



芯高科技
HIGH TECH
TECHNOLOGY LIMITED

HT6329E 130W-2C (65W+65W) 演示板测试及使用 指南

双输出充电器

测试单元: 20240327

2024/4/2 | 机密文件



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1. 摘要



操作模式:	Ch1 (Type-C)	Ch2 (Type-C)
输入电压范围	4.7-36VDC	
输出电压和电流范围 (最大输出功率是 65W+65W)	(5V 3A), (9V 3A), (12V 3A), (15V 3A), (20V 3.25A)	(5V 3A), (9V 3A), (12V 3A), (15V 3A), (20V 3.25A)
主要支持的快速充电协议	PD 3.0, QC 3.0*	PD 3.0, QC 3.0*
尺寸	64mm(长) x 62mm(阔) x 22mm(高)	
最大输出功率	65W	65W
最大功率转换效率	97% @ 36Vin 98% @ 16Vin	97% @ 36Vin 98% @ 16Vin
短路(Short Circuit)测试	✓	

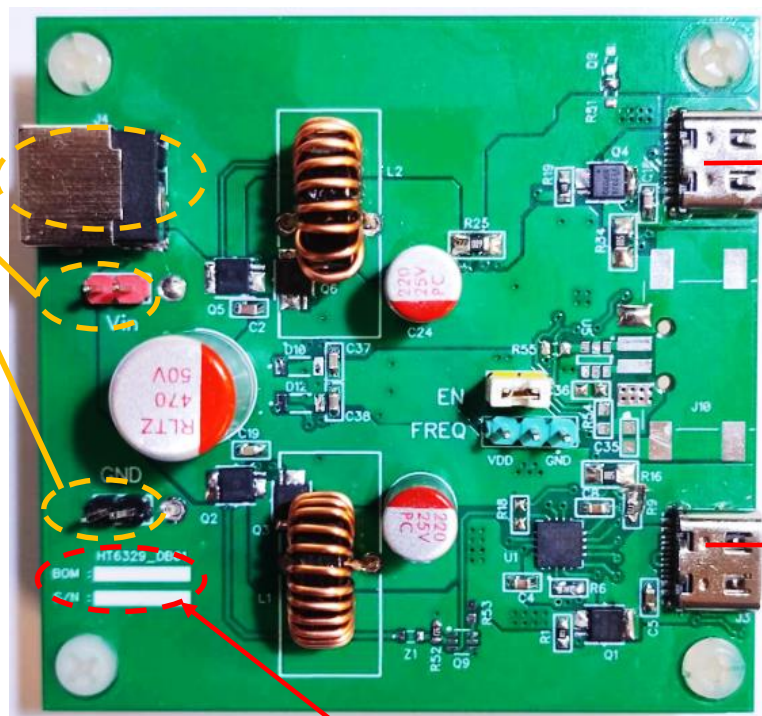
* QC3.0: Based on QUALCOMM webpage: Charge up to 4 times faster than conventional 5W chargers.
(<https://www.qualcomm.com/news/onq/2015/09/14/introducing-quick-charge-30-next-generation-fast-charging-technology>)



2a. 演示板介绍

- 4.7VDC - 36VDC 供电，2C 输出
- 尺寸: 64mm(长) x 62mm(阔) x 40mm(高)

演示板 (顶视图)



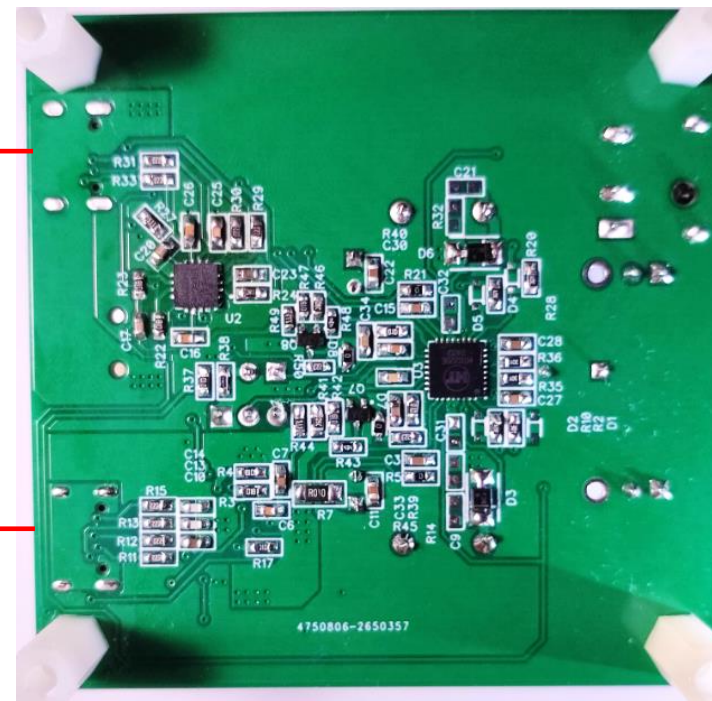
24 - 36VDC 供电口 : DC Jack (φ2.5) 或 排针

Type-C 输出 (65W max)

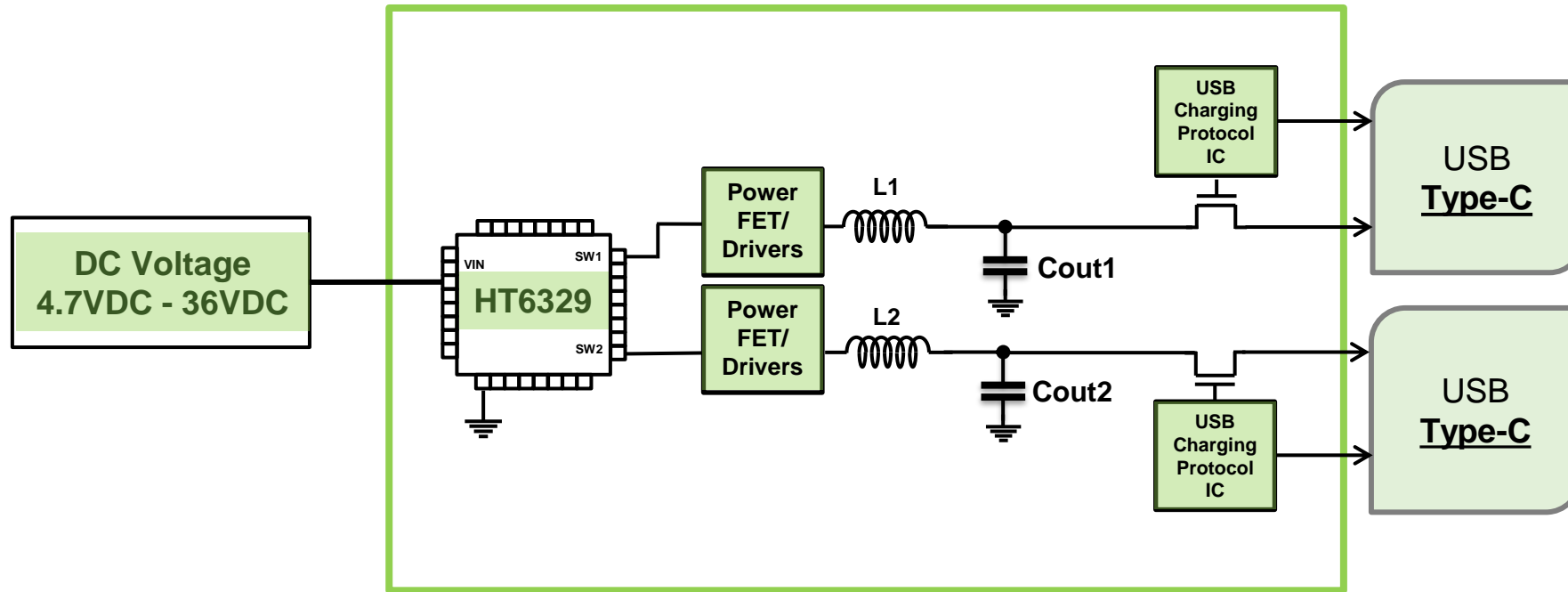
Type-C 输出 (65W max)

HT6329_DB01
S/N: 20240327

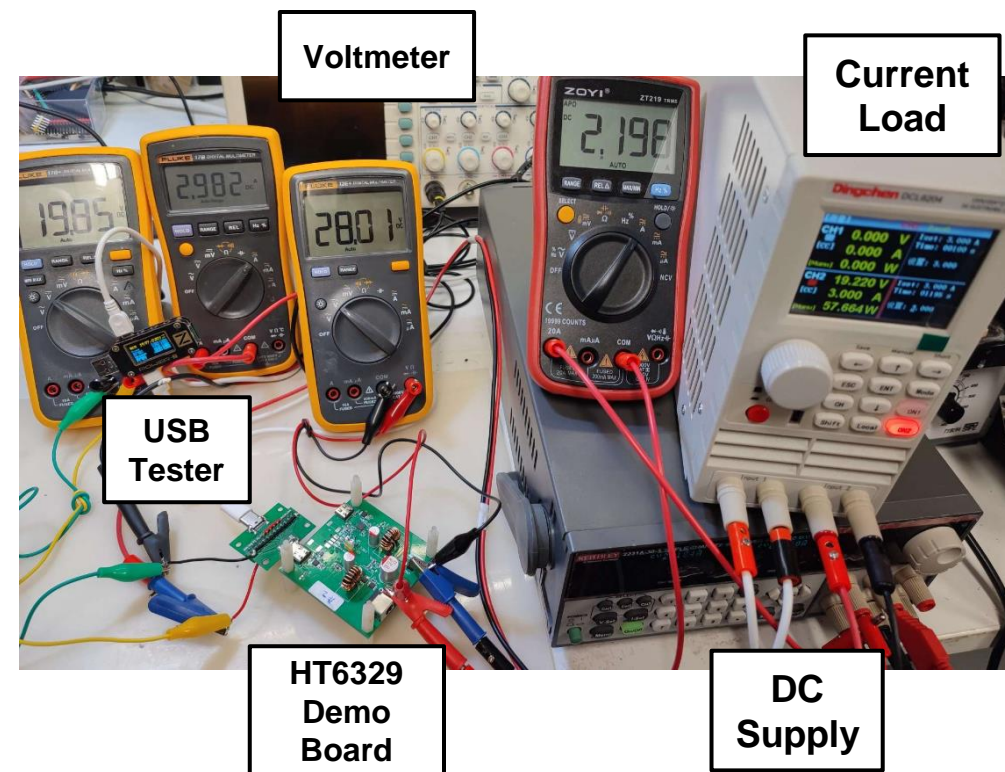
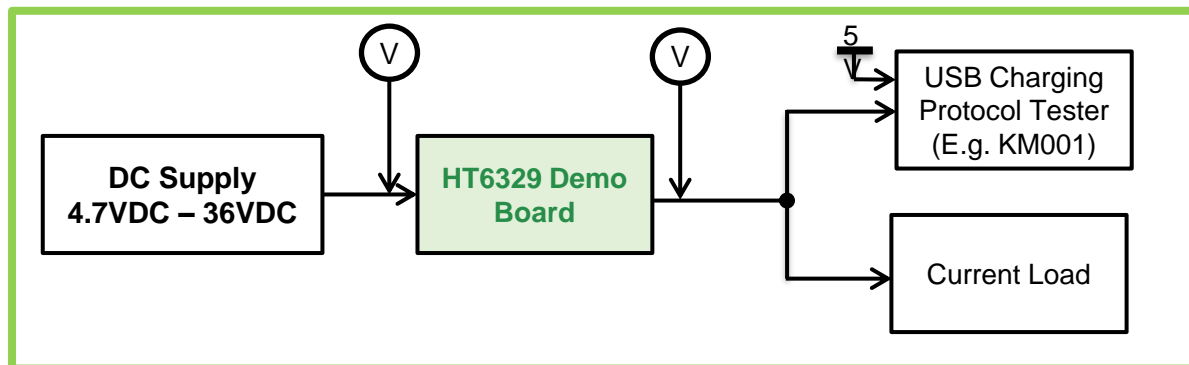
演示板 (底视图)



2b. 演示板介绍



3. 测试设置





3. 测试规格

输入电压

4.7VDC – 36VDC

输出电压和电流

- CH1 (Type-C)

- 5 V, 0 – 3 A (15 W)
- 9 V, 0 – 3 A (27 W)
- 12 V, 0 – 3 A (36 W)
- 15 V, 0 – 3 A (45 W)
- 20V, 0 – 3.25 A (65 W)

- CH2 (Type-C)

- 5 V, 0 – 3 A (15 W)
- 9 V, 0 – 3 A (27 W)
- 12 V, 0 – 3 A (36 W)
- 15 V, 0 – 3 A (45 W)
- 20V, 0 – 3.25 A (65 W)

双路输出的总输出电流及功率

- 最大总输出电流为 6.5 A
- 总功率最高为 130W (65W + 65W)

4. 待机功率



Channel	Freq(kHz)	Vin(V)	Iin(mA)	Pin(mW)
Ch1 (Type-C)	150	36	2.1	75.6
Ch2 (Type-C)	150	36	2.1	75.6

5. 待机纹波

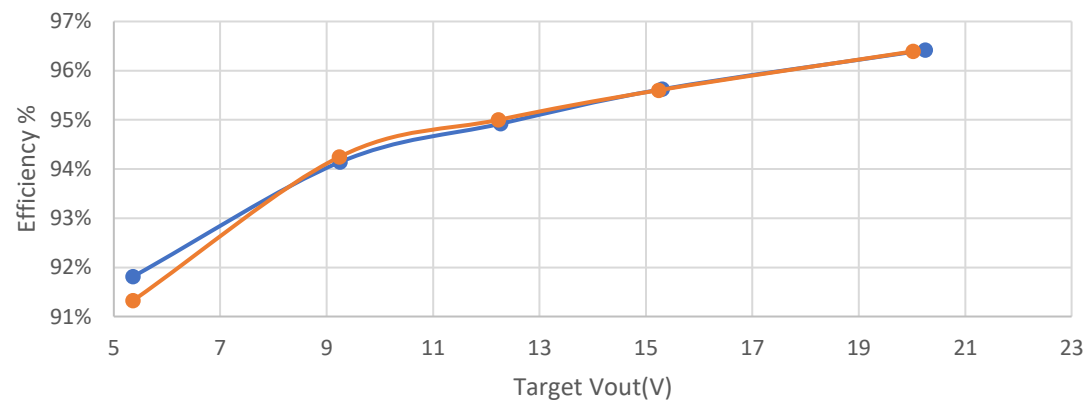


Channel	Freq(kHz)	Vin(V)	Vout(V)	Vripple(mV)
Ch1 (Type-C)	150	36	5.13	200
Ch2 (Type-C)	150	36	5.12	200

6. 不同PDO 下最大输出功率, $\eta_{fullload}$



Efficiency under maximum output (Different PDO)
(Fsw=150kHz)



Channel	Vin(V)	Iin(A)	Vout(V)	Iout(A)	Vripple(mV)	Efficiency
Ch1 (Type-C)	36	0.4865	5.36	3	50	91.8%
	36	0.8188	9.25	3	50	94.1%
	36	1.0772	12.27	3	60	94.9%
	36	1.3342	15.31	3	60	95.6%
	36	1.896	20.25	3.25	70	96.4%
Ch2 (Type-C)	36	0.4891	5.36	3	70	91.3%
	36	0.817	9.24	3	70	94.2%
	36	1.0728	12.23	3	70	95.0%
	36	1.3284	15.24	3	70	95.6%
	36	1.875	20.02	3.25	70	96.4%

*输出量在PCB上位置

6a. 功率转换效率, $\eta_{fullload\ single}$



- 总结

(Fsw = 150kHz)

Ch 1, 单通道 (Ch 2 No Load)

输入电压 12V

输出电压	5 V	9 V	12V	15V	20V
最大效率, $\eta_{max\ single}$	91.8%	94.1%	94.9%	95.6%	96.4%

Ch 2, 单通道 (Ch 1 No Load)

输入电压 12V

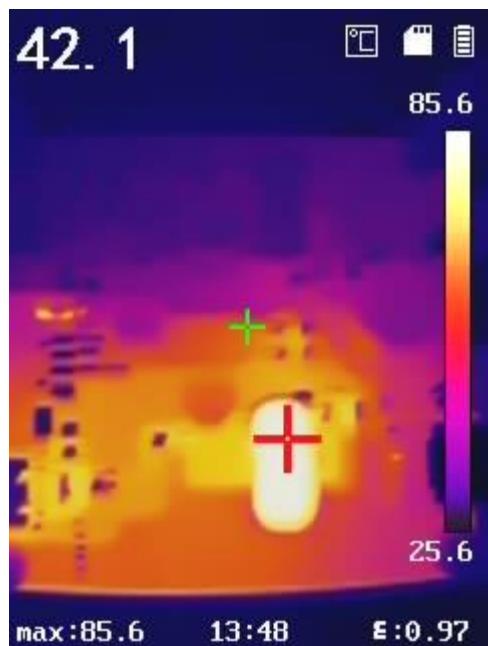
输出电压	5 V	9 V	12V	15V	20V
最大效率, $\eta_{max\ single}$	91.3%	94.2%	95%	95.6%	96.4%

7. 过流保护 Over-Current Protection

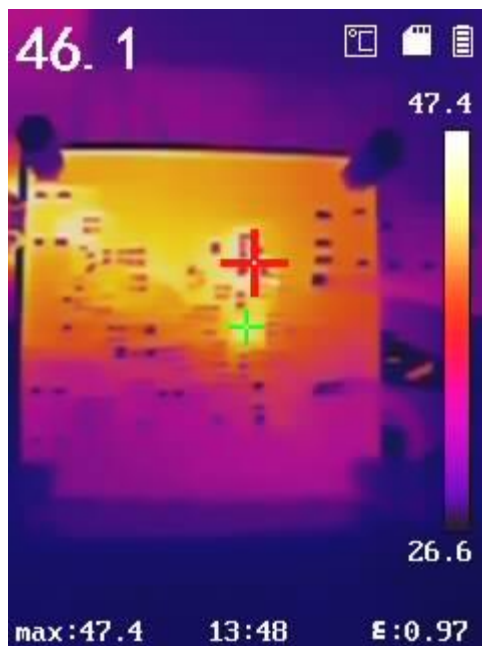


Channel	OCP/SCP level
Ch1 (PD 5V)	3.35
Ch1 (PD 9V)	3.41
Ch1 (PD 12V)	3.41
Ch1 (PD 15V)	3.4
Ch1 (PD 20V)	3.57
Ch2 (PD 5V)	3.3
Ch2 (PD 9V)	3.37
Ch2 (PD 12V)	3.37
Ch2 (PD 15V)	3.37
Ch1 (PD 20V)	3.42

8. 温升测试 (单输出 Type-C, 65W)



Top side



Bottom side

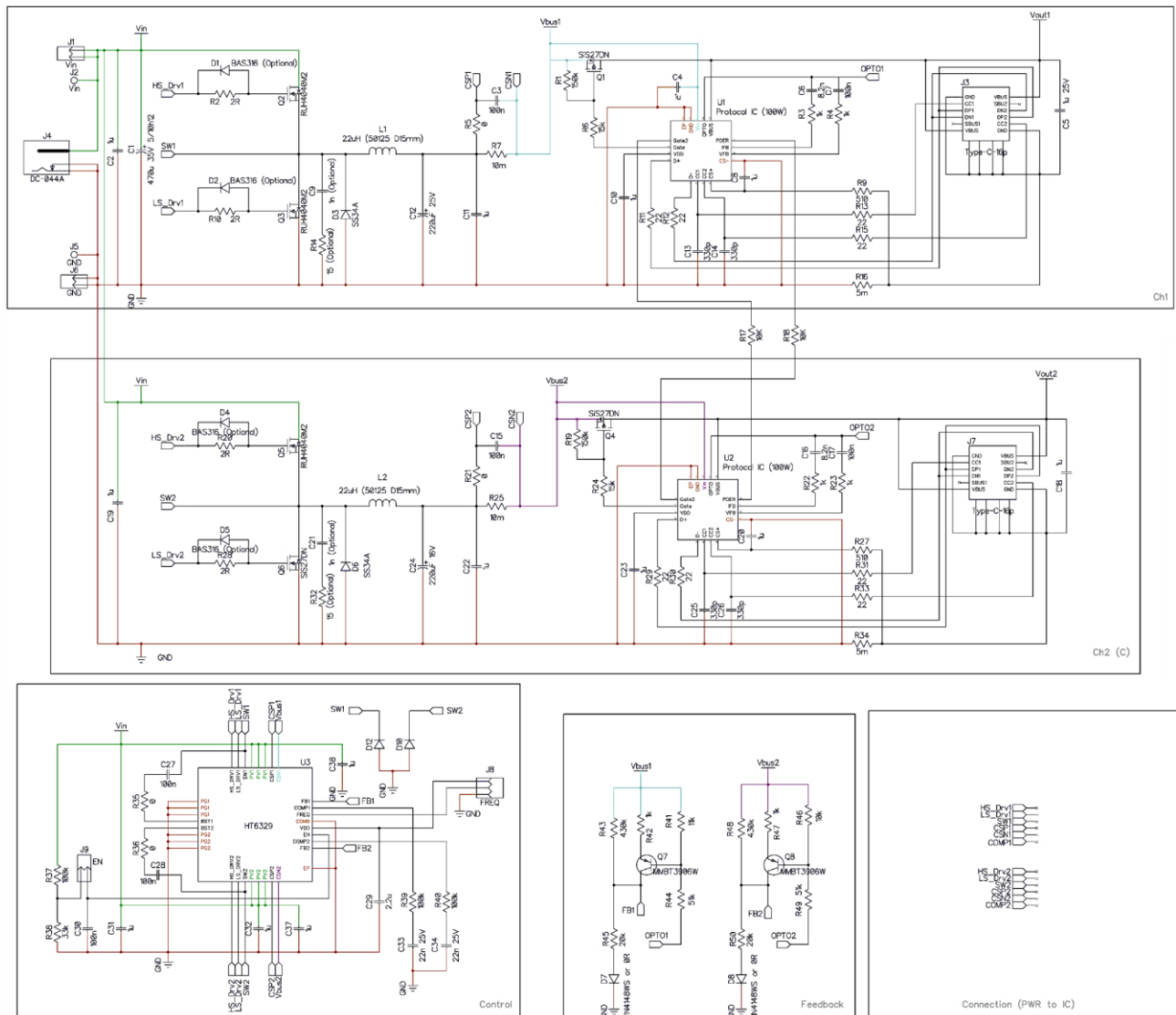
Parameter	Value
Vin	36V
Vout, Iout	20V, 3.25A (Type-C)
Fsw	150kHz
Test Time	30min

Component	Temperature
U3 (HT6329)	46.1 °C
L1 (22uH)	85.6 °C

9a. 附录 I



- 演示板原理图
(物料清单详见附录II)



9b. 附录 II



• 演示板物料

Item	Description	Name	Value	Quantity
1	C1	Solid State Capacitor	470u 35V	1
2	C2, C4, C8, C10, C11, C18, C19, C20, C22, C23, C31, C32, C37, C38	CAP_0603	1u	15
3	C3, C7, C15, C17, C27, C28, C30	CAP_0603	100n	7
4	C5	CAP_0603	1u 25V	2
5	C6, C16	CAP_0603	8.2n	2
6	C9, C21	CAP_0603	1n (Optional)	2
7	C12	Solid State Capacitor	220uF 25V	1
8	C13, C14, C25, C26	CAP_0603	330p	4
9	C24	220uF 16V	220uF 16V	1
10	C29	CAP_0603	2.2u	1
11	C33, C34	CAP_0603	22n 25V	2
12	D1, D2, D4, D5	BAS316	BAS316 (Optional)	4
13	D3, D6	SMA	SS34A	2
14	D7, D8	1N4148WS or 0R	1N4148WS or 0R	2
15	D9	LED_0603(1608 Metric) MNF_White		1
16	D10, D12	DIODE	MBR140 (Optional)	2
17	J1	P2/2.54	Vin	1
18	J2	Pad2.5/1.5	Vin	1
19	J3, J7	Type-C-16p	TYPE-C CONNECTOR	2
20	J4	DC-044A		1
21	J5	Pad2.5/1.5	GND	1
22	J6	P2/2.54	GND	1
23	J8	P3/2.54	FREQ	1
24	J9	P2/2.54	EN	1
25	L1, L2	17mm_H	22uH (50125 D15mm)	2
26	Q1, Q4	PMOS_PDFN3333	SiS27DN	2
27	Q2, Q3, Q5	NMOS_PDFN3333	RUH4040M2	3
28	Q6	NMOS_PDFN3333	SiS27DN	1
29	Q7, Q8	PNP Transistor	MMBT3906W	2

Item	Description	Name	Value	Quantity
32	R1, R19	RES_0603	150k	2
33	R2, R10, R20, R28	RES_0603	2R	4
34	R3, R4, R22, R23	RES_0603	1k	4
35	R42, R47	RES_0603	7.5k	2
36	R5, R21, R35, R36	RES_0603	0	5
37	R6, R24	RES_0603	15k	2
38	R7, R25	RES_1206	10m	2
39	R9, R27	RES_0603	510	2
40	R11, R12, R13, R15, R29, R30, R31, R33	RES_0603	22	8
41	R14, R32	RES_0603	15 (Optional)	2
42	R16, R34	RES_1206	5m	2
43	R17, R18	RES_0603	10K	2
44	R37, R39, R40	RES_0603	100k	3
45	R38	RES_0603	33k	1
46	R41	RES_0603	11k	1
47	R43	RES_0603	430k	1
48	R44	RES_0603	51k	1
49	R45	RES_0603	20k	1
50	R46	RES_0402	10k	1
51	R48	RES_0402	430k	1
52	R49	RES_0402	51k	1
53	R50	RES_0402	20k	1
54	U1, U2	HUSB350	Protocol IC (100W)	2
55	U3	HT6329 (VIP3)	HT6329	1