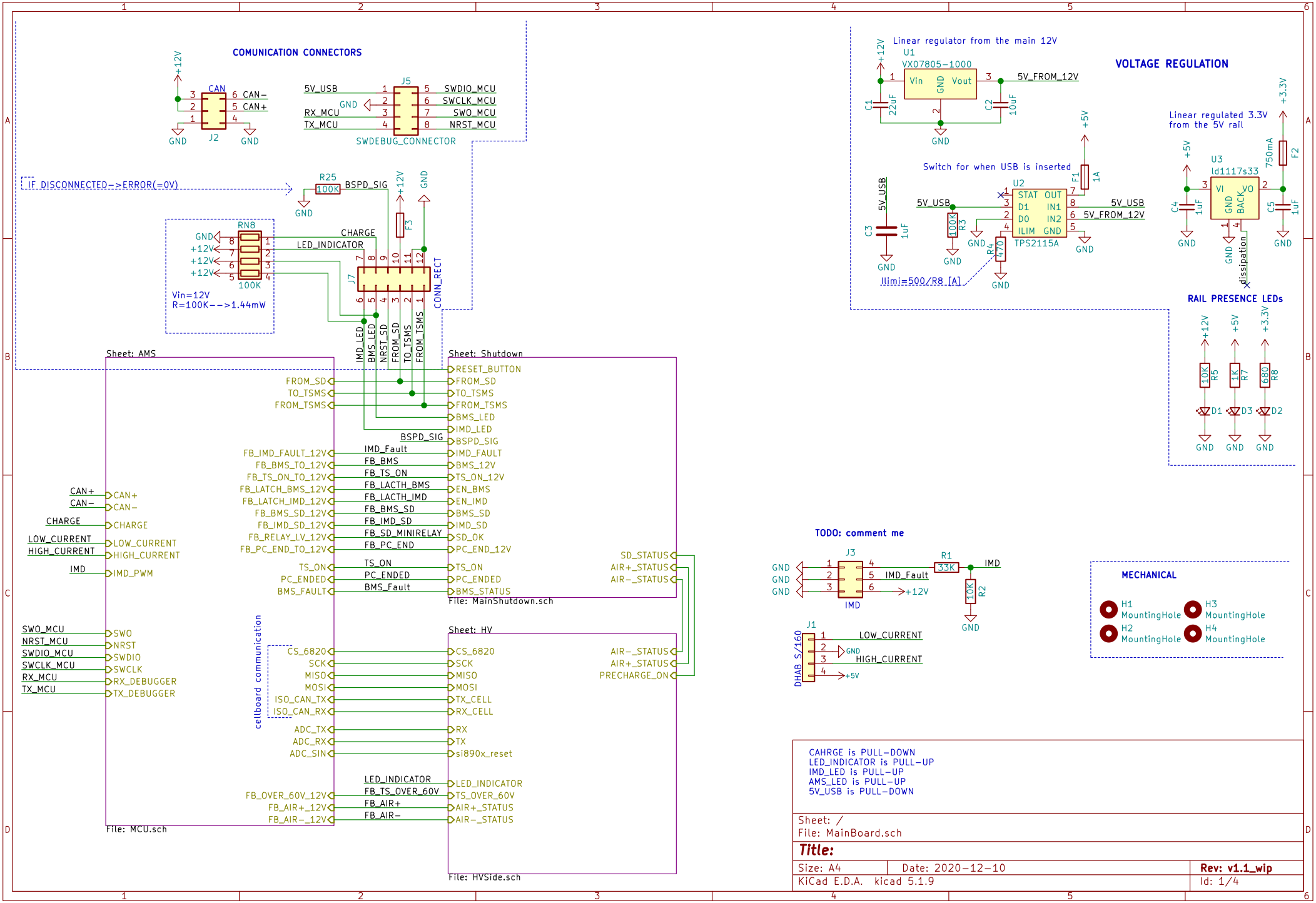
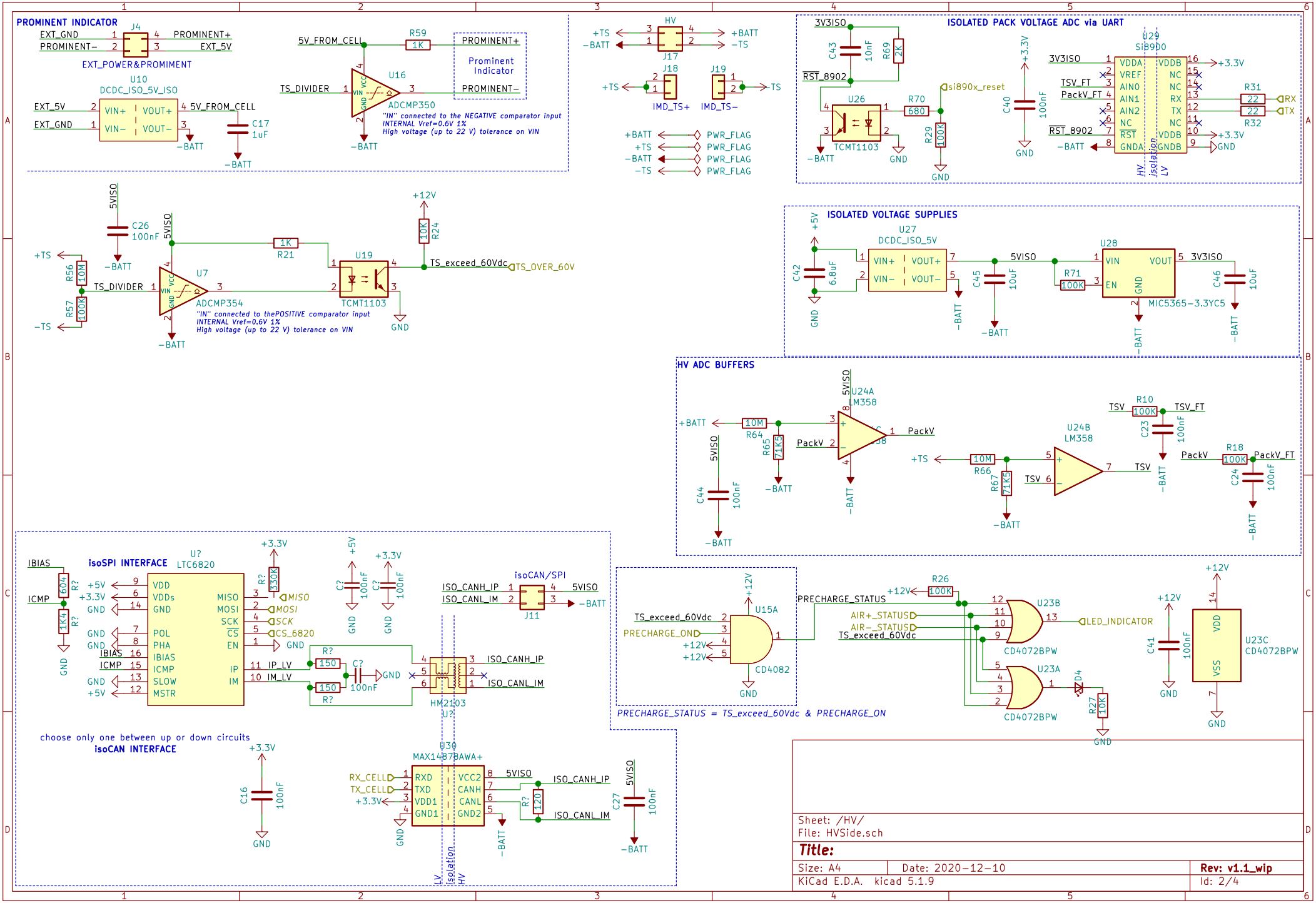
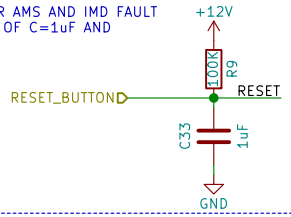
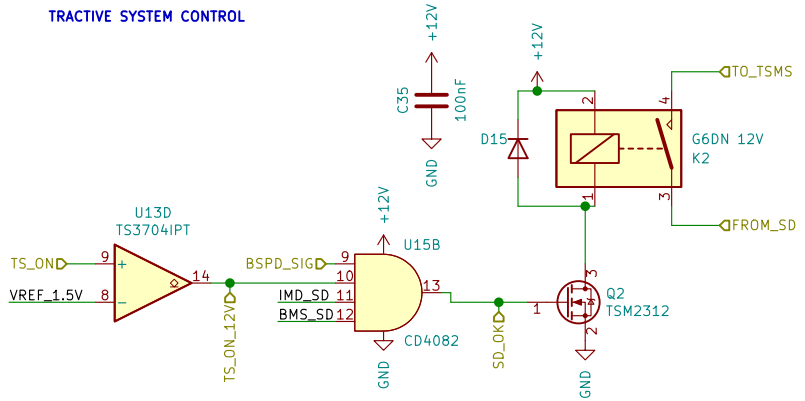

COMUNICATION CONNECTORS
CAN
J2
CAN-
CAN+
GND
+12V
5V_USB
GND
RX_MCU
TX_MCU
J5
SWDIO_MCU
SWCLK_MCU
SWO_MCU
NRST_MCU
SWDEBUG_CONNECTOR
IF DISCONNECTED->ERROR(=0V)
R25
100K
BSPD_SIG
RN8
CHARGE
LED_INDICATOR
F3
J7
CONN_RECT
Vin=12V
R=100K-->1.44mW
IMD_LED
BMS_LED
NRST_SD
FROM_SD
TO_TSMS
FROM_TSMS
Sheet: AMS
Sheet: Shutdown
RESET_BUTTON
IMD_Fault
FB_BMS
FB_TS_ON
FB_LACTH_BMS
FB_LACTH_IMD
FB_BMS_SD
FB_IMD_SD
FB_SD_MINIRELAY
FB_PC_END
IMD_FAULT
BMS_12V
TS_ON_12V
EN_BMS
EN_IMD
BMS_SD
IMD_SD
SD_OK
PC_END_12V
TS_ON
PC_ENDED
BMS_FAULT
BMS_STATUS
SD_STATUS
AIR+_STATUS
AIR-_STATUS
File: MainShutdown.sch
CAN+
CAN-
CHARGE
LOW_CURRENT
HIGH_CURRENT
IMD
IMD_PWM
SWO_MCU
NRST_MCU
SWDIO_MCU
SWCLK_MCU
RX_MCU
TX_MCU
SWO
NRST
SWDIO
SWCLK
RX_DEBUGGER
TX_DEBUGGER
cellboard communication
Sheet: HV
CS_6820
SCK
MISO
MOSI
ISO_CAN_TX
ISO_CAN_RX
TX_CELL
RX_CELL
ADC_TX
ADC_RX
ADC_SIN
RX
TX
si890x_reset
PRECHARGE_ON
LED_INDICATOR
FB_OVER_60V_12V
FB_TS_OVER_60V
FB_AIR+_12V
FB_AIR-_12V
FB_AIR+
FB_AIR-
TS_OVER_60V
AIR+_STATUS
AIR-_STATUS
File: MCU.sch
File: HVSide.sch
VOLTAGE REGULATION
Linear regulator from the main 12V
U1
VX07805-1000
Vin
GND
Vout
5V_FROM_12V
C1
22uF
C2
10uF
Switch for when USB is inserted
U2
TPS2115A
STAT
OUT
D1
IN1
D0
IN2
ILIM
F1
1A
C3
1uF
R3
100K
R4
470
Ilimi=500/R8 [A]
Linear regulated 3.3V from the 5V rail
U3
ld1117s33
VI
VO
BACK
750mA
F2
C4
1uF
C5
1uF
dissipation
RAIL PRESENCE LEDs
R5
10K
R7
1K
R8
680
D1
D3
D2
TODO: comment me
J3
IMD_Fault
R1
33K
R2
10K
IMD
J1
DHAB S/160
LOW_CURRENT
HIGH_CURRENT
MECHANICAL
H1
MountingHole
H2
MountingHole
H3
MountingHole
H4
MountingHole
CAHRGE is PULL-DOWN
LED_INDICATOR is PULL-UP
IMD_LED is PULL-UP
AMS_LED is PULL-UP
5V_USB is PULL-DOWN
Sheet: /
File: MainBoard.sch
Title:
Size: A4
Date: 2020-12-10
Rev: v1.1_wip
KiCad E.D.A. kicad 5.1.9
Id: 1/4


PROMINENT INDICATOR
EXT_GND
PROMINENT−
PROMINENT+
EXT_5V
EXT_POWER&PROMIMENT
U10
DCDC_ISO_5V_ISO
EXT_5V
EXT_GND
VIN+
VIN−
VOUT+
VOUT−
5V_FROM_CELL
C17
1uF
−BATT
5V_FROM_CELL
R59
1K
PROMINENT+
Prominent Indicator
PROMINENT−
TS_DIVIDER
U16
ADCMP350
"IN" connected to the NEGATIVE comparator input
INTERNAL Vref=0.6V 1%
High voltage (up to 22 V) tolerance on VIN
HV
+TS
−BATT
+BATT
−TS
J17
J18
J19
IMD_TS+
IMD_TS−
PWR_FLAG
ISOLATED PACK VOLTAGE ADC via UART
3V3ISO
C43
10nF
R69
2K
RST_8902
U26
TCMT1103
R70
680
R29
100K
si890x_reset
GND
C40
100nF
+3.3V
U29
Si8900
VDDA
VREF
AIN0
AIN1
AIN2
NC
RST
GNDA
VDDB
RX
TX
TSV_FT
PackV_FT
R31
R32
22
HV
isolation
LV
ISOLATED VOLTAGE SUPPLIES
U27
DCDC_ISO_5V
+5V
C42
6.8uF
5VISO
C45
10uF
U28
MIC5365−3.3YC5
VIN
VOUT
EN
R71
100K
C46
HV ADC BUFFERS
U24A
LM358
U24B
PackV
TSV
TSV_FT
PackV_FT
R64
10M
R65
71K5
R66
R67
R10
R18
C23
C24
100nF
C44
+12V
R24
10K
TS_exceed_60Vdc
TS_OVER_60V
R56
R57
R21
1K
U7
U19
TCMT1103
ADCMP354
"IN" connected to thePOSITIVE comparator input
INTERNAL Vref=0.6V 1%
High voltage (up to 22 V) tolerance on VIN
C26
100nF
isoSPI INTERFACE
U?
LTC6820
IBIAS
ICMP
MISO
MOSI
SCK
CS_6820
IP_LV
IM_LV
HM2103
isoCAN/SPI
ISO_CANH_IP
ISO_CANL_IM
J11
choose only one between up or down circuits
isoCAN INTERFACE
U30
MAX14887BAWA+
RX_CELL
TX_CELL
RXD
TXD
VDD1
GND1
VCC2
CANH
CANL
GND2
R?
120
C16
C27
TS_exceed_60Vdc
PRECHARGE_ON
U15A
CD4082
PRECHARGE_STATUS = TS_exceed_60Vdc & PRECHARGE_ON
PRECHARGE_STATUS
AIR+_STATUS
AIR−_STATUS
U23B
U23A
U23C
CD4072BPW
LED_INDICATOR
D4
R27
10K
R26
100K
Sheet: /HV/
File: HVSide.sch
Title:
Size: A4
Date: 2020−12−10
KiCad E.D.A. kicad 5.1.9
Rev: v1.1_wip
Id: 2/4

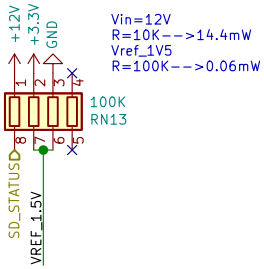
RESET BUTTON WITH PULLUP (100K) FOR AMS AND IMD FAULT
WITH START DELAY OF 120ms (BECAUSE OF C=1uF AND
VIH MIN OF 4044 is 8.4V AT VCC=12V)



TRACTIVE SYSTEM CONTROL



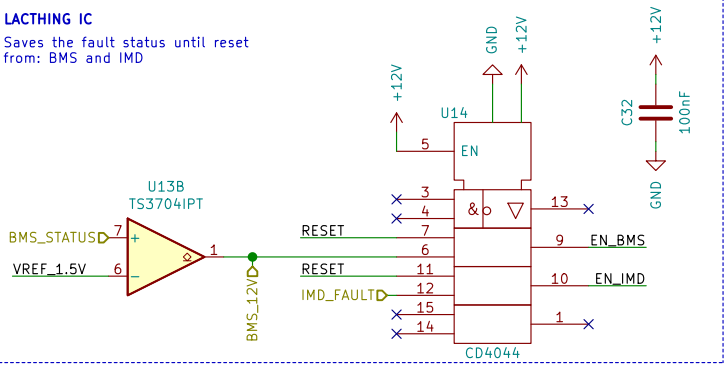
TODO: no idea

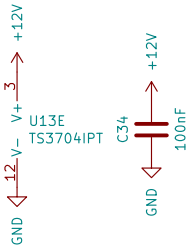


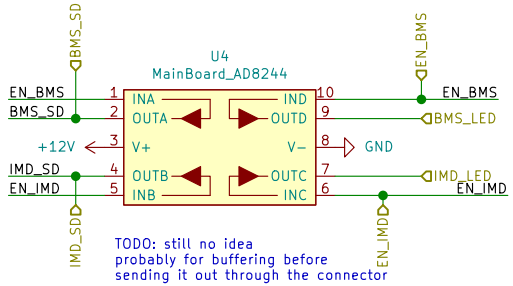
Vin=12V
R=10K-->14.4mW
Vref_1V5
R=100K-->0.06mW

LACTHING IC

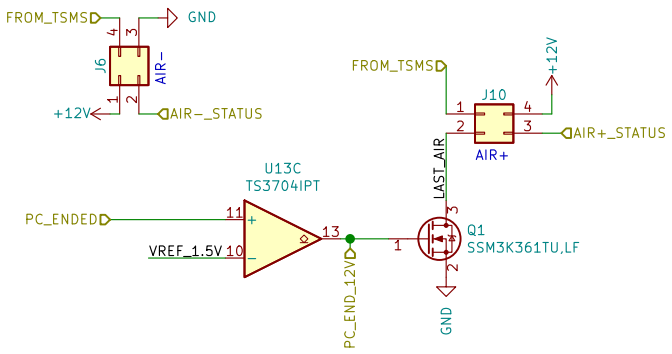
Saves the fault status until reset
from: BMS and IMD



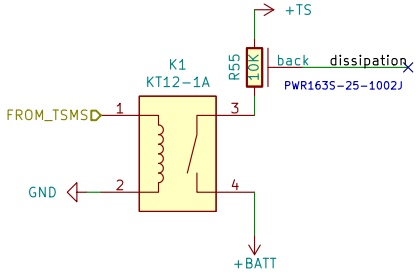




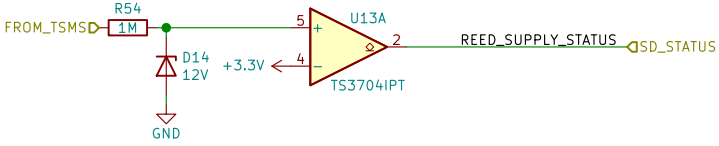
AIR CONTROL CIRCUIT



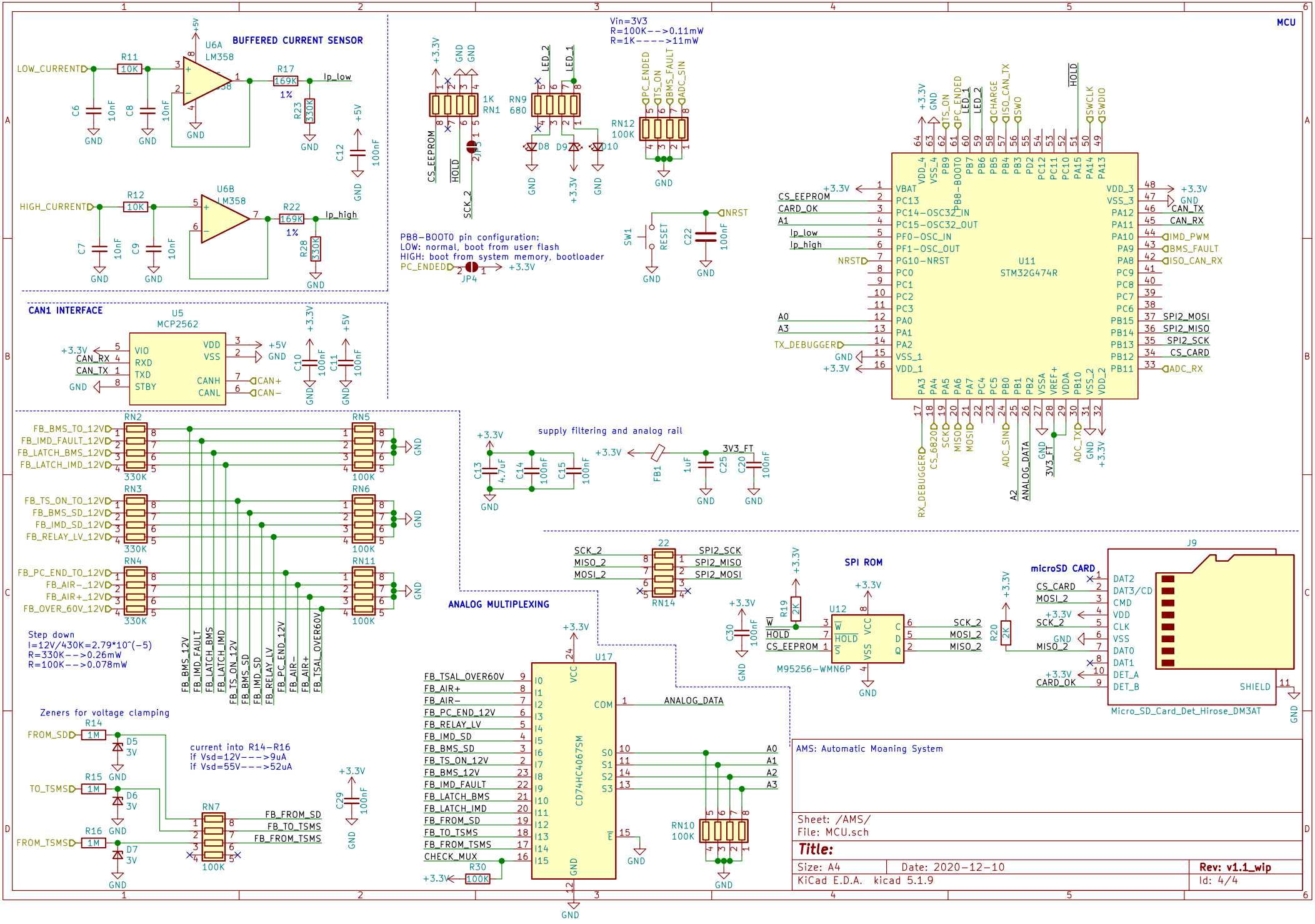
PRE-CHARGE CIRCUIT



SHUTDOWN STATUS



Sheet: /Shutdown/		
File: MainShutdown.sch		
Title:		
Size: A4	Date: 2020-12-10	**Rev: v1.1_wip**
KiCad E.D.A. kicad 5.1.9		Id: 3/4


BUFFERED CURRENT SENSOR
LOW_CURRENT
HIGH_CURRENT
lp_low
lp_high
U6A
U6B
LM358
R11
R12
R17
R22
R23
R28
10K
169K
330K
1%
C6
C7
C8
C9
C12
10nF
100nF
GND
+5V
Vin=3V3
R=100K-->0.11mW
R=1K---->11mW
RN1
RN9
RN12
1K
680
100K
LED_2
LED_1
D8
D9
D10
CS_EEPROM
HOLD
SCK_2
PC_ENDED
TS_ON
BMS_FAULT
ADC_SIN
PB8-BOOT0 pin configuration:
LOW: normal, boot from user flash
HIGH: boot from system memory, bootloader
JP4
SW1
RESET
NRST
C22
MCU
U11
STM32G474R
VBAT
PC13
PC14-OSC32_IN
PC15-OSC32_OUT
PF0-OSC_IN
PF1-OSC_OUT
PG10-NRST
PC0
PC1
PC2
PC3
PA0
PA1
PA2
VSS_1
VDD_1
VDD_4
VSS_4
PB9
PB8-BOOT0
PB7
PB6
PB5
PB4
PB3
PD2
PC12
PC11
PC10
PA15
PA14
PA13
VDD_3
VSS_3
PA12
PA11
PA10
PA9
PA8
PC9
PC8
PC7
PC6
PB15
PB14
PB13
PB12
PB11
PA3
PA4
PA5
PA6
PA7
PC4
PC5
PB0
PB1
PB2
VSSA
VREF+
VDDA
PB10
VSS_2
VDD_2
CHARGE
ISO_CAN_TX
SWO
SWCLK
SWDIO
CAN_TX
CAN_RX
IMD_PWM
BMS_FAULT
ISO_CAN_RX
SPI2_MOSI
SPI2_MISO
SPI2_SCK
CS_CARD
ADC_RX
CAN1 INTERFACE
U5
MCP2562
VIO
RXD
TXD
STBY
VDD
VSS
CANH
CANL
CAN+
CAN-
C10
C11
supply filtering and analog rail
C13
C14
C15
FB1
C25
C20
3V3_FT
RN2
RN3
RN4
RN5
RN6
RN11
330K
100K
FB_BMS_TO_12V
FB_IMD_FAULT_12V
FB_LATCH_BMS_12V
FB_LATCH_IMD_12V
FB_TS_ON_TO_12V
FB_BMS_SD_12V
FB_IMD_SD_12V
FB_RELAY_LV_12V
FB_PC_END_TO_12V
FB_AIR-_12V
FB_AIR+_12V
FB_OVER_60V_12V
Step down
I=12V/430K=2.79*10^(-5)
R=330K-->0.26mW
R=100K-->0.078mW
ANALOG MULTIPLEXING
RN14
SCK_2
MISO_2
MOSI_2
SPI2_SCK
SPI2_MISO
SPI2_MOSI
SPI ROM
U12
M95256-WMN6P
R19
R20
C30
microSD CARD
J9
Micro_SD_Card_Det_Hirose_DM3AT
CS_CARD
MOSI_2
SCK_2
MISO_2
CARD_OK
SHIELD
Zeners for voltage clamping
R14
R15
R16
D5
D6
D7
3V
1M
FROM_SD
TO_TSMS
FROM_TSMS
current into R14-R16
if Vsd=12V---->9uA
if Vsd=55V---->52uA
RN7
FB_FROM_SD
FB_TO_TSMS
FB_FROM_TSMS
C29
U17
CD74HC4067SM
ANALOG_DATA
FB_TSAL_OVER60V
FB_AIR+
FB_AIR-
FB_PC_END_12V
FB_RELAY_LV
FB_IMD_SD
FB_BMS_SD
FB_TS_ON_12V
FB_BMS_12V
FB_IMD_FAULT
FB_LATCH_BMS
FB_LATCH_IMD
FB_FROM_SD
FB_TO_TSMS
FB_FROM_TSMS
CHECK_MUX
R30
RN10
A0
A1
A2
A3
AMS: Automatic Moaning System
Sheet: /AMS/
File: MCU.sch
Title:
Size: A4
Date: 2020-12-10
Rev: v1.1_wip
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Id: 4/4