DC Motor Controller

ATTD_RST_DRAIN
SWD_RST
+3V3
R8 33K
R9 1K
+3V3
GND

100nF C18 100nF C17 100nF C12 100nF C13 4.7uF C15 C14 100nF 1uF
+3V3
GND

IC5
TLV803SDBZT
VDD 1
RESET 2
GND

C11 1nF

Y1
ABM10AIG-24.000MHZ-4Z-T3
24 MHz
GND_2 XTAL_2
XTAL_1 GND_1
C19 10pf
C20 10pf
GND

U1
STM32L051C8Tx
NRST
BOOT0
PH0
PH1
PC13
PC14
PC15
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
PB8
PB9
PB10
PB11
PB12
PB13
PB14
PB15
VSS
VSSA
GND

PA0 MAGTRQ_PWGOOD
PA1 MAGTRQ_Y_IN2
PA2 MAGTRQ_Y_IN1
PA3 MAGTRQ_X_IN2
PA4 MAGTRQ_X_IN1
PA5 RW_IN1
PA6 RW_EN1
PA7 RW_IN2
PA8 RW_EN2
PA9 RW_IN3
PA10 RW_EN3
PA11 RW_FAULT
PA12
PA13 SWD_SWDIO
PA14 SWD_SWCLK
PA15

WATCHDOG_ATTD_OUT
WATCHDOG_ATTD_IN

UART CaC
RW_UART_RX
RW_UART_TX

Gyroscope

IC2
ASM330LHHTR
GYRO_SPI_MOSI
GYRO_SPI_SCK
GYRO_SPI_SS
SDA
SCL
CS

GYRO_SPI_MISO SDO/SA0
GND RES_1
GND RES_2
INT1

NC_2
NC_1
INT2
VDD

R6 10K
+3V3
GND

R7 10K
GND

VDDIO
GND_1
GND_2
+3V3 GND

Magnetometer

IC8
MLX90395KDC-BBA-001-RE
MGTMTR_SCK SCL/SCLK MC/CS MGTMTR_CS
MGTMTR_MOSI SDA/MOSI VDD +3V3
MGTMTR_MISO MISO VSS GND
MGTMTR_INT INT/TRG A0

External Actuators

J3 Conn_01x01 MAGTRQ_Y+
J4 Conn_01x01 MAGTRQ_Y−
J5 Conn_01x01 MAGTRQ_X+
J6 Conn_01x01 MAGTRQ_X−
J7 Conn_01x01 RW_MOTOR_U
J8 Conn_01x01 RW_MOTOR_V
J10 Conn_01x01 RW_MOTOR_W

J1 1979

RW_GATE
GYRO_RST GYRO_SPI_SCK
GYRO_SPI_MISO
GYRO_SPI_MOSI
ATTD_DIGITAL_ON
MAGTRQ_GATE
WATCHDOG_ATTD_IN
GYRO_SS
RW_UART_RX
RW_UART_TX
WATCHDOG_ATTD_OUT
ATTD_RST_DRAIN

MGTMTR_CS
MGTMTR_SCK
MGTMTR_MOSI
MGTMTR_MISO
MGTMTR_INT

9V_DRIVER GND
5V_DIRECT
LOAD_F_VBUS LOAD_E_VBUS
LOAD_D_VBUS
LOAD_C_VBUS LOAD_B_VBUS

J2 1979

Reaction Wheel Driver

IC9
DRV8313PWPR
C30 .01uF
C29 .1uF
C26 .1uF
C28 100uF
C27 .1uF
GND
+9V

CPL GND_3 GND
CPH IN1 RW_IN1
VCP EN1 RW_EN1
VM_1 IN2 RW_IN2
OUT1 EN2 RW_EN2
PGND1 IN3 RW_IN3
PGND2 EN3 RW_EN3
OUT2 NC
PGND3 GND_2 GND
VM_2 NCOMPO GND
COMPP NFAULT
COMPN NSLEEP RW_GATE
GND_1 NRESET +3V3
V3P3

RW_MOTOR_U
RW_MOTOR_V
RW_MOTOR_W
RW_FAULT
R12 10K
C31 .47uF
GND
EP 29

Mosfet

IC1
MCP14A0455T-E_SN
GND R1 100K
MAGTRQ_GATE ENA ENB R13 100K GND
9V_DRIVER INA OUTA/OUTA/OUTA ATTD_DIGITAL_ON
GND GND VDD MAGTRQ_GATE_9V
9V_DRIVER INB OUTB/OUTB/OUTB 9V_DRIVER
ATTD_DIGITAL_ON_9V

Q2
BUK9K13-60RAX
(No Breaker) 5V_DIRECT S1 D2_2 DIGITAL_VBUS_5V
MAGTRQ_GATE_9V G1 D1_1 MAGTRQ_5V
(Breaker) LOAD_C_VBUS S2 D1_2 MAGTRQ_5V
ATTD_DIGITAL_ON_9V G2 N D2_3 DIGITAL_VBUS_5V
DIGITAL_VBUS_5V D2_1 D1_3 MAGTRQ_5V

9V Converter for Reaction Wheel

C3 2.2uF
C7 .1uF
GND
IC4
MAX20474ATDA_V+
BIAS EN
AV GND
REG SYNC
OUTS SSEN
OUT RESET
LX_1 PGND_2
LX_2 PGND_1

+9V
C9 220nF C4 220nF
C6 24uF C5 10pF R4 68K
R5 6.8K
C8 2.2uF
L1 1uH
5V_DIRECT

R3 10K +3V3
GND
+3V3
GND
R2 10K +3V3
GND
GND

Consider x7r
Reg to ground cap = 220nF
Cin 2.2uF X7R
Cout = 24uF at 500mA 9v low ESR cap (1210)
68K = 6.8K(Vout/.812 − 1)
Vout = 8.932 v
Inductor size matters
2016(0806) might be the least

STM32 DEBUG PORT

J9
FTSH-105-01-F-D-RA-K
SWD_RST 10
GND 8
6
4
2
9 SWD_SWDIO
7 GND
5 SWD_SWCLK
3
1

3.3 CONVERTER FOR DIGITAL ELECTRONICS (W/ BREAKER)

IC3
MIC29300-3.3WU
DIGITAL_VBUS_5V IN GND_2 GND
C1 4.7uF GND_1 C2 10uF
OUT +3V3

3.3 CONVERTER FOR MECHANICAL SYSTEMS (NO BREAKER)

IC6
MIC29300-3.3WU
MAGTRQ_5V IN GND_2 GND
C21 4.7uF GND_1 C22 10uF
OUT MAGTRQ_VBUS
GND

Magnetorquer Driver

IC7
DRV8833PWR
+3V3 NSLEEP AIN1 MAGTRQ_X_IN1
MAGTRQ_X+ AOUT1 AIN2 MAGTRQ_X_IN2
GND AISEN VINT
MAGTRQ_X+ R10 DNI AOUT2 GND
MAGTRQ_Y+ BOUT2 VM MAGTRQ_VBUS
R11 DNI BISEN VCP
MAGTRQ_Y− BOUT1 BIN2 MAGTRQ_Y_IN2
MAGTRQ_PWGOOD NFAULT BIN1 MAGTRQ_Y_IN1

C25 2.2uF
C24 10uF
C23 .01uF
GND
GND

Check the actual current
limit of main regulator
for 5V