Power Jack 7.5x5mm
19v DC
J1

SW1

+19v
U2
EN
D24V22F5
VIN VOUT
5V REG
PG GND

C1 470uf
C2 .1uf

+5v
R1 330
D1 GREEN

+19v
U5
EN
D24V22F12
VIN VOUT
12V REG
PG GND

J6
1
2
LED LIGHTING

+3.3v +5v LCD1
1 VCC
2 GND
3 LCD_CS
4 LCD_RST
5 LCD_DC
6 LCD_MOSI
7 LCD_CLK
8 BACKLIGHT
9 LCD_MISO
10 TOUCH_CLK
11 TOUCH_CS
12 TOUCH_DI
13 TOUCH_DO
14 TOUCH_IRQ
TOUCH SCREEN LCD

LCD_CS
LCD_DC
LCD_MOSI
LCD_CLK
LCD_MISO
LCD_CLK
TOUCH_CS
LCD_MOSI
LCD_MISO

U1
1 GND
2 D0/MOSI1/RX1
3 D1/MISO1/TX1
4 D2/PWM3
5 D3/SCL2/PWM1
6 D4/SDA2/PWM1
7 D5/PWM0
8 D6/PWM0
9 D7/RX3/PWM3
10 D8/TX3/PWM3
11 D9/RX2/PWM0
12 D10/TX2/PWM0
13 D11/MOSI0
14 D12/MISO0
15 3.3V
16 D24
17 D25
18 D26
19 D27
20 D28
21 D29/PWM2
22 D30/PWM2
23 D31/A12/RX4/CS1
24 D32/A13/TX4/SCK1
TEENSY3.6

48 VIN
47 AGND
46 (0.25A max) 3.3V
45 PWM0/A9/D23
44 PWM0/A8/D22
43 PWM0/A7/D21
42 PWM0/A6/D20
41 SCL0/A5/D19
40 SDA0/A4/D18
39 PWM1/A3/D17
38 PWM1/A2/D16
37 A1/D15
36 PWM3/A0/D14
35 (LED)/SCK0/D13
34 GND
33 DAC1/A22
32 DAC0/A21
31 A20/D39
30 PWM3/SDA1/A19/D38
29 PWM3/SCL1/A18/D37
28 PWM3/A17/D36
27 PWM3/A16/D35
26 A15/D34
25 A14/D33

+5v +3.3v

HOME_T
HOME_R
STEP_ENABLE
MICROSTEP_0
MICROSTEP_1
MICROSTEP_2
TOUCH_CS
LCD_DC
LCD_CS
LCD_MOSI
LCD_MISO

+3.3v

DIRECTION_T
STEP_T
DIRECTION_R
STEP_R

TP1
R4 180
D2 RED

D19_SCL
D18_SDA
LCD_CLK

R3 330
R2 10K
Q1 AO3400A
D G S

+19v
U3
16 VMOT
5 /RESET
6 /SLEEP
1 /EN
7 STEP
8 DIR
2 M0
3 M1
4 M2
10 /FAULT
9 GND 15 GND
TMC2208

C3 100uf@50v

MOTOR RADIUS
14 B2 1
13 B1 2
12 A1 3
11 A2 4
J3

STEP_ENABLE
STEP_R
DIRECTION_R
MICROSTEP_0
MICROSTEP_1
MICROSTEP_2
+5v

+19v
U4
16 VMOT
5 /RESET
6 /SLEEP
1 /EN
7 STEP
8 DIR
2 M0
3 M1
4 M2
10 /FAULT
9 GND 15 GND
TMC2208

C4 100uf@50v

MOTOR THETA
14 B2 1
13 B1 2
12 A1 3
11 A2 4
J5

STEP_ENABLE
STEP_T
DIRECTION_T
MICROSTEP_0
MICROSTEP_1
MICROSTEP_2
+5v

+19v HOME_A HOME R
3
2 J2
1
RADIUS
NPN PROX SENSOR
BLACK SIGNAL
BROWN +V
BLUE GND

+5v HOME_T HOME B
3
2 J4
1
THETA
NPN PROX SENSOR
BLACK SIGNAL
BROWN +V
BLUE GND

OTHER PARTS:
o 19V Power supply for Dell Inspiron with round 7.5x5mm connector
o Inductive prox sensor NPN, 4mm distance, 8mm diameter, 6-36 volts
o Inductive prox sensor, Prusa PINDA 2mm distance, 5 volts
o Sockets for stepper driver, 4 required
o Sockets for Teensy, 2 required
o Sockets for LCD
o 4-40 x 7/16" spacer, 2 required

NOTES:
1) Cut Teensy's 5V USB jumper so externally powered.
2) Set TMC2208's pot to 0.7V (equals 0.5A RMS)

S. Reifel & Company
Polar Sandbox

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