MCU

Phase_A_H
Phase_B_H
Phase_C_H
Phase_A_L
Phase_B_L
Phase_C_L

Current_Out1
BEMC_Phase_A
BEMC_Phase_B
BEMC_Phase_C

Phase_A_H_2
Phase_B_H_2
Phase_C_H_2
Phase_A_L_2
Phase_B_L_2
Phase_C_L_2

Current_Out2
BEMC_Phase_A_2
BEMC_Phase_B_2
BEMC_Phase_C_2

ESC_V1

Phase_A_H
Phase_B_H
Phase_C_H
Phase_A_L
Phase_B_L
Phase_C_L

Current_Out
BEMC_Phase_A
BEMC_Phase_B
BEMC_Phase_C

ESC_V2

Phase_A_H
Phase_B_H
Phase_C_H
Phase_A_L
Phase_B_L
Phase_C_L

Current_Out
BEMC_Phase_A
BEMC_Phase_B
BEMC_Phase_C

POWER

DANGER PINS
GPIO_3
GPIO_45
GPIO_46

ESP_EN

R18
10k
DTR

Q20
MMBT5551L

R19
10k
RST

MMBT5551L
Q21

ESP_BOOT

+3V3

J7
6
5 DTR
4 RST
3 TX
2 TX
1 RX

+3V3

C9   C10   C11
1u   10u   10u

U6
ESP32-S3-WROOM-1

37	U0TXD/GPIO43/CLK_OUT1	3V3
36	U0RXD/GPIO44/CLK_OUT2	EN

D+ 14 GPIO20/U1CTS/ADC2_CH9/CLK_OUT1/USB_D+   GPIO15/U0RTS/ADC2_CH4/XTAL_32K_P 8   GPIO_15
D- 13 GPIO19/U1RTS/ADC2_CH8/CLK_OUT2/USB_D-   GPIO16/U0CTS/ADC2_CH5/XTAL_32K_N 9   GPIO_16

ESP_BOOT 27 GPIO0/BOOT
GPIO_01 39 GPIO1/TOUCH1/ADC1_CH0   MTCK/GPIO39/CLK_OUT3/SUBSPICS1 32 GPIO_39
GPIO_02 38 GPIO2/TOUCH2/ADC1_CH1   MTDO/GPIO40/CLK_OUT2 33 GPIO_40
GPIO_04   GPIO3/TOUCH3/ADC1_CH2   MTDI/GPIO41/CLK_OUT1 34 GPIO_41
GPIO_04   4 GPIO4/TOUCH4/ADC1_CH3   MTMS/GPIO42 35 GPIO_42
GPIO_05   5 GPIO5/TOUCH5/ADC1_CH4
GPIO_06   6 GPIO6/TOUCH6/ADC1_CH5
GPIO_07   7 GPIO7/TOUCH7/ADC1_CH6
GPIO_08 17 GPIO8/TOUCH8/ADC1_CH7/SUBSPICS1
GPIO_09 18 GPIO9/TOUCH9/ADC1_CH8/FSPIHD/SUBSPIHD
GPIO_10 19 GPIO10/TOUCH10/ADC1_CH9/FSPICS0/FSPIIO4/SUBSPICS0
GPIO_11 20 GPIO11/TOUCH11/ADC2_CH0/FSPID/FSPIIO5/SUBSPID
GPIO_12 21 GPIO12/TOUCH12/ADC2_CH1/FSPICLK/FSPIIO6/SUBSPICLK
GPIO_13 22 GPIO13/TOUCH13/ADC2_CH2/FSPIQ/FSPIIO7/SUBSPIQ
GPIO_14 23 GPIO14/TOUCH14/ADC2_CH3/FSPIWP/FSPIDQS/SUBSPIWP
GPIO_17 10 GPIO17/U1TXD/ADC2_CH6
GPIO_18 11 GPIO18/U1RXD/ADC2_CH7/CLK_OUT3
GPIO_21 23 GPIO21
GPIO_38 31 GPIO38/FSPIWP/SUBSPIWP
         26 GPIO45   SPIIO6/GPIO35/FSPID/SUBSPID 28 GPIO_35
         16 GPIO46   SPIIO7/GPIO36/FSPICLK/SUBSPICLK 29 GPIO_36
GPIO_47 24 GPIO47/SPICLK_P/SUBSPICLK_P_DIFF   SPIDQS/GPIO37/FSPIQ/SUBSPIQ 30 GPIO_37
GPIO_48 25 GPIO48/SPICLK_N/SUBSPICLK_N_DIFF

GND 1

ESP32-S3-WROOM-1

MCP6002-xSN
U13B
7 +
   - 6
REF_2v5

+VDC

R34 R35
470 2k

2V5_RAW

C13
1u

U13C
MCP6002-xSN
8 V+
REF U9
CJ431
4 V-

+3V3

C78
1u

+3V3

MP1 2 GPIO_16
RV1

+3V3

MP1 2 GPIO_15
RV2

GPIO_18 Phase_A_H
GPIO_13 Phase_A_L
GPIO_04 Phase_B_H
GPIO_05 Phase_B_L
GPIO_06 Phase_C_H
GPIO_07 Phase_C_L
GPIO_38 BEMC_Phase_A
GPIO_12 BEMC_Phase_B
GPIO_17 BEMC_Phase_C

GPIO_39 Phase_A_H_2
GPIO_35 Phase_A_L_2
GPIO_37 Phase_B_H_2
GPIO_40 Phase_B_L_2
GPIO_36 Phase_C_H_2
GPIO_41 Phase_C_L_2
GPIO_42 BEMC_Phase_A_2
GPIO_14 BEMC_Phase_B_2
GPIO_21 BEMC_Phase_C_2

GPIO_08 Current_Out1
GPIO_11 Current_Out2
GPIO_09 current
GPIO_10 REF_2v5

GPIO_02 SCL
GPIO_01 SDA

VBUS

+5V
FB1
FerriteBead_Small

U7
SRV05-4

D+ D-

IO1 IO3
IO2 IO4

VP
VN

VBUS
D+ D+
D- D-
GND
Shield

J5
USB_A

+5V   +3V3   VDC

D4   D5   D6
reversed on purpose

R22 R23   R24
1k   1k   1k

JP1

USB+ESC TVS + Indicator LEDs

BOOT & ENABLE BUTTONS

+3V3 R36
10k

ESP_EN

C14
100n

SW1
MCU_RESET

+3V3 R38
10k

TP1

ESP_BOOT

C17
100n

MCU_RESET
SW3

I2C

+3V3

J10
4 SDA
3
2
1 SCL

+3V3

R32 R33
5k1 5k1

SDA

SCL

MISCELANIOUS

H1   H2   H3   H4
hole hole hole hole

FID1
Fiducial
FID2
Fiducial
FID3
Fiducial

VCC

20 A so 0.1V drop

R25
1k

R44
75k

R41
1m

R26
1k

U10B
LM324
5
6
7

Current_Out

ESC2_VCC

R40
75k

A1   B1   C1

R47   R48   R49
75k   75k   75k

U10A
LM324
3
2
1
BEMC_Phase_C

star2

U10C
LM324
10
9
8
BEMC_Phase_B

star2

U10D
LM324
12
13
14
BEMC_Phase_A

star2

R51   R52   R53
10K   10K   10K

star2

+3V3

U10E
LM324
V+
4
V-
11

C21
100n

+15V

D11
B5819W_SL

HB1

R30   D9
22   1N5819WS

gate_H1

ESC2_VCC

C66   C67
10u   10u

HO1

C19
10u

R43
22

Q7
HYG025N06LS1C2

A1   J11
A

+15V

C22   C20
10u   10u

R45
22

gate_L1

LO1

R31   D10
22   1N5819WS

Q8
HYG025N06LS1C2

U11
DRV8300N

VDD   7

BTS_A   20
G_HA   19

SH_A   18
G_LA   11

IN_HA   1   Phase_A_HD
IN_HB   2   Phase_B_HD
IN_HC   3   Phase_C_HD
IN_LA   4   Phase_A_LD
IN_LB   5   Phase_B_LD
IN_LC   6   Phase_C_LD

BTS_B   17
G_HB   16

SH_B   15
G_LB   10

BTS_A   14
G_HC   13

SH_C   12
G_LC   9

GND   8

750mA source
1.5A sink

22ohm=>.54A

+15V

D12
B5819W_SL

HB2

R29   D8
22   1N5819WS

gate_H2

ESC2_VCC

C68   C69
10u   10u

HO2

C15
10u

R46
22

Q9
HYG025N06LS1C2

B1   J12
B

R50
22

gate_L2

LO2

R37   D14
22   1N5819WS

Q10
HYG025N06LS1C2

+15V

D13
B5819W_SL

HB3

R28   D7
22   1N5819WS

gate_H3

ESC2_VCC

C70   C71
10u   10u

HO3

C16
10u

R54
22

Q11
HYG025N06LS1C2

C1   J13
C

R55
22

gate_L3

LO3

R39   D15
22   1N5819WS

Q12
HYG025N06LS1C2

+3V3

C18
10u

SDA
SCL

A1
A0

U12
INA219AxD

SDA SCL VS
IN+
IN−
GND

R57
5R1

C25
100n

R58
5R1

VCC

R56
1m

VDC

J15
A
J14
A

R65
75k

R64
1k

current

MCP6002−xSN
U13A

R66
1k

R67
75k

VCC

D25

R69
10K

JP2

VCC

U8
LM317_TO−220

VI VO
ADJ

+15V

C29
10u

R21
2k

C12
10u

R20
470

R70
10k

R71
10k

+5V

VCC

D24
B5819W_SL

D22
B5819W_SL

C24
1u

C26
10u

J4
Conn_01x02

U5
TPS5430DDA

VIN BOOT
EN PH
GND VSENSE
GNDPAD

C8
100n

D23
B5819W_SL

L1
75u

R27
10K

C23
100u

C27
1u

C28
10u

+3V3

R68
6.2k

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Title:

Size: A3   Date:
KiCad E.D.A. kicad 7.0.1

Rev:

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