Serial communication for setting configuration parameters
like wheel circumference, RPM range etc.
LCD CONNECTOR
2,8' TFT SPI display
No touch
ILI9341 driver
1 GND
2 RESET
3 SCL
4 D/C
5 CS
6 SDA
7 SDO
8 GND
9 VCC
10 LED Anode
11-14 LED Cathode
15-18 Touch
Backlight LED
Uf=3,2V
If=60mA
C24
0,1u
LCD_RESET
LCD_SCK
LCD_DC
LCD_CS
LCD_MOSI
LCD_MISO
R66 39R
R65 39R
R64 39R
R63 39R
R62 0R
TP30
LCDV
J9
LCD Connector
TP27
LCDCAP
R61 100k
TFTBCKL
C25
22u
Q2
2N7002KQ-13
EEPROM
C23
0,1u
U6
M95320-WMN6P
R51 10k
R52 10k
EEPROM_CS
TP23
CS2
W
HOLD
S
VCC
VSS
C
D
Q
EEPROM_SCK
EEPROM_MOSI
EEPROM_MISO
TP31
SCK2
TP32
MOSI2
TP33
MISO2
Configuration data storage
Saving data like odometer, mileage etc.
Only RTC is powered when ignition is OFF
REV2
Wiktor Burdecki
Sheet: /
File: motoHUD.sch
Title: motoHUD
Size: A3
Date: 2019-07-11
Rev: 2
KiCad E.D.A. kicad (5.0.2)-1
Id: 1/1