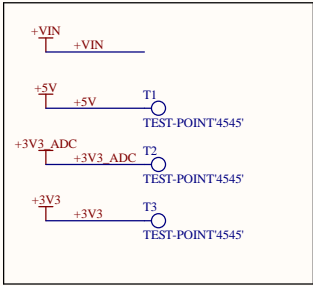
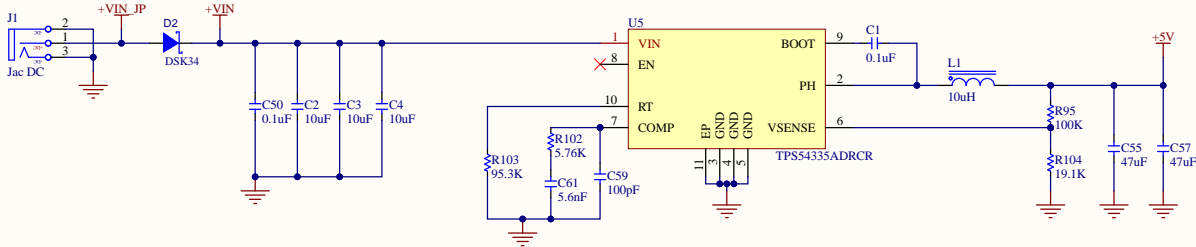


# 1 POWER

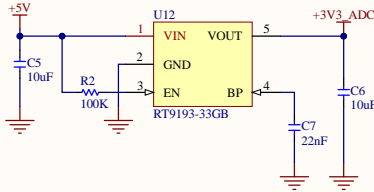
## Power.SchDoc



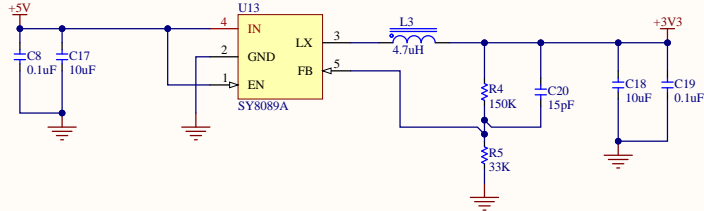
### 8V~28V to 5V@1A



### 5V to 3V3 ADC



### 5V to 3V3 MCU and LAN8720



LOGO1

ESD

LOGO2

Logo EPCB

LOGO EPCB

LOGO3

QC Check Button

QC\_Check

Bản 2.2 có một số nâng cấp với bản 2.1

1. ETH\_LED\_1 tích cực mức cao giúp đèn trạng thái nhảy đúng.
2. Đổi TVS bảo vệ Cổng sensor SMAJ5.0A thành SMAJ5.0CA
3. Bỏ trở 10ohm output 1V65
4. Thêm 4 IC Analog Switches giúp chuyển đổi giữa cảm biến CT và INPUT
5. Thay đổi IC nguồn XL1509-5V(XLSIMD) thành TPS54335A (TI)
6. Thêm phần điều khiển nguồn cho LAN8720

## NH Speaker Sensor 16CH 2.3\_C

Title: NH Speaker Sensor 16CH 2.3\_C.PrjPcb

Page Contents: Power.SchDoc

Size: DWG NO

Revision: 2.3

Date: 04/11/2023

Hoang Anh

Sheet

of 1

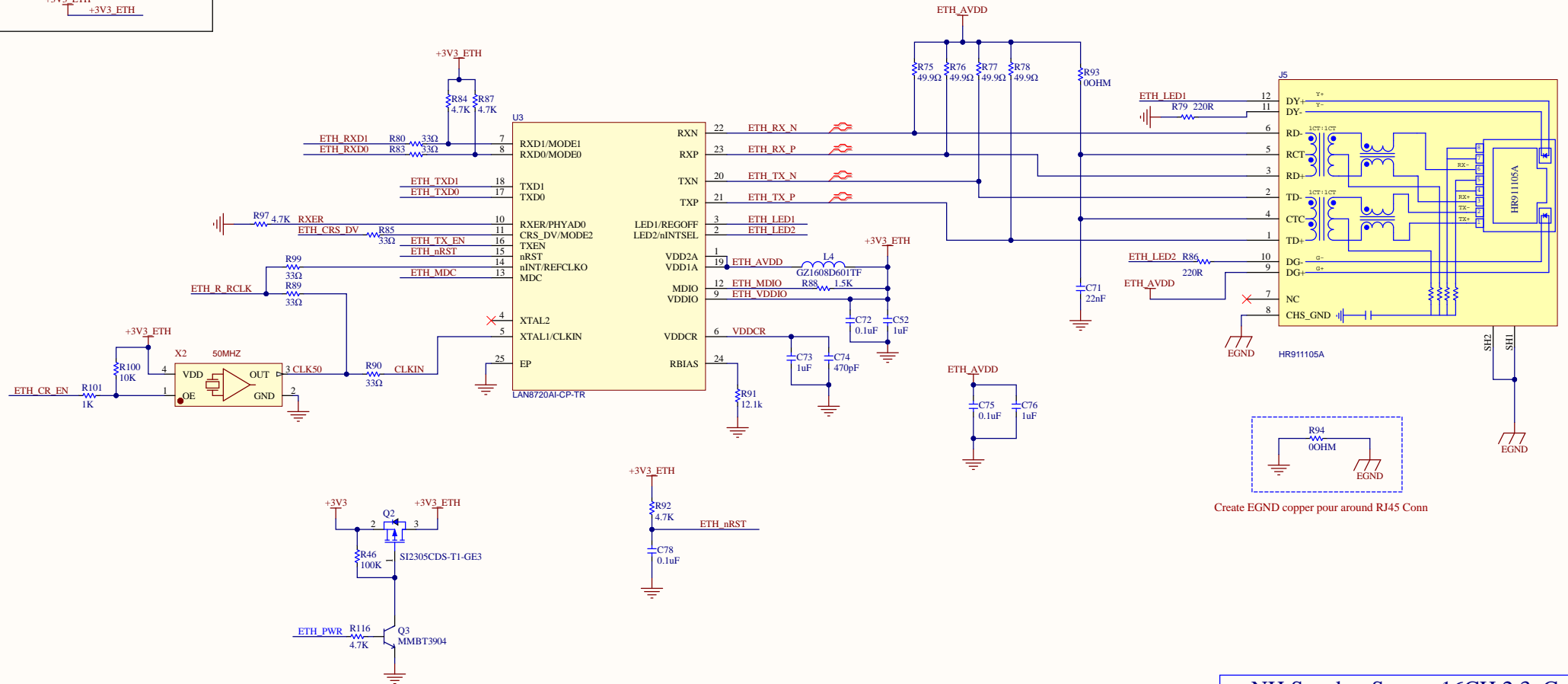
6

# Ethernet.SchDoc

ETH_MDC	ETH MDC
ETH_MDIO	ETH MDIO
ETH_CRSDV	ETH CRS DV
ETH_R_RCLK	ETH R RCLK
ETH_RXD1	ETH RXD1
ETH_RXD0	ETH RXD0
ETH_TXD0	ETH TXD0
ETH_TXEN	ETH TX EN
ETH_TXD1	ETH TXD1
ETH_nRST	ETH nRST
ETH_CR_EN	ETH CR EN

ETH\_PWR >> ETH\_PWR

+3V3\_ETH



### Create EGND copper pour around RJ45 Conn

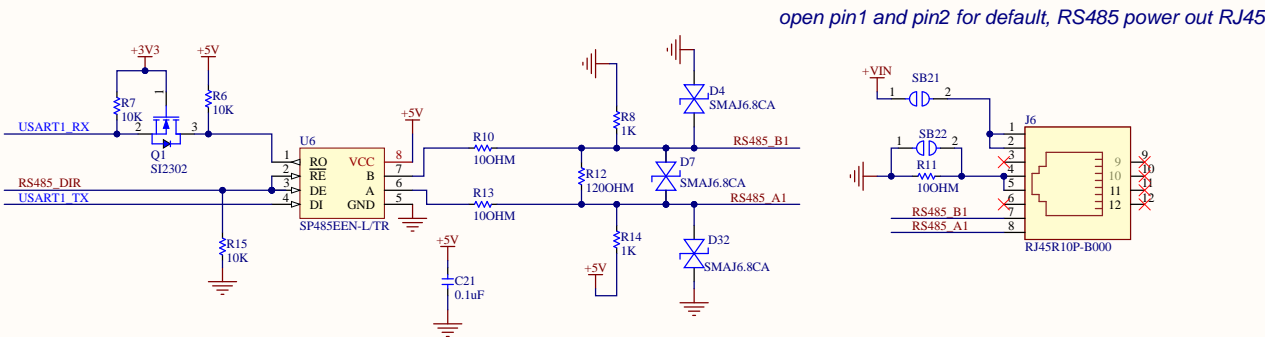
Title: NH Speaker Sensor 16CH 2.3_C.PrjPcb			
Page Contents: Ethernet.SchDoc			
Size:	DWG NO		Revision: 2.3
Date:	04/11/2023	Hoang Anh	Sheet of 2 6

# 3 RS485

## RS485.SchDoc

### RS485

USART1\_RX >> USART1\_RX  
USART1\_TX >> USART1\_TX  
RS485\_DIR >> RS485\_DIR



### NH Speaker Sensor 16CH 2.3\_C

Title: NH Speaker Sensor 16CH 2.3_C.PrjPcb			
Page Contents: RS485.SchDoc			
Size:	DWG NO	Revision: 2.3	
Date:	04/11/2023	Hoang Anh	Sheet of 3 6

## Sensor.SchDoc

The diagram shows two sets of connections. The top set connects ADC channels VAL0 through VAL5 to IN pins CTI3 through CTI6. Specifically, ADC\_VAL0 connects to IN\_CT I3, ADC\_S0 to IN\_CT I4, ADC\_S1 to IN\_CT I5, ADC\_S2 to IN\_CT I6, and ADC\_S3 to IN\_CT I7. The bottom set connects R channels CTI3 through CTI6 to R pins CTI3 through CTI6. Specifically, R\_CT I3 connects to R\_CT I3, R\_CT I4 to R\_CT I4, R\_CT I5 to R\_CT I5, and R\_CT I6 to R\_CT I6.

The diagram illustrates the internal circuitry of the CD4067B/M96, specifically the analog section. It shows the connection of the +3V3\_ADC supply to the internal logic blocks (CT1 to CT16) and the ADC input pins (ADC\_S0 to ADC\_S3). The ADC output pin (ADC\_VAL0) is also shown. The device is shown in a CD4067B/M96 package.

[illegible]

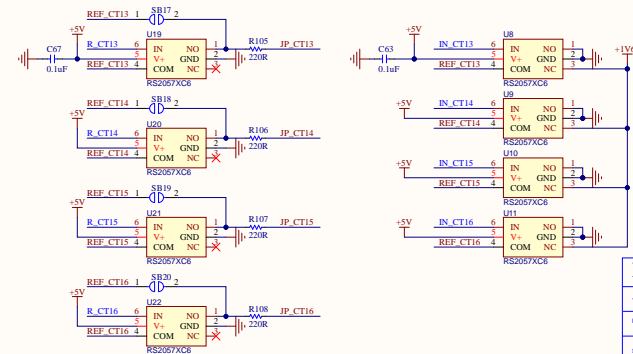
Figure 1 illustrates the pin connections for the ESDA6V1L component. The connections are organized into two columns. The left column shows pins D3, D5, D6, and D8, each connected to a specific JP connector (CT1, CT5, CT2, and CT4 respectively). The right column shows pins D9, D10, D11, and D12, each connected to a specific JP connector (CT19, CT10, CT11, and CT12 respectively). All connections are grounded to the ESDA6V1L component.

J3			
REF CT1	2	1	REF CT5
JP CT1	4	3	JP CT5
REF CT2	6	5	REF CT6
JP CT2	8	7	JP CT6
REF CT3	10	9	REF CT7
JP CT3	12	11	JP CT7
REF CT4	14	13	REF CT8
JP CT4	16	15	JP CT8

15EDGRH-3.81-16P

[illegible]

closed pin1 and pin2 or R\_CTxx=High use CT AC



Title: NH Speaker Sensor 16CH 2.3_C.PrjPcb			
Page Contents: Sensor.SchDoc			
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# 5 Console

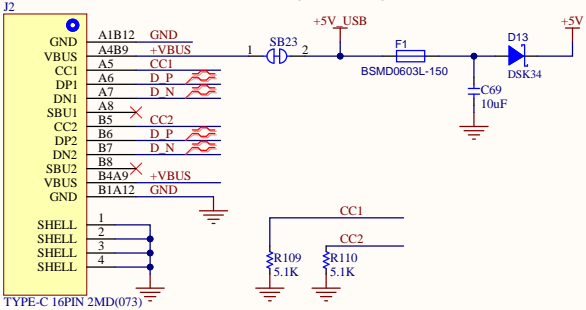
## Console.SchDoc

### CONSOLE

USART2\_RX >> USART2\_RX  
USART2\_TX >> USART2\_TX

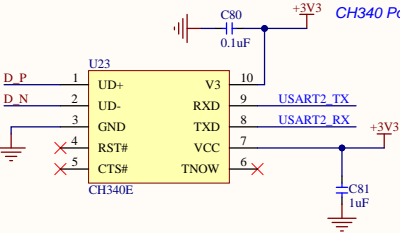
### USB Type C

closed pin1 and pin2 for default, USB 5V power IN



### CH340E USB to TTL

CH340 Power Use 3V3 System



## NH Speaker Sensor 16CH 2.3\_C

Title: NH Speaker Sensor 16CH 2.3_C.PrjPcb			
Page Contents: Console.SchDoc			
Size:	DWG NO	Revision:	2.3
Date:	04/11/2023	Hoang Anh	Sheet of 5 6

## MCU.SchDoc

ETH_MDC	ETH_MDC
ETH_MDIO	ETH_MDIO
ETH_RCS_DV	ETH_CRS_DV
ETH_R_RCLK	ETH_R_RCLK
ETH_RXD1	ETH_RXD1
ETH_RXD0	ETH_RXD0
ETH_TXD0	ETH_TXD0
ETH_TX_EN	ETH_TX_EN
ETH_TXD1	ETH_TXD1
ETH_nRST	ETH_nRST
ETH_CR_EN	ETH_CR_EN

## RS485

USART1_RX	USART1_RX
USART1_TX	USART1_TX
RS485_DIR	RS485_DIR

**SENSOR**

```

ADC_VAL0 >>> ADC_VAL0
ADC_S0 >>> ADC_S0
ADC_S1 >>> ADC_S1
ADC_S2 >>> ADC_S2
ADC_S3 >>> ADC_S3

```

IN_CT13	IN CT13
IN_CT14	IN CT14
IN_CT15	IN CT15
IN_CT16	IN CT16

## CONSOLE

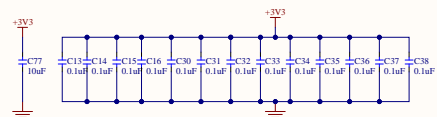
USART2\_TX >>> USART2\_TX  
USART2\_RX >>> USART2\_RX

## MCU

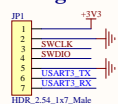
```

graph LR
    TX1[USART2_TX] --> RX2[USART2_RX]
    RX1[USART2_RX] --> TX2[USART2_TX]
  
```

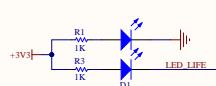
### Decoupling Capacitor 13x100nF



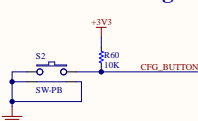
## Debug



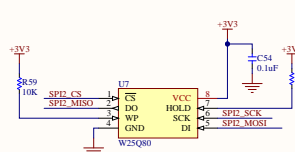
## LED



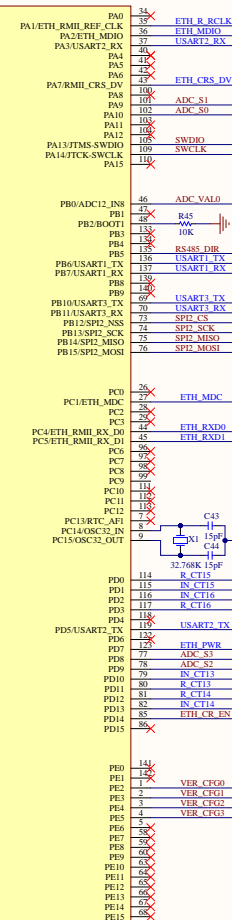
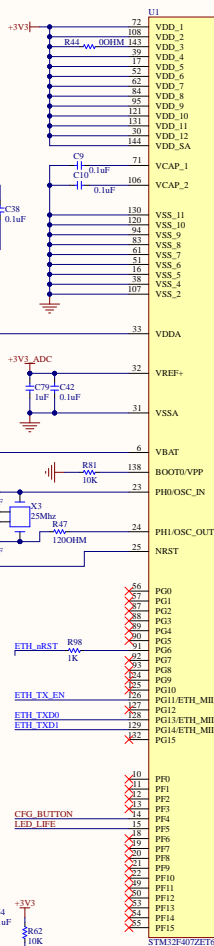
## Button Config



## 8Mbit Nor Flash



# STM32F407ZET6



### Three-mode optional sensor

Mode: CT Audio

R\_CTxx: LOW  
IN\_CTxx: LOW

Mode: CT AC Grid

R\_CTxx: HIGH  
IN\_CTxx: LOW

Mode: Digital Input

R\_CTxx: LOW  
IN\_CTxx: HIGH

## Version Config

```
0000: Ver 2.1
0001: Ver 2.2
0010: Ver 2.3
```



# NH Speaker Sensor 16CH 2.3 C.PrjPcb

#	Name	Designator	Footprint	CS Part Number	Manufacturer Part Number	Manufacturer	Quantity	Description	Assembly type	Link
1	0.1uF	C1, C8, C_0603		C14663	CC0603KRX7R9BB104	YAGEO	34	100NF 50V 0603 ROHS	SMT Assembly	
2	10uF	C2, C3, C_0805		C440198	GRM21BR61H106KE43L	Murata Electronics	5	10uF ±10% 50V X5R 0805	SMT Assembly	
3	10uF	C5, C6, C_0603		C19702	CL10A106KP8NNNC	Samsung Electro-Mechanics	5	10uF 10V 0603 Multilayer	SMT Assembly	
4	22nF	C7, C71	C_0603	C21122	CL10B223KB8NNNC	Samsung Electro-Mechanics	2	22nF 50V 0603 Multilayer	SMT Assembly	
5	15pF	C11, C1C_0603		C1644	CL10C150JB8NNNC	Samsung Electro-Mechanics	5	15pF ±5% 50V COG 0603	SMT Assembly	
6	100pF	C24, C2C_0603		C1635	0603CG101J500NT	FH(Guangdong Fenghua Adva	16	100pF 50V COG ±5% 0603	SMT Assembly	
7	1uF	C40, C6C_0603		C15849	CL10A105KB8NNNC	Samsung Electro-Mechanics	5	1UF 50V 0603 ROHS	SMT Assembly	
8	0.1uF	C46, C6C_0603		C14663	CC0603KRX7R9BB104	YAGEO	2	100NF 50V 0603 ROHS	SMT Assembly	
9	47uF	C55, C5C_0805		C124129	GRM21BR61A476ME15L	Murata Electronics	2	47uF ±20% 10V X5R 0805	SMT Assembly	
10	100pF	C59	C_0603	C1635	0603CG101J500NT	FH(Guangdong Fenghua Adva	1	100pF 50V COG ±5% 0603	SMT Assembly	
11	5.6nF	C61	C_0603	C1628	0603B562K500NT	FH(Guangdong Fenghua Adva	1	5.6nF 50V X7R ±10% 0603	SMT Assembly	
12	470pF	C74	C_0603	C1620	0603B471K500NT	FH(Guangdong Fenghua Adva	1	470pF 50V 0603 Multilayer	SMT Assembly	
13	0.1uF	C80	C_0603	C14663	CC0603KRX7R9BB104	YAGEO	1	100NF 50V 0603 ROHS	SMT Assembly	
14	1uF	C81	C_0603	C15849	CL10A105KB8NNNC	Samsung Electro-Mechanics	1	1UF 50V 0603 ROHS	SMT Assembly	
15	2LED_3MM	D1	2LED_3MM	N/A	2 Led 3mm	N/A	1	Typical RED GaAs LED	Hand Soldering	
16	DSK34	D2, D13	SOD-123_L2.8-W1.4	C41029	DSK34	MDD (Microdiode Electronics)	2	DSK34 40V 550mV@3mA	SMT Assembly	
17	ESDA6V1L	D3, D5, SOT-23-3_L2.9-W1.4	C587141	ESDA6V1L		TECH PUBLIC(台鼎)	8	ESDA6V1L SOT-23-3	SMT Assembly	
18	SMAJ6.8CA	D4, D7, SMA_DO-214AC - C	C406209	SMAJ6.8CA		Bourne Semicon (Shenzhen)	3	Bidirectional 6.8V SMAJ	SMT Assembly	
19	SMF5.0CA_C908214	D14, D15	SOD-123_L2.8-W1.4	C908214	SMF5.0CA	FUXINSEMI(富芯森美)	16	SMF5.0CA 9.2V 6.4V 500mA	SMT Assembly	
20	BAT54C	D18	SOT-23-3_L2.9-W1.4	C14308	BAT54CLT1G	ON Semicon	1	SCHOTTKY BARRIER	SMT Assembly	
21	BSMD0603L-150	F1	F0603	C914094	BSMD0603L-150	BHFUSE	1	6V 1.5A 50A 1W -40°C	SMT Assembly	
22	Jac DC	J1	DC0	C718033	DC+021	JINJIA	1	Jac DC input 5.5x2.1mm	Hand Soldering	
23	TYPE-C 16PIN 2MD	J2	USB-C-SMD_TYPE-C	C2765186	TYPE-C16PIN	SHOU HAN	1	5A 1 Surface Mount 16PIN	SMT Assembly	
24	15EDGRH-3.81-16P	J3, J4	Header 3.81 8 pin dual	N/A		1843130 Phoenix Contact	2	16 Position Terminal Block	Hand Soldering	
25	HR911105A	J5	RJ45-TH_HR911105	C12074	HR911105A	HANRUN	1	RJ45 12 1 Green - Yellow	Hand Soldering	
26	RJ45R10P-B000	J6	RJ45-TH_R-RJ45R10P	C386758	R-RJ45R10P-B000	Ckmtw(Shenzhen Cankemeng)	1	RJ45 18MM, No Transceiver	Hand Soldering	
27	HDR_2.54_1x7_Male	JP1	HDR1X7	N/A	HDR_2.54_1x7_Male	China	1	CONN HEADER VERT	Hand Soldering	
28	10uH	L1	IND-SMD_L4.4-W4.4	C408339	MVSA0402S-100MT	Sunlord	1	POWER INDUCTORS	SMT Assembly	
29	GZ1608D601TF	L2, L4	L_0603	C1002	GZ1608D601TF	Sunlord	2	600Q @ 100MHz 1 200mA	SMT Assembly	
30	4.7uH	L3	IND-SMD_L4.4-W4.4	C408337	MVSA0402S-4R7MT	Sunlord	1	4.7uH IND 4.2x4.4x2.0mm	SMT Assembly	
31	SI2302	Q1	SOT-23-3_L2.9-W1.4	C10488	SI2302CDS-T1-GE3	Vishay Intertech	1	MOSFET N TRENCH 2.5A	SMT Assembly	
32	SI2305CDS-T1-GE3	Q2	SOT-23-3_L2.9-W1.4	C37577	SI2305CDS-T1-GE3	Vishay Intertech	1	SI2305CDS-T1-GE3 8V	SMT Assembly	
33	MMBT3904	Q3	SOT-23-3_L2.9-W1.4	C20526	MMBT3904	Changjiang Electronics Tech (	1	MMBT3904 TRANSISTOR	SMT Assembly	
34	1K	R1, R3, R_0603		C21190	0603WAF100T15E	Uniroyal Elec	6	1KOHMS ±1% 1/10W	SMT Assembly	
35	100K	R2, R46	R_0603	C25803	0603WAF100T35E	Uniroyal Elec	3	100KOHMS ±1% 1/10W	SMT Assembly	
36	150K	R4	R_0603	C22807	0603WAF150T35E	Uniroyal Elec	1	150KQ ±1% ±100ppm/°C	SMT Assembly	
37	33K	R5	R_0603	C4216	0603WAF330T25E	Uniroyal Elec	1	33KOHMS ±1% 1/10W	SMT Assembly	
38	10K	R6, R7, R_0603		C25804	0603WAF100T25E	Uniroyal Elec	3	10KOHMS ±1% 1/10W	SMT Assembly	
39	220R	R9, R23	R_0603	C22962	0603WAF220T075E	Uniroyal Elec	2	220R 220OHMS ±1% 1/10W	SMT Assembly	
40	100OHM	R10, R1R_0805		C17415	0805W8F100JT5E	Uniroyal Elec	2	100HMS ±1% 1/8W 0805	SMT Assembly	
41	100OHM	R11, R2R_0603		C22859	0603WAF100JT5E	Uniroyal Elec	1	100HMS ±1% 1/10W 0603	SMT Assembly	
42	120OHM	R12, R4R_0603		C22787	0603WAF1200T5E	Uniroyal Elec	2	120OHMS ±1% 1/10W	SMT Assembly	
43	0OHM	R44, R9R_0603		C21189	0603WAF000T075E	Uniroyal Elec	3	0OHMS ±1% 1/10W 0603	SMT Assembly	
44	49.9Q	R75, R7R_0603		C23185	0603WAF499JT5E	Uniroyal Elec	4	49.9OHM ±1% ±1% 0.1W	SMT Assembly	
45	33Q	R80, R8R_0603		C23140	0603WAF330JT5E	Uniroyal Elec	6	33OHM ±1% 0.1W ±10%	SMT Assembly	
46	4.7K	R84, R8R_0603		C23162	0603WAF470T15E	Uniroyal Elec	5	4.7KOHMS ±1% 1/10W	SMT Assembly	
47	1.5K	R88	R_0603	C22843	0603WAF150T15E	Uniroyal Elec	1	1.5KOHMS ±1% 1/10W	SMT Assembly	
48	12.1k	R91	R_0603	C22864	0603WAF121T25E	Uniroyal Elec	1	12.1kQ ±1% 0.1W ±10%	SMT Assembly	
49	5.76K	R102	R_0603	C23070	0603WAF576T15E	Uniroyal Elec	1	5.76kQ 0603 1/10W Th	SMT Assembly	
50	95.3K	R103	R_0603	C23267	0603WAF953T25E	Uniroyal Elec	1	95.3kQ 0603 1/10W Th	SMT Assembly	
51	19.1K	R104	R_0603	C22897	0603WAF191T25E	Uniroyal Elec	1	19.1kQ 0603 1/10W Th	SMT Assembly	
52	5.1K	R109, R1R_0603		C23186	0603WAF510T15E	Uniroyal Elec	2	5.1K 5.1kQ 0603 1/10W	SMT Assembly	
53	3.32K	R113	R_0603	C137731	RC0603FR-073K32L	Uniroyal Elec	1	3.32K ±1% 1/10W 0603	SMT Assembly	
54	10K	R114	R_0603	C25804	0603WAF100T25E	Uniroyal Elec	1	10KOHMS ±1% 1/10W	SMT Assembly	
55	SW-PB	S1, S2	SW2-D2	N/A	EVQ-PF306K	Panasonic	2	SPST 50mA @ 12VDC	Hand Soldering	
56	STM32F407ZET6	U1	LQFP-144_L20.0-W14.0	C36869	STM32F407ZET6	STMicroelectronics	1	STM32F407ZGT6 ARM Cortex-M4	SMT Assembly	
57	CD4067BM96	U2	SOIC-24_L15.4-W7.6	C6525	CD4067BM96	Texas Instruments	1	CD4067BM96 1 240Q 5V	SMT Assembly	
58	LAN8720AI-CP-TR	U3	QFN-24_L4.0-W4.0	C17146	LAN8720AI-CP-TR	SMSC	1	Ethernet Transceivers	SMT Assembly	
59	LM321G-AE5-R	U4	SOT-23-5_L3.0-W1.4	C100068	LM321G-AE5-R	UTC	1	1MHz 1 General Purpose	SMT Assembly	
60	TPS54335ADRCR	U5	VSON-10_L3.0-W3.0	C473400	TPS54335ADRCR	Texas Instruments	1	TPS54335A 28V 3A SC	SMT Assembly	
61	SP485EEN-L/TR	U6	SOIC-8_3.9x4.9x1.2	C6855	SP485EEN-L/TR	MaxLinear	1	RS-485 & RS-422 1/1	SMT Assembly	
62	W25Q80	U7	SOIC-8_3.9x4.9x1.2	C401655	W25Q80DVSNIQ TR	Winbond	1	FLASH FLASH 8MB (1M)	SMT Assembly	
63	RS2057XC6	U8, U9, SC-70-6_L2.2-W1.3	C237027			RUNIC(润石)	8	8Q 1 SPDT(SPDT) SC	C237027	
64	RT9193-33GB	U12	SOT-23-5_L3.0-W1.4	C15651	RT9193-33GB	Richtek Tech	1	5.5V 300mV @ 300mA	SMT Assembly	
65	SY8089A	U13	SOT-23-5_L3.0-W1.4	C479074	SY8089A1AAC	Silergy Corp	1	High Efficiency 5.5V, 2A	SMT Assembly	
66	LM324AMTR	U14, U15	SOIC-14_3.9x8.7x1.4	C2688471	LM324AMTR	HGSEMI	4	LM324AMNOPB GENE	SMT Assembly	
67	TLV431AIDBZR	U18	SOT-23-3_L2.9-W1.4	C56765	TLV431AIDBZR	Texas Instruments	1	TLV431AIDBZR 1.24V	SMT Assembly	
68	CH340E	U23	MSOP-10_L3.0-W3.0-P0.50-L5.0-BL			WCH(Jiangsu Qin Heng)	1	Transceiver USB 2.0 28mA	SMT Assembly	
69	32.768K	X1	SMD-3215_2P	C32346	Q13FC1350000400	Seiko Epson	1	32.768K SMD CRYSTAL	SMT Assembly	
70	50MHZ	X2	SMD-3225_4P	C160451	HSO321S 50MHZ 3.3V 50PPM	HELE(Harmony Elec)	1	HSO321S 50MHZ 3.3V	SMT Assembly	
71	25Mhz	X3	SMD-3225_4P	C9006	X322525MOB4SI	Yangxing Tech	1	25MHz ±10ppm 12pF 4	SMT Assembly	