Vertical type C connector
J1
USB_C_Receptacle_USB2.0

All in one battery charging and boost IC

Reference:
https://dl.espressif.com/dl/schematics/SCH_ESP32-S3-DevKitC-1_V1.1_20220413.pdf

VBUS

USB_D−
USB_D+

GND

D7 SMF5V0A
D5 SMF5V0A
D6 SMF5V0A

SHIELD

C27 0.1u   C5 10u
GND

D4 LED   D3 LED   D2 LED   D1 LED
25%   50%   75%   100%
SW1 BAT_CHK
battery check button
C2 10u

U4 IP5305
VIN   VOUT
LED1   SW
LED2   BAT
LED3   KEY
PAD

Vin 5v/2.4A
+5V_CHG
Vcharge 4.2V/ 1.2A
L1 1uH/1A
R3 10k
R2 2
C7 10u
R25 10m 50ppm
VBAT
J2
BAT1
XH2.54 female socket

Address 0x55
U9 BQ27220
SDA   SRN
SCL   SRP
BAT
GPOUT BIN
VDD

I2C0_SDA
I2C0_SCL
R28 10k
VBAT
R27 1.8M
C34 2.2u   C35 0.47u   R26 10k
GND
VBAT

+5V_CHG
C8 22u   C3 22u   C4 22u
GND

+5V
U5 AMS1117
VI   VO
ADJ
C1 10u   C10 0.1u
GND
+3V3
C9 0.1u   C11 10u
D8 LED_R
R7 5.1k

+5V
hv_power
PWR_VIN+   PWR_HV+   ANODE
PWR_VIN−   PWR_HV−
GND
File: hv_power.kicad_sch
GND1

J5 HV_OUTPUT
ANODE
ANODE
ANODE
GND1

VBUS
R1 22.1k
R4 47.5k   C12 1u
GND

+3V3
C13 10u
R5 1k
GND

USB_D−
USB_D+
JP2 NO
NO JP3
optional USB to UART
normal open, debug purpose

U2 CP2102N-Axx-xQFN28
VREGIN   TXD
VDD   RXD
RST   RTS
VBUS   CTS
D−   DSR
D+   DTR
RI/CLK   DCD
SUSPEND
SUSPEND
TXT/GPIO.0
RXT/GPIO.1
RS485/GPIO.2
WAKEUP/GPIO.3
GPIO.4
GPIO.5
GPIO.6
CHREN
CHR0
CHR1
GND

optional USB to UART
normal open, debug purpose

JP5 NO
JP6 NO
UORXD
UOTXD
RTS
DTR
+3V3   GND
J3 UART_DEBUG
R6 1k
GND

R9 10k   Q1 MMBT3904   R10 0   CHIP_PU
DTR
R8 10k   Q2 MMBT3904   R11 0   GPIO0
RTS

Auto program

DTR	RTS	−>	EN	IO0	IO2
0	0		1	1	1
1	1		1	1	1
1	0		0	1	1
0	1		1	0	0

RTC circuit, directly connect VBAT
to Lipo battery since there should
be UVLO protection on battery
Address: 0x64

VBAT
+3V3
I2C0_SCL   SCL   VBAT
I2C0_SDA   SDA   VCC
RST   INT/SQW   RTC_INT
GND
U7 DS3231MZ
GND

C15 GND
10u

+3V3
C14 0.1u

CHIP_PU
R12 10k   R13 0
C6 1u
GND

U6 ESP32-S3-WROOM
GND1   GND2
3V3   IO1
EN   IO2
IO4   TXD0
IO5   RXD0
IO6   IO42
IO7   IO41
IO15   IO40
IO16   IO39
IO17   IO38
IO18   IO37
IO8   IO36
IO19   IO35
IO20   EPAD

NIXIE_OE
I2C0_SCL
I2C0_SDA
RGB_LED_DI
RGB_LED_DO
U1TXD
U1RXD
RTC_INT
GND

UOTXD
UORXD
USB to UART connect, default open

GPIO0
GND

JP1 NC
USB_D−
USB_D+
JP4 NC
ESP32 USB direct connect

accel/gyrocomp/temperaure sensor
Address: 0x68

+3V3
C29 10n   +3V3   C30 0.1u
R23 10k   GND   GND
R24 10k

I2C0_SDA   SDA   INT
I2C0_SCL   SCL   AUX_DA
AD0   AUX_CL
FSYNC   CPOUT
CLKIN   REGOUT
GND
C32 0.1u   C31 2.2n
GND
U8 MPU-6050

+5V
C33 100uF
GND
U1RXD   Vcc   BUSY
U1TXD   RX   USB−
        TX   USB+
        DAC_R ADKEY_2
        DAC_L ADKEY_1
        SPK_1 IO_2
        GND   GND
        SPK_2 IO_1
U3 DFPlayer_mini
LS1 Speaker
XH2.54mm socket
3W max
baud 9600, databits=1
GND

+5V_CHG
+5V   +5V
R31 10m
R30 10m
R29 10m
U10 INA3221
IN+1   VS
IN−1   VPU
IN+2   CRITICAL
IN−2   WARNING
IN+3   TC
IN−3   SDA
       SCL
       A0
       EP
HV_PWR+
+5V
LED_PWR+
I2C0_SDA
I2C0_SCL
GND
Address: 0x40

J4 PCA9685 address: 0x40-0x43
CTRL
+3V3
NIXIE_OE   SDA1   I2C0_SDA
GND   SCL1   I2C0_SCL
           GND

J6 LED_CTRL
RGB_LED_DI
RGB_LED_DO   I2C0_SCL
LED_PWR+
GND

PWR_VIN+

PWR_VIN−

UVLO_ON=4.5V
UVLO_OFF=4.1V

C21
120u

C17
10u

C16
0.1u

R15
15k

R22
7.5k

R14
13.78k

C26
220n

R17
150k

C20
90n

C28
3pf

L2
FNR4018S6R8MT

U1
LM5155

1	BIAS	VCC	2
12	UVLO/EN/SYNC	GATE	3
11	PGOOD	CS	5
10	RT	FB	8
9	SS	PGND	4
6	COMP	EP	13
7	AGND		

GND

C18
0.1u

R19
0

GND

R16
0

C19
NC

R18
10m

GND

D9
D_Schottky

Q3
NMOS

C24
0.1u

C23
0.1u

C22
120u

PWR_HV+

PWR_HV−

R20
100k

R21
630

C25
NC

GND