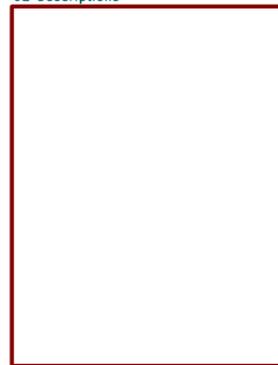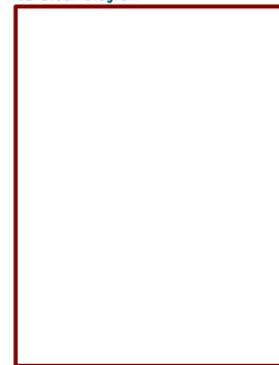01 Descriptions

File: 01 Descriptions.kicad_sch

02 Block Diagram

File: 02 Block Diagram.kicad_sch

03 Power
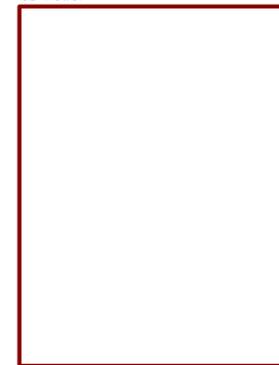
File: 03 Power.kicad_sch

04 ESP32-S3
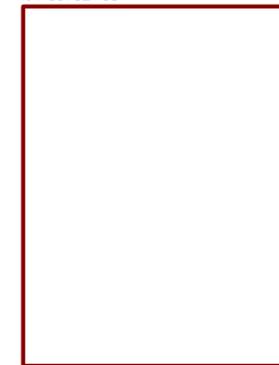
File: 04 ESP32-S3.kicad_sch

05 Debug&Interface
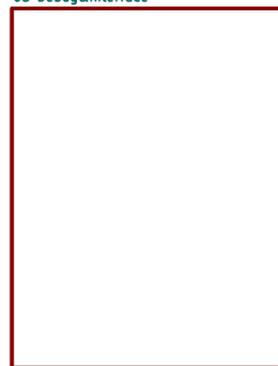
File: 05 Debug&interface.kicad_sch

06 Peripherals
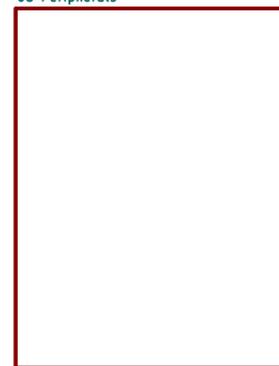
File: 06 Peripherals.kicad_sch

07 60P FPC Connector
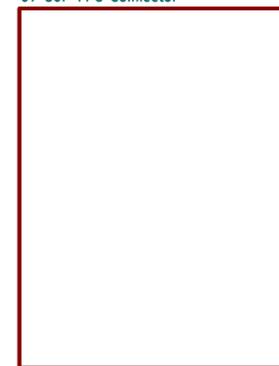
File: 07 60P FPC Connector.kicad_sch

seeed studio

Title: reTerminal E1004

| Size: A3 | Date: 2026-01-05 | Rev: v1.0 |
| KiCad E.D.A. 9.0.0 | | Id: 1/8 |

Version	Descriptions	Data	Name
v1.0	First Release	05/01/2026	

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Title: reTerminal E1004

Size: A3	Date: 2026-01-05	Rev: v1.0
KiCad E.D.A. 9.0.0		Id: 2/8

Block diagram — reTerminal E1004

- USB-C
- Battery
- Micro SD Holder
- FPC Connector 60Pin_e-Paper
- FPC Connector 6Pin_TP Panel
- Button x 2
- Touch x 3
- External module
- Crystal 40MHz
- Header 1x5

- Power Path Management &Charging
- Power Switch
- charge
- Buck-Boost to sys 3V3
- Power 3V3
- ANT 2.4G

ESP32-S3R8 (With 8MB PSRAM)
- ADC
- Power
- ANT
- SPI
- UART0
- I2C1
- PDM
- GPIO
- GPIO
- SPI0
- OSCO
- GPIO
- I2C0

- USB TO UART
- MIC
- Passive Buzzer
- Flash
- RTC
  - Coin cell bat Holder
  - Crystal 32.768KHz
- T & RH Sensor

POWER

USBC_IN USB1 U263-16XN-4BQC65 None USBC_IN TYPEC_5V

R1 5.1K 1%
USBC_DP
USBC_DN

A1 GND   B12 GND
A4 VBUS   B9 VBUS
A5 CC1   B8 SBU2
A6 DP1   B7 DN2
A7 DN1   B6 DP2
A8 SBU1   B5 CC2
A9 VBUS   B4 VBUS
A12 GND   B1 GND

S1 S2 S3 S4   S1 S2 S3 S4

GND

F1 2A DC6V
USBC_DN
USBC_DP
R141 5.1K GND

GNDPWR
C22 X7R 2KV 1nF   R24 0R 5%

C10 22uF X5R 25V   C11 100nF X7R 16V
D2 SMF5.0CA 5V
U22 TVS0500DRVR
D3 5.5V TPD1E10B06DPYR
D4 ESDPSA0402V05
D5 ESDPSA0402V05
GND

R114 0R 5%
R115 0R 5% 400mA 90R LB
USB_DN
USB_DP

R117 0R 5%   TP16
C25 1nF X7R 2KV   GND GNDPWR_1

R147 0R 5%   TP17
C81 1nF X7R 2KV   GND GNDPWR_3

R142 0R 5%   TP18
C105 1nF X7R 2KV   GND GNDPWR_2

R143 0R 5%   TP19
C106 1nF X7R 2KV   GND GNDPWR_2

TP21 TYPEC_5V

C51 10uF X5R 25V   C75 10uF X5R 25V   C79 100nF X7R 16V   GND

SY_SVS

U12 SY6974B

24 BUS
1 VAC
3 DM
2 DP
STAT
SCL
SDA
/INT
/CE
/QON
REGN
NC1
NC2
PAD
NTC

PMID
PGND1
PGND2
LX1
LX2
BST
SYS1
SYS2
BAT1
BAT2

C89 10uF X5R 25V   C12 100nF X7R 16V
L10 1UH 7A
I out max = 2.5A

C5 47nF X7R 25V
R10 2R   C3 10uF X7R 50V   R64 0R 5%

C96 100nF X7R 16V   C97 22uF X5R 25V   C99 22uF X5R 25V

TP24 SY_SVS
TP26 GND

Q1 CJ3407 30V;4.3A
R20 1M 1%
C107 10nF X7R 50V
R22 1K 5%
D68 ESDPSA0402V05
VSYS TP27
C19 100nF X7R 16V TP28

CH340_EN
SS-12F17G5
SW1
D67 ESDPSA0402V05
GND

R48 10K 1%   TP49 TP50   SY_DN SY_DP
R47 2K 5% D8 RED
XL-234SURD-L

ESP_IO20/I2C0_SCL   R135 0R 5% SY_SCL
ESP_IO19/I2C0_SDA   R136 0R 5% SY_SDA
ESP_IO47/SY_INT   R138 0R 5% SY_INT

SYS_3V3 SYS_3V3 SYS_3V3
R113 4.7K 1%   R137 4.7K 1%   R61 10K 1%
SY_INT SY_SCL SY_SDA

R59 10K 1%   GND
R60 100K 1%

TP2 V_BAT
C17 1uF X5R 10V
J7 PH-3A-WT
BAT_NTC
Battery

TP25
C95 10uF X5R 25V
C94 4.7uF 25V X5R

R8 3.3K 1%
R9 4.7K 1%
BAT_NTC NTC_IN2
R7 51K 1%
R2 1K 1%
GND

TP3 GND

0°-45° NTC probe hole position

VSYS

C2 22uF X5R 25V   C4 10uF 10V X5R   C6 100nF X7R 16V
R4 100K 5%
L1 1uH 3.1A
U1 TPS631000DRLR

VIN LX1 LX2 VOUT
EN MODE FB

R25 49.9R 1%
C104 NPO 50V 12pF
C7 47uF X5R 10V   C8 22uF X5R 25V   C9 100nF X7R 16V

SYS_3V3 TP29
I out max = 2.5A

R12 511K 1%
R13 91K 1%
R5 100K   R6 100K 5%
MODE=0: PFM
MODE=1: PWM
GND TP30

After enabling the function, it is recommended to wait for approximately 1 ms before reading.

V_BAT
U3 TPS22916CYFPR
A2 VIN   VOUT A1
B2 EN   GND B1

ESP_IO21/VBAT_EN
C87 100nF X7R 16V
R158 100K 5%
GND

R19 10K 1%
R21 10K 1%
C18 10nF 50V X7R
ESP_IO1/VBAT_ADC
GND

Seeed Studio
Sheet: /03 Power/
File: 03 Power.kicad_sch
Title: reTerminal E1004
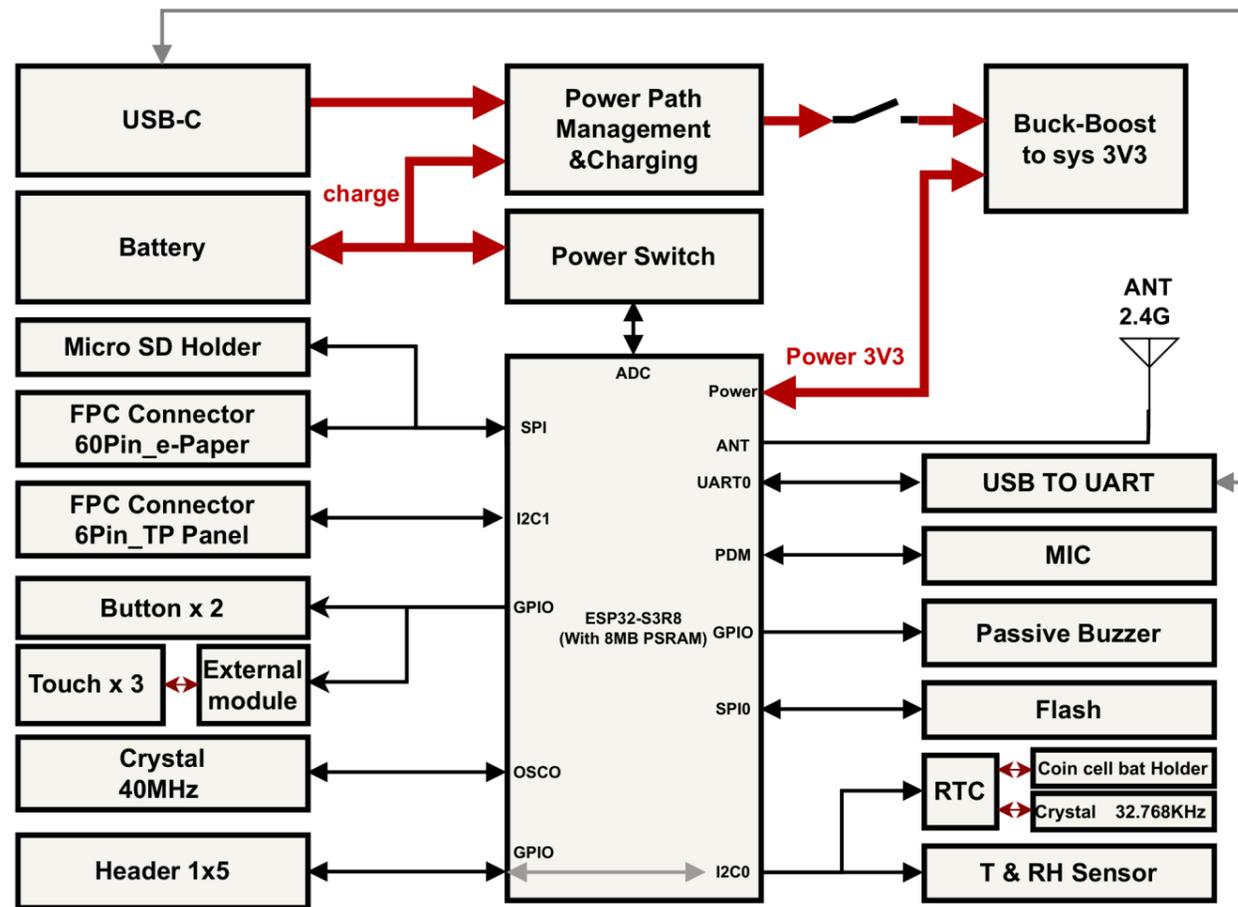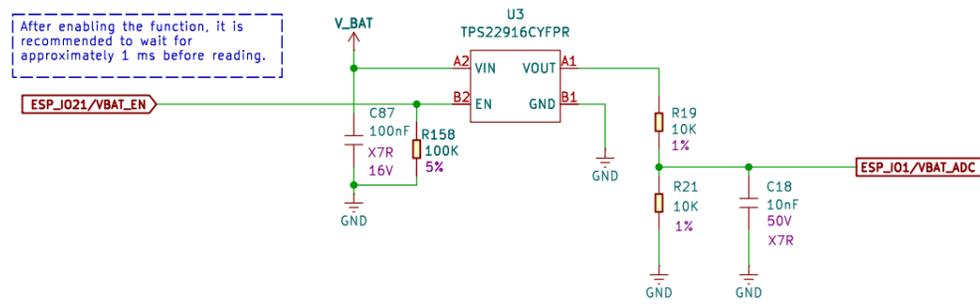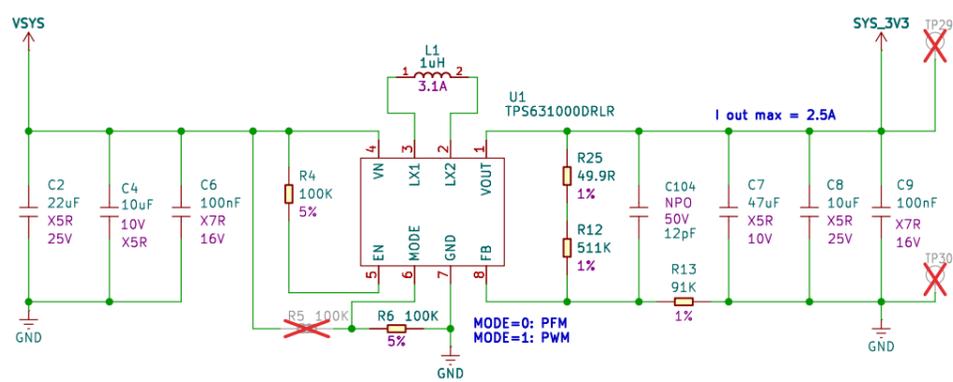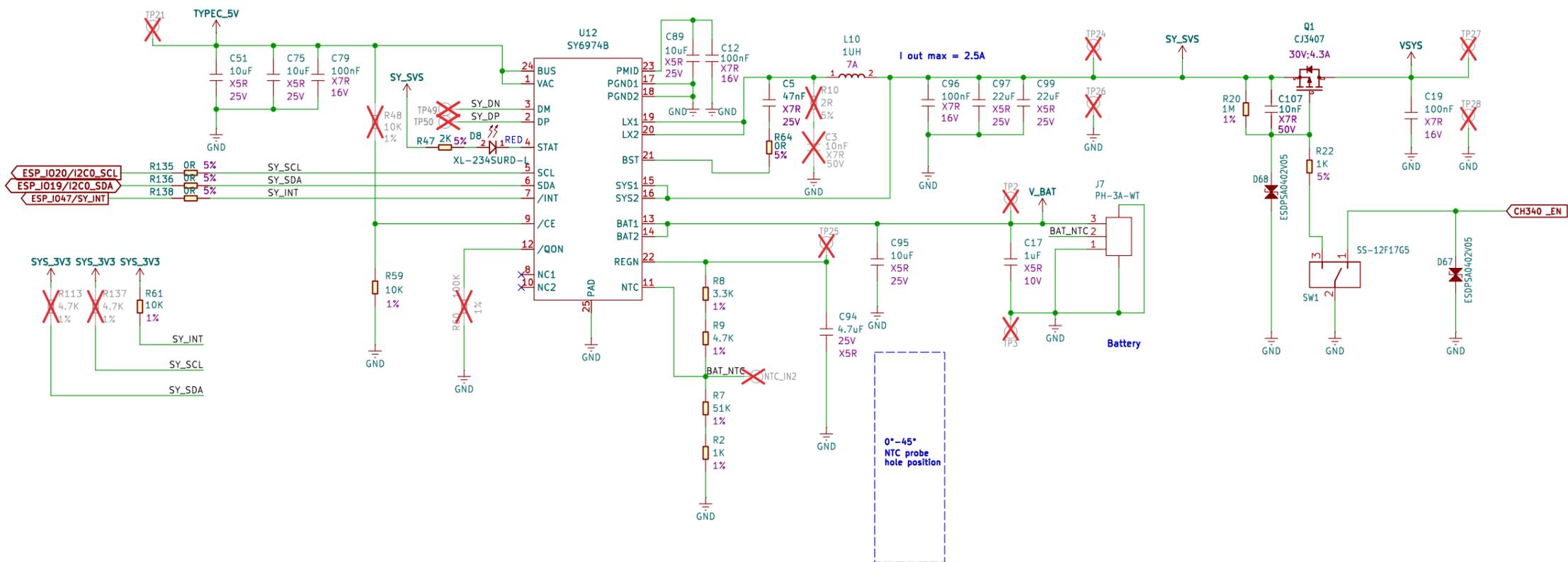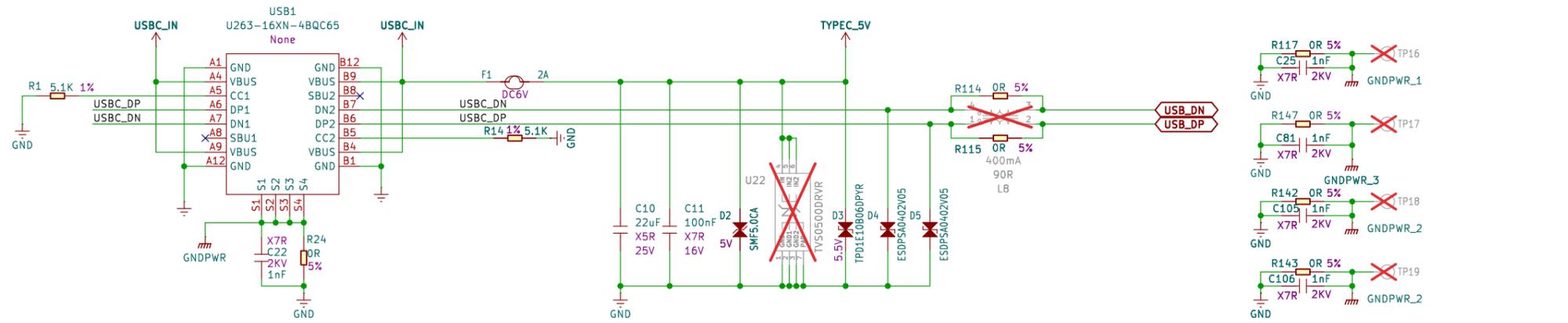Size: A3   Date: 2026-01-05   Rev: v1.0
KiCad E.D.A. 9.0.0   Id: 4/8

SYS_3V3
FB3 120R 1.3A
R144 0R 5%
ESP_3V3_PA
Layout Note: Close to Pin 2,3; 45°lead out
C20 100nF X7R 16V
GND
C23 10uF X5R 10V
C24 1uF X5R 10V
C26 1pF 50V NPO
L4 2.2nH 1A
C29 100nF X7R 16V
C30 2.4pF NPO 50V
GND
ESP_3V3_DA

SYS_3V3
FB4 120R 1.3A
R145 0R 5%
ESP_3V3_DA
C102 100nF X7R 16V
GND

C35 12pF NPO 50V
GND
X1 40MHz 10ppm
GND
C36 12pF NPO 50V
GND
ESP_3V3_DA

C32 1uF X5R 10V
C34 10nF X7R 50V
GND
L28 5% 27nH 300mA

ESP_IO46/POWER_EN
ESP_IO45/BUZZER_EN
R26 499R 1%
ESP_RX0
ESP_TX0

C37 100nF X7R 16V
GND

R155 0R 5%
ESP_IO42/RX1
R45 499R 1%
ESP_IO41/TX1
ESP_IO40/I2C1_SCL
ESP_IO39/I2C1_SDA
ESP_IO38/SCREEN_RST#

ANT2 U.FL-R-SMT-1
GND
R141 0R 5%
C21 VALUE
C91 VALUE
L3 L
C103 VALUE
L9 2.7nH 300mA
RF_IN
C31 1.8pF NPO 50V
C27 1.6pF 0.1pF 50V
GND

U19 can clipL2.9*W1.7*H1.65
GND

U6 ESP32-S3R8

GND 57
VDDA@2 56
VDDA@1 55
XTAL_P 54
XTAL_N 53
GPIO46 52
GPIO45 51
U0RXD 50
U0TXD 49
MTDI 48
MTMS 47
MTDO 46
MTCK 45
VDD3P3_CPU 44
GPIO38 43

1 LNA_IN
2 VDD3P3@1
3 VDD3P3@2
4 CHIP_PU
5 GPIO0 ESP_RST
ESP_BOOT
6 GPIO1 ESP_IO1/VBAT_ADC
7 GPIO2 ESP_IO2/SPI_CS_S
8 GPIO3 ESP_IO3/KEY0
9 GPIO4 ESP_IO4/KEY1
10 GPIO5 ESP_IO5/KEY2
11 GPIO6 ESP_IO6/ADC
12 GPIO7 ESP_IO7/SCK
13 GPIO8 ESP_IO8/MISO
14 GPIO9 ESP_IO9/MOSI

GPIO37/DQS/DM 42
GPIO36/DQ7 41
GPIO35/DQ6 40
GPIO34/DQ5 39
GPIO33/DQ4 38
SPICLK_P 37
SPICLK_N 36
SPID/DQ0 35
SPIQ/DQ1 34
SPICLK/CLK 33
SPICS0 32
SPIWP/DQ2 31
SPIHD/DQ3 30
VDD_SPI 29

TP20
ESP_IO47/SY_INT
ESP_IO48/LED
SPI_D
SPI_Q
SPI_CLK
SPI_CS0
SPI_WP
SPI_HD

VDD_SPI
C38 100nF X7R 16V
C39 1uF X5R 10V
GND

GPIO10 15
GPIO11 16
GPIO12 17
GPIO13 18
GPIO14 19
VDD3P3_RTC 20
XTAL_32K_P 21
XTAL_32K_N 22
GPIO17 23
GPIO18 24
GPIO19 25
GPIO20 26
GPIO21 27
SPICS1/CE# 28

ESP_IO10/SCREEN_CS#
ESP_IO11/SCREEN_DC#
ESP_IO12/SCREEN_EN#
ESP_IO13/SCREEN_BUSY#
ESP_IO14/SD_CS
ESP_IO15/SD_DET
ESP_IO16/SD_EN
ESP_IO17/SPI_DD2
ESP_IO18/SPI_DD3
ESP_IO19/I2C0_SDA
ESP_IO20/I2C0_SCL
ESP_IO21/VBAT_EN

ESP_3V3_DA
C33 100nF X7R 16V
GND

Flash
VDD_SPI
R23 100K 5%
U4 ZB25VQ128DSJG
1 /CS VCC 8
2 DO(IO1)/HOLD(IO3) 7
3 /WP(IO2) CLK 6
4 GND DI(IO0) 5
GND
U5 ZB25Q256AYJG
None
SPI_CS0
SPI_Q
SPI_WP
1 CS# VCC 8
2 DO HOLD#/RESET# 7
3 WP# CLK 6
4 GND DI 5
9 PAD
GND GND
SPI_HD
SPI_CLK
SPI_D
VDD_SPI
C28 100nF X7R 16V
GND

CC BY-SA 4.0

USB TO UART

U2 TPL740F33-5TR 500mA

TYPEC_5V

C42 10uF X5R 25V
R65 100K 5%
R62 0R 5%
CH340 _EN

UART_3V3
R32 0R 5%
SYS_3V3
R46 0R 5%

C43 100nF 16V X7R
C45 100nF X7R 16V

U7 CH340K

V3	1	
RXD	9	
TXD	8	
VCC	7	
RTS#	6	

10	UD+	USB_DP
2	UD-	USB_DN
3	GND	
4	DTR#	DTR#
5	CTS#	

ESP_TX0 5% 0R R38
ESP_RX0 5% 0R R39
RTS#
GND

D1 LRB520S-30T1G 30V,200mA
R51 0R 5%
ESP_RST

DTR#
R41 10K 1%
Q3 BC817W-25W

RTS#
R42 10K 1%
BC817W-25W Q4

D10 LRB520S-30T1G 30V,200mA
R63 0R 5%
ESP_BOOT

RST & BOOT & USER KEY

SYS_3V3
R31 10K 1%
C41 12pF 50V NPO
D42 ESDPSA0402V05
TP6
D6 LRB520S-30T1G 30V,200mA
K4 TS-1185F-B
ESP_BOOT

SYS_3V3
R35 10K 1%
D35 ESDPSA0402V05
C46 1uF X5R 10V
TP8
K5 TS-1185F-B
ESP_RST

SYS_3V3
R37 220R 1%
D2 GREEN XL-234SYGD-L D9
ESP_IO48/LED R108 1K 5%
Q13 BC817W-25W
R109 100K 5%

SYS_3V3
R30 10K 1%
C40 100nF 16V X7R
TP5
K1 TC00104
D58 ESDPSA0402V05
Physical_K0

SYS_3V3
R34 10K 1%
C44 100nF 16V X7R
TP7
K2 TC00104
D59 ESDPSA0402V05
Physical_K1

SYS_3V3
R36 10K 1%
C47 100nF X7R 16V
TP9
K3 TC00104
D60 ESDPSA0402V05
Physical_K2

J4 GH-1.25-5A
FB8 1.3A 120R GH1
GH2
FB5 1.3A120R
GH3
FB6 1.3A120R
GH4
FB7 1.3A120R
GH5
FB9 1.3A 120R

SYS_3V3 SYS_3V3 SYS_3V3
R128 100K 5%
R129 100K 5%
R130 100K 5%
Touch_K0
Touch_K1
Touch_K2

D7 5.5V TPD1E10B06DPYR
D55 ESDPSA0402V05
D56 ESDPSA0402V05
D57 ESDPSA0402V05

R134 0R 5%
U16 SN74LVC1G08DBVR
Physical_K0 1 A Vcc 5
Touch_K0 2 B
3 GND Y 4
SYS_3V3
C88 100nF 16V X7R
ESP_IO3/KEY0

R135 0R 5%
U20 SN74LVC1G08DBVR
Physical_K1 1 A Vcc 5
Touch_K1 2 B
3 GND Y 4
SYS_3V3
C90 100nF 16V X7R
ESP_IO4/KEY1

R136 0R 5%
U21 SN74LVC1G08DBVR
Physical_K2 1 A Vcc 5
Touch_K2 2 B
3 GND Y 4
SYS_3V3
C93 100nF 16V X7R
ESP_IO5/KEY2

Header

SYS_3V3
R127 0R
U14 TPS22916CYFPR
A2 VIN VOUT A1
B2 EN GND B1
ESP_IO46/POWER_EN
R161 100K 5%
C92 100nF 16V X7R

R4 0R 5%
Q2 CJ3407 30V:4.3A
U9A BC856S 65V~100mA
U9B BC856S 65V~100mA
R40 1M 5%
R50 1M 5%
HEADER_3V3
C48 10uF X5R 10V

SYS_3V3
R43 4.7K 1%
R49 4.7K 1%
ESP_IO40/I2C1_SCL
ESP_IO39/I2C1_SDA

HEADER_3V3
ESP_IO40/I2C1_SCL
ESP_IO39/I2C1_SDA

J3 ST-FH-254-0148-2*4P
TP32 TP15 TP14
TP22 TP23 TP31

1		8
2		7
3		6
4		5

ESP_IO42/RX1
ESP_IO41/TX1
ESP_IO6/ADC

D20 5V SMF5.0CA
D21 5.5V TPD1E10B06DPYR
D62 ESDPSA0402V05
D63 ESDPSA0402V05
D64 ESDPSA0402V05
D65 ESDPSA0402V05
D66 ESDPSA0402V05

RTC

I2C Address: 0x51

Temperature and Humidity sensor

I2C Address: 0x44
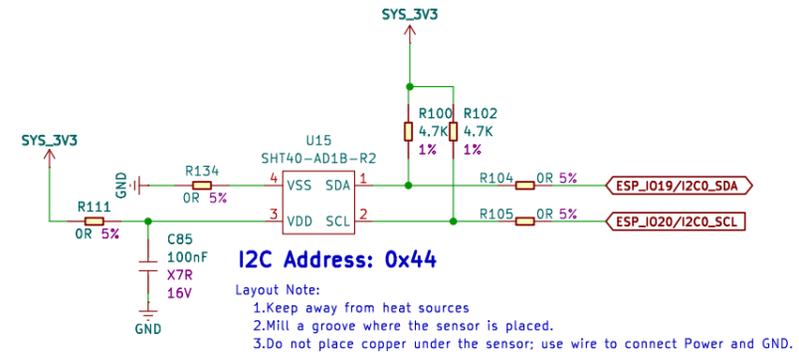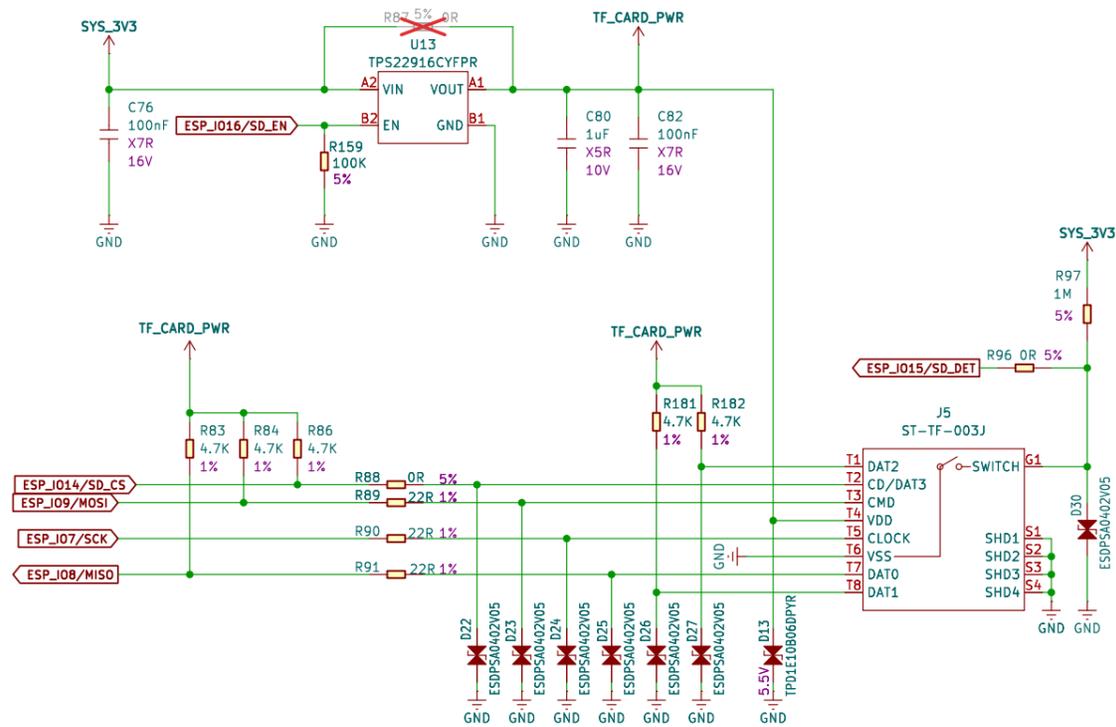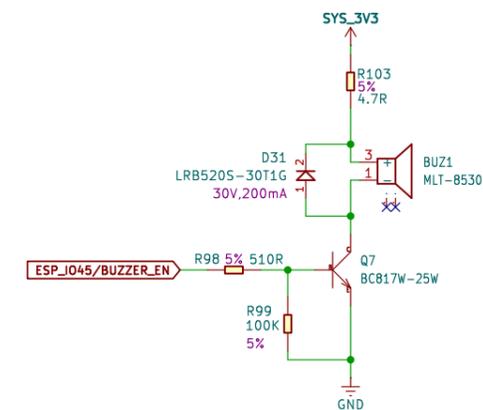
Layout Note:
1. Keep away from heat sources
2. Mill a groove where the sensor is placed.
3. Do not place copper under the sensor; use wire to connect Power and GND.

SD Card

BUZZER

CC BY-SA 4.0

Title: reTerminal E1004

Size: A3 Date: 2026-01-05 Rev: v1.0

KiCad E.D.A. 9.0.0 Id: 7/8

SYS_3V3

C98 22uF X5R 25V
C49 100nF X7R 16V

R57 5% 0R
U10 TPS22916CYFPR
A2 VIN VOUT A1
B2 EN GND B1
R52 0R 5%

I out max = 1.5A

C70 22uF X5R 25V

FB1 120R 2A
FB2 100R 4A
EPD_3V3 TP4
VDD1 TP12

C118 100nF X7R 16V
C108 100uF X5R 10V
C119 100uF X5R 10V
C52 100nF X7R 16V

ESP_IO12/SCREEN_EN#
R53 100K 5%

TP13
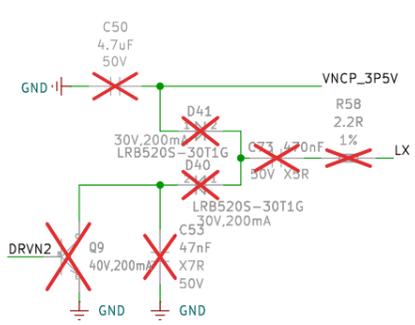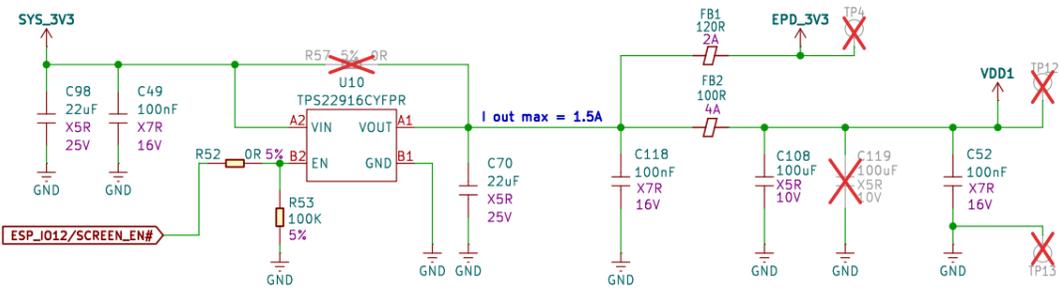
FPC PIN1->SCREEN PIN60

BS2	BS1	SPI MODE
0	0	3-wire SPI
0	1	4-wire SPI
1	0	Standrd 4-wire
1	1	SPI /Dual SPI /Quad SPI

130-221-600003-W3G
60P,0.5

GND 470nF C71 X5R 50V
RESEC 1 1 VCOMBD_M
RESEC 2 2 RESEC
GDRC 3 3 GDRC
RESEN 4 4 RESEN
GDRN 5 5 GDRN
RESEP 6 6 RESEP
GDRP 7 7 GDRP
GND 8 8 GND
VDD1 9 9 AVDD
EPD_3V3 10 10 VDD
11 11 NC
GND 10uF C63 X5R 25V VCC 12 12 VCC
VDDP 13 13 VDDP
14 14 VDDP
VPP 15 15 VPP
GND 10uF C72 X5R 25V R76 5% 0R
VDDN 16 16 VDDN
17 17 VDDN
GND 100nF C60 16V X7R VCC1 18 18 VCC1
VDDIO 19 19 VDDIO
R82 4.7K 5% EPD_3V3 R77 5% 0R
R185 4.7K 1% TSCL 20 20 TSCL
EPD_3V3 R184 4.7K 1% TSDA 21 21 TSDA
22 22 BS0
23 23 BS1
R116 0R 5% EDP_RES RST_N 24 24 RST_N
ESP_IO38/SCREEN_RST# R118 0R 5% EDP_BUSY 25 25 BUSY_N
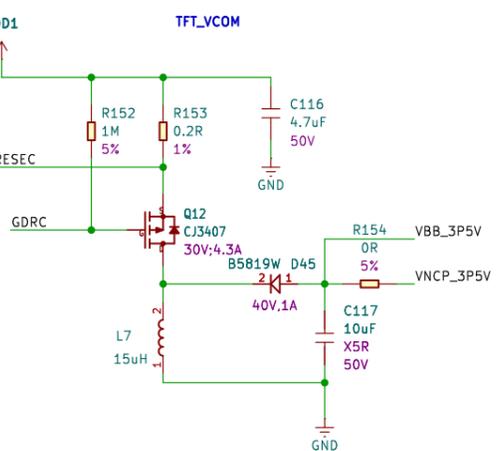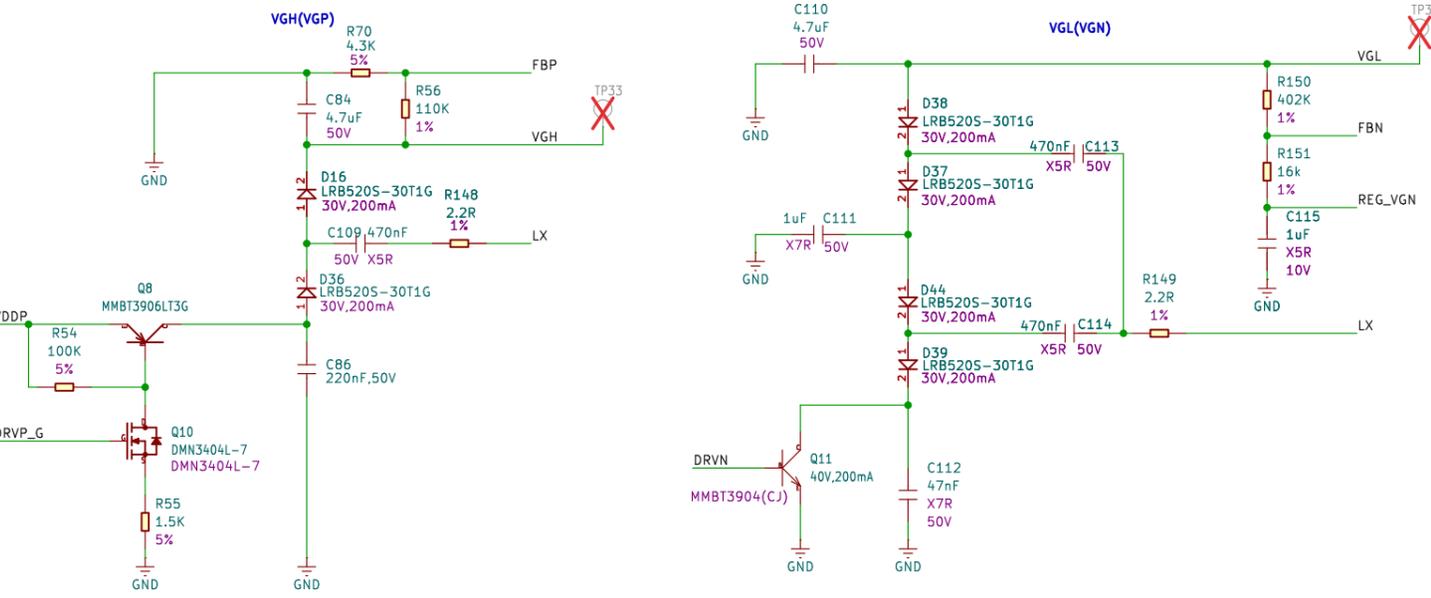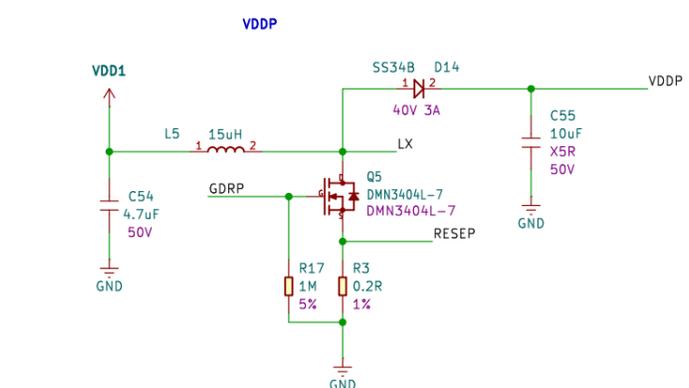ESP_IO13/SCREEN_BUSY# R119 0R 5% EDP_DC 26 26 DC/X
ESP_IO11/SCREEN_DC# R120 0R 5% SPI_CS_M 27 27 CSB_M
ESP_IO10/SCREEN_CS# R121 22R 1% SPI_CLK 28 28 SCL
ESP_IO7/SCK R122 22R 1% SPI_D0 29 29 SI0
ESP_IO9/MOSI R123 22R 1% SPI_D1 30 30 SI1/MISO
ESP_IO8/MISO R124 22R 1% SPI_D2 31 31 SI2
ESP_IO17/SPI_D2 R125 22R 1% SPI_D3 32 32 SI3
ESP_IO18/SPI_D3

EPD_3V3 EPD_3V3
R73 4.7K 5%
R74 4.7K 5%
R79 4.7K 5%
R78 4.7K 5%

DRVP_G 33 33 DRVP_G
FBP 34 34 FBP
35 35 GND
EDP_RES ESDPSA0402V05 D53 36 36 VCOMBD_S
GND 470nF C69 X5R 50V
DRVN 37 37 DRVN
EDP_BUSY ESDPSA0402V05 D43 FBN 38 38 FBN
REG_VGN 39 39 REG_VGN
EDP_DC ESDPSA0402V05 D46 DRVN2 40 40 DRVN2
VNCP_3P5V 41 41 VNCP_3P5V
SPI_CS_M ESDPSA0402V05 D47 47uF C64 X5R 25V VSPH 42 42 VSPH
VSPL 43 43 VSPL
SPI_CLK ESDPSA0402V05 D48 47uF C61 X5R 25V 47uF C65 X5R 25V VSPL2 44 44 VSPL2
VSPLI 45 45 VSPLI
SPI_D0 ESDPSA0402V05 D49 VSPHI 46 46 VSPHI
VSPL2I 47 47 VSPL2I
SPI_D1 ESDPSA0402V05 D50 47uF C66 X5R 25V VSNH 48 48 VSNH
VSNL 49 49 VSNL
SPI_D2 ESDPSA0402V05 D51 47uF C62 X5R 25V 47uF C67 X5R 25V VSNL2 50 50 VSNL2
VSNLI 51 51 VSNLI
SPI_D3 ESDPSA0402V05 D52 VSNHI 52 52 VSNHI
FPL_VCOM 53 53 FPL_VCOM
SPI_CS_S ESDPSA0402V05 D54 GND 470nF C68 X5R 50V TFT_VCOM 54 54 TFT_VCOM
VBB_3P5V 4.7uF C58 50V VBB_3P5V 55 55 VBB_3P5V
56 56 NC
ESP_IO2/SPI_CS_S R126 0R 5% SPI_CS_S 57 57 CSB_S
VGH 58 58 VGH
VGL 59 59 VGH
60 60 VGL

60Pin
GND 61 61
GND 62 62
J2

VDD1 EPD_3V3
Position it in close proximity to the associated power pin of the FPC socket
C59 100nF X7R 16V
C56 100nF X7R 16V

VDDP

SS34B D14 40V 3A
Q5 DMN3404L-7 DMN3404L-7
LX
C55 10uF X5R 50V VDDP

VDD1
L5 15uH
C54 4.7uF 50V
GDRP
RESEP
R17 1M 5%
R3 0.2R 1%

VDD1 VDDN
R18 0R 5%
R27 1M 5%
R28 0.2R 1%
C57 4.7uF 50V
RESEN
GDRN
Q6 CJ3407 30V:4.3A
SS34B 40V 3A D15
R29 0R 5% VDDN
L6 15uH
C74 10uF X5R 50V

VGH(VGP)
R70 4.3K 5% FBP
C84 4.7uF 50V
R56 110K 1% VGH TP33
D16 LRB520S-30T1G 30V,200mA
R148 2.2R 1% LX
C109 470nF 50V X5R
D36 LRB520S-30T1G 30V,200mA
Q8 MMBT3906LT3G
VDDP R54 100K 5%
C86 220nF,50V
DRVP_G Q10 DMN3404L-7 DMN3404L-7
R55 1.5K 5%

VGL(VGN)
C110 4.7uF 50V
R150 402K 1% VGL TP34
D38 LRB520S-30T1G 30V,200mA
D37 LRB520S-30T1G 30V,200mA
470nF C113 X5R 50V
R151 16k 1% FBN
1uF C111 X7R 50V
D44 LRB520S-30T1G 30V,200mA
470nF C114 X5R 50V
C115 1uF X5R 10V REG_VGN
D39 LRB520S-30T1G 30V,200mA
R149 2.2R 1% LX
DRVN Q11 40V,200mA
MMBT3904(CJ)
C112 47nF X7R 50V

TFT_VCOM
VDD1
R152 1M 5%
R153 0.2R 1%
C116 4.7uF 50V
RESEC
GDRC Q12 CJ3407 30V:4.3A
B5819W D45 40V,1A
R154 0R 5% VBB_3P5V
C117 10uF X5R 50V VNCP_3P5V
L7 15uH

C50 4.7uF 50V
GND VNCP_3P5V
D41 LRB520S-30T1G 30V,200mA
R58 2.2R 1% LX
D40 LRB520S-30T1G 30V,200mA 30V X5R
DRVN2 Q9 40V,200mA
C53 1nF X7R 50V

seeed studio