



芯高科技
HIGH TECH
TECHNOLOGY LIMITED

HT6122 (1A1C_18+45W) 演示板测试及使用指南

双输出充电器

测试单元: 20240314

2024/3/22 | 机密文件



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1. 摘要



操作模式:	Ch1 (Type-C)	Ch2 (Type-A)
输入电压范围	12VDC (16V max)	
输出电压和电流范围 (最大输出功率是 45W+18W)	(5V 3A), (9V 3A), (12V 3A), (15V 3A)#	(5V 3A), (9V 2A), (12V 1.5A)
主要支持的快速充电协议	PD 3.0, QC 3.0*	QC 2.0, QC 3.0*
尺寸	64mm(长) x 57mm(阔) x 40mm(高)	
最大输出功率	45W#	18W
最大功率转换效率	98%	98%
短路(Short Circuit)测试	✓	

(15V 3A) (45W) is supported when Vin = 16V

* QC3.0: Based on QUALCOMM webpage: Charge up to 4 times faster than conventional 5W chargers.

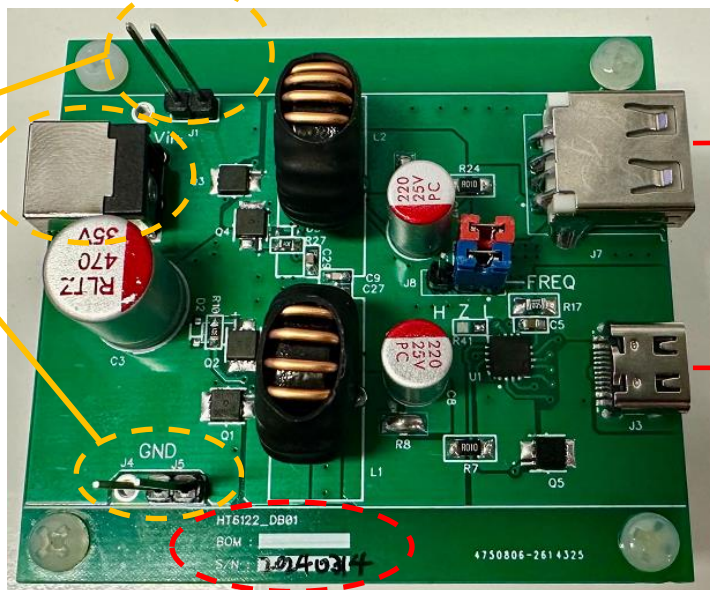
<https://www.qualcomm.com/news/onq/2015/09/14/introducing-quick-charge-30-next-generation-fast-charging-technology>



2a. 演示板介绍

- 12VDC 供电，1A1C 输出
- 尺寸: 64mm(长) x 57mm(阔) x 40mm(高)

演示板 (顶视图)



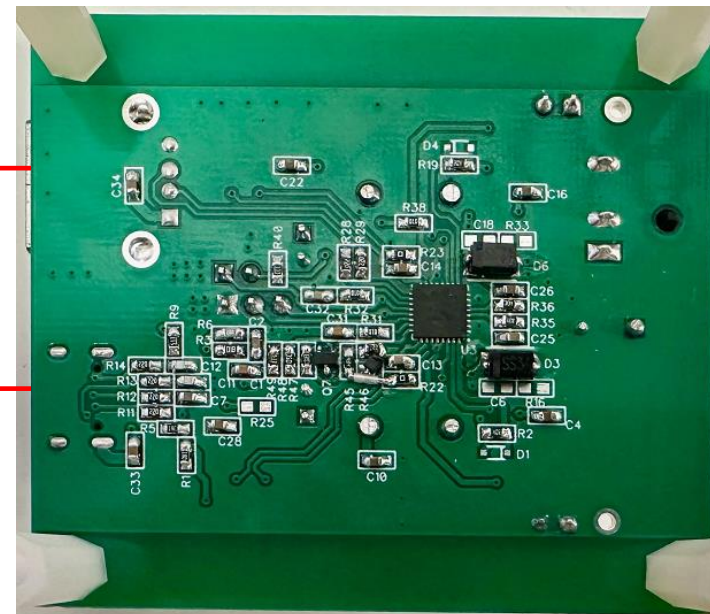
12VDC (16V max)
供电口: DC
Jack (φ2.5)
或 排针

Type-A 输出
(18W max)

Type-C 输出
(45W max)

HT6122_DB01
S/N: 20240314

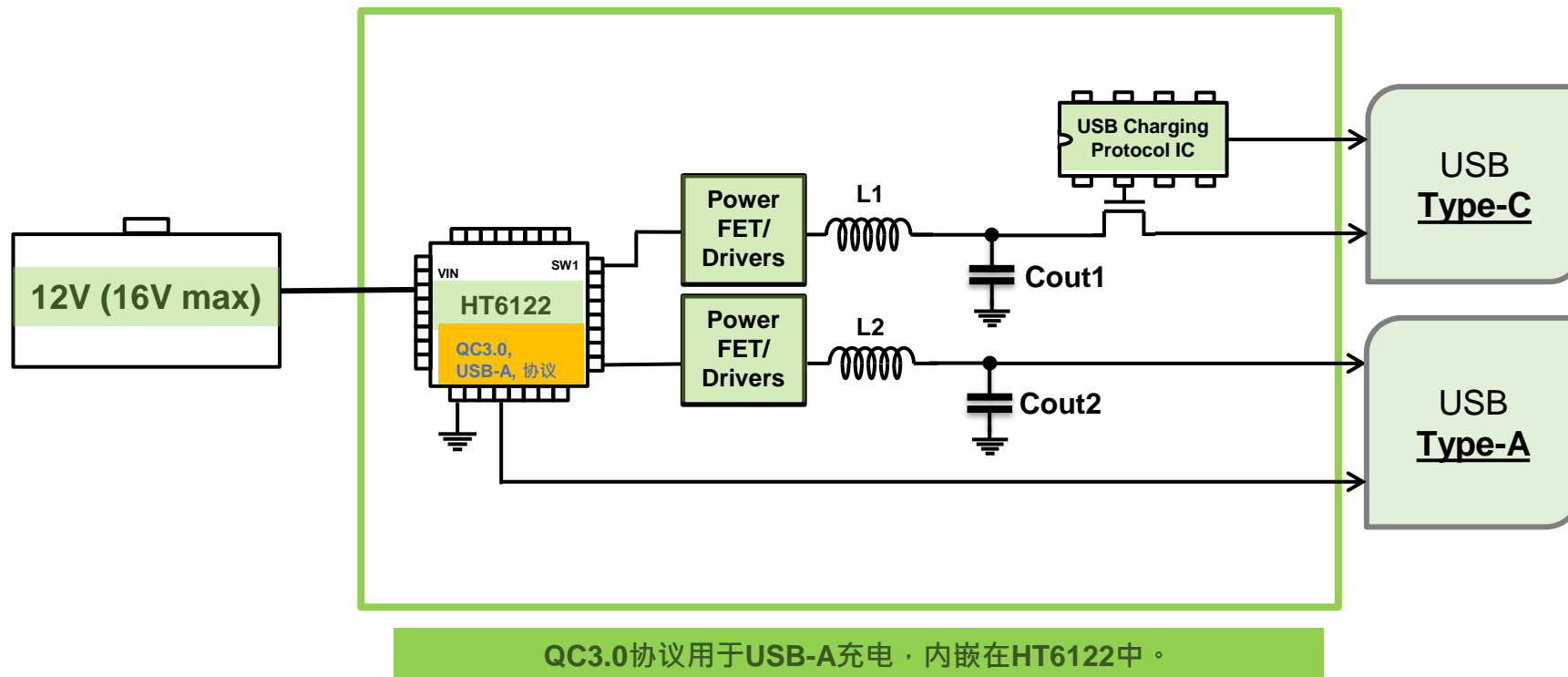
演示板 (底视图)



2b. 演示板介绍

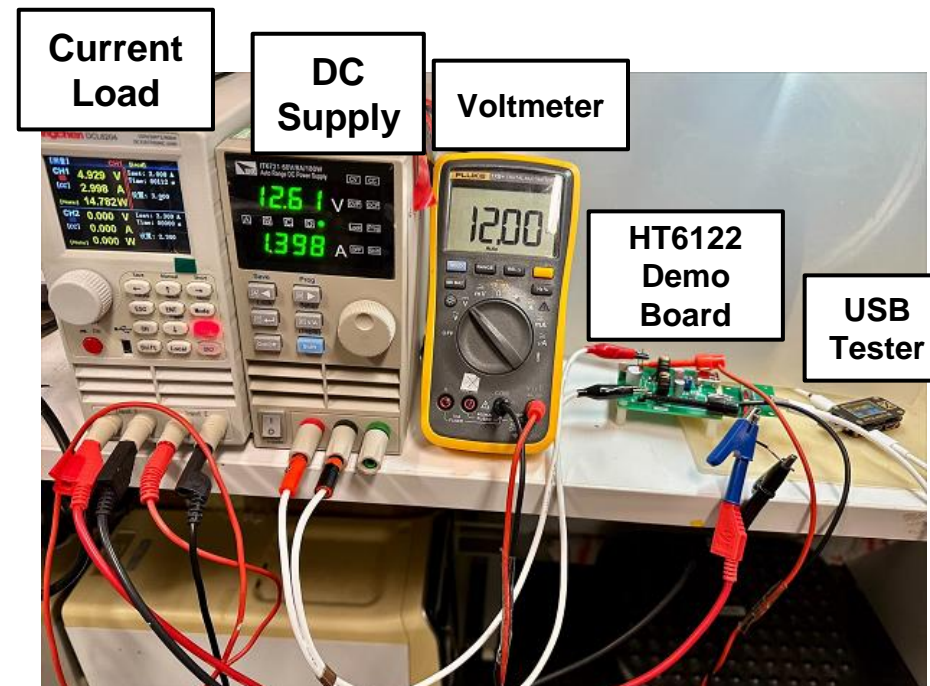
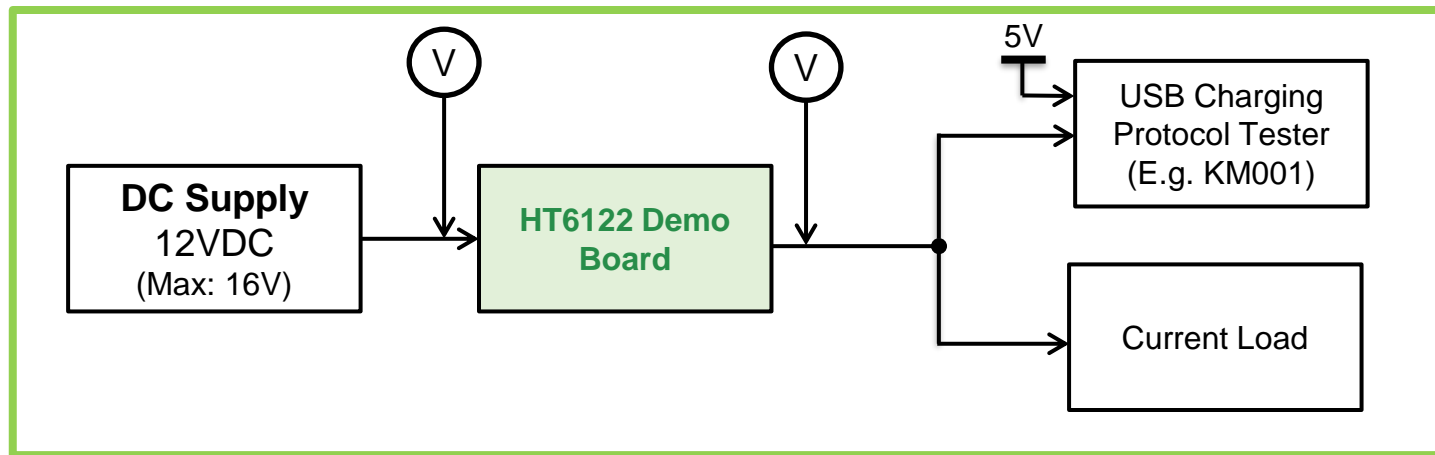


设计简约*



* 有关完整的电路图，请参见附录I。

3. 测试设置





3. 测试规格

输入电压

12 V (Max 16V)

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) #
- CH2 (Type-A)
 - 5 V, 0 – 3 A (15 W)
 - 9 V, 0 – 2 A (18 W)
 - 12 V, 0 – 1.5 A (18 W)

双路输出的总输出电流及功率

- 最大总输出电流为 6 A
- 总功率最高为 63W (45W + 18W)

(15V 3A) (45W) is supported when Vin = 16V

4. 待机功率



Channel	Freq(kHz)	Vin(V)	Iin(mA)	Pin(mW)
Ch1 (Type-C)	150	12	2.52	30
Ch2 (Type-A)	150	12	2.52	30

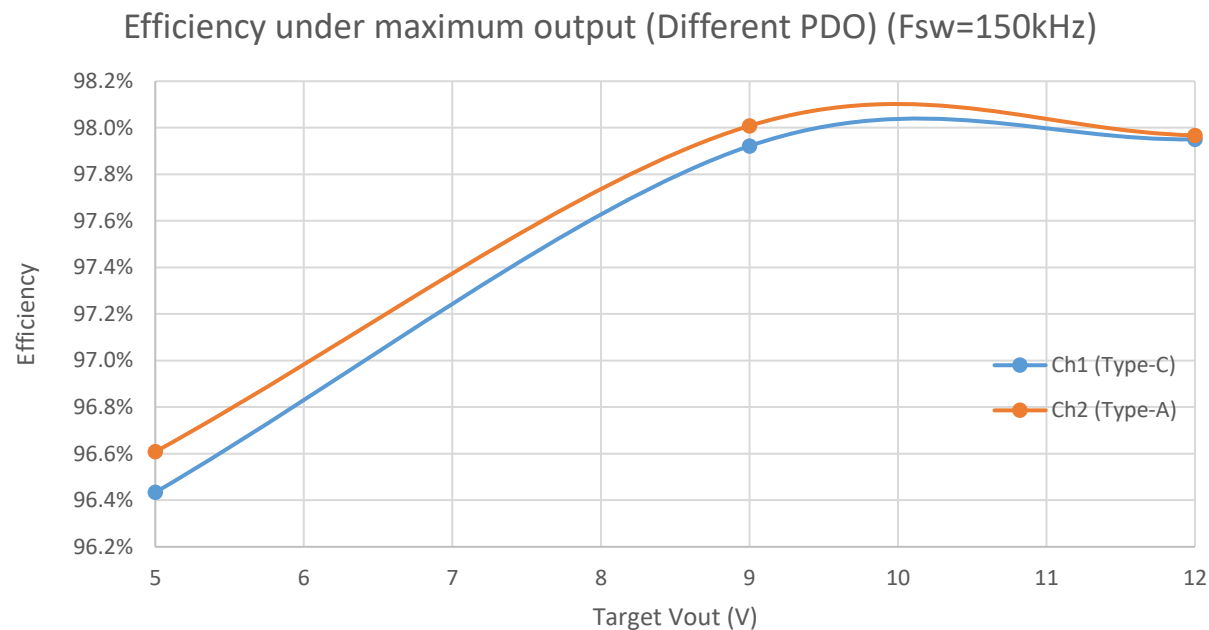
* Iout = 0A

5. 待机纹波



Channel	Freq(kHz)	Vin(V)	Vout(V)	Vripple(mV)
Ch1 (Type-C)	150	12	5.1	12.4
Ch2 (Type-A)	150	12	5.1	220

6. 不同PDO 下最大输出功率, $\eta_{fullload}$



Channel	Vin(V)	Iin(A)	Vout(V)	Iout(A)	Vripple(mV)	Efficiency
Ch1 (Type-C)	12	1.39	5.35	3	22	96.4%
	12	2.37	9.28	3	52.4	97.9%
	12	2.98	11.66	3	56	97.9%
Ch2 (Type-A)	12	1.43	5.53	3	31.2	96.6%
	12	1.54	9.34	1.94	68	98.0%
	12	1.45	11.76	1.45	43.2	98.0%

6d. 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
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最大效率, $\eta_{max\ single}$	96%	98%	98%
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Ch 2, 单通道 (Ch 1 No Load)

输入电压 12V

输出电压	5 V	9 V	12V
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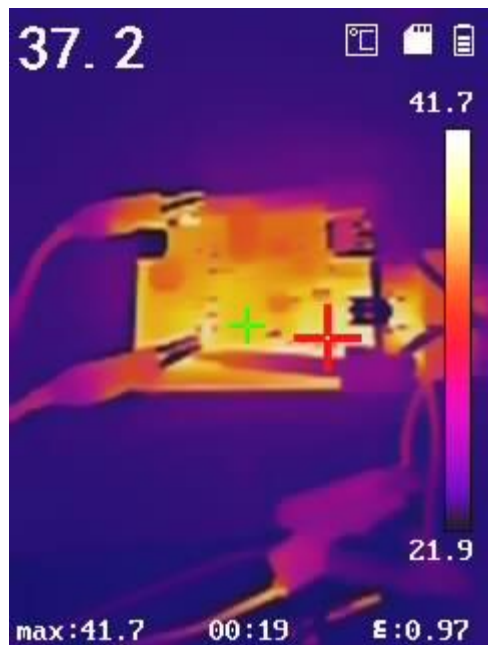
最大效率, $\eta_{max\ single}$	97%	98%	98%
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7. 过流保护 Over-Current Protection

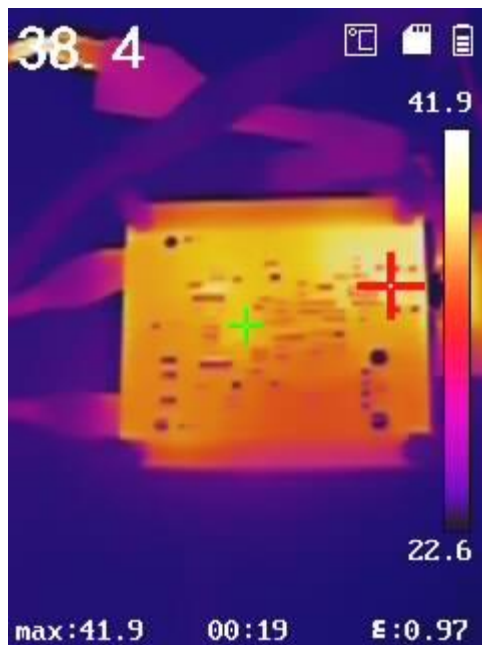


Channel	OCP/SCP level
Ch1 (PD 5V)	3.3A
Ch1 (PD 9V)	3.3A
Ch1 (PD 12V)	3.3A
Ch1 (PD 15V)	3.3A
Ch2 (QC 5V)	3A
Ch2 (QC 9V)	2A
Ch2 (QC 12V)	1.5A

8. 温升测试 (单输出 Type-C, 36W)



Top side



Bottom side

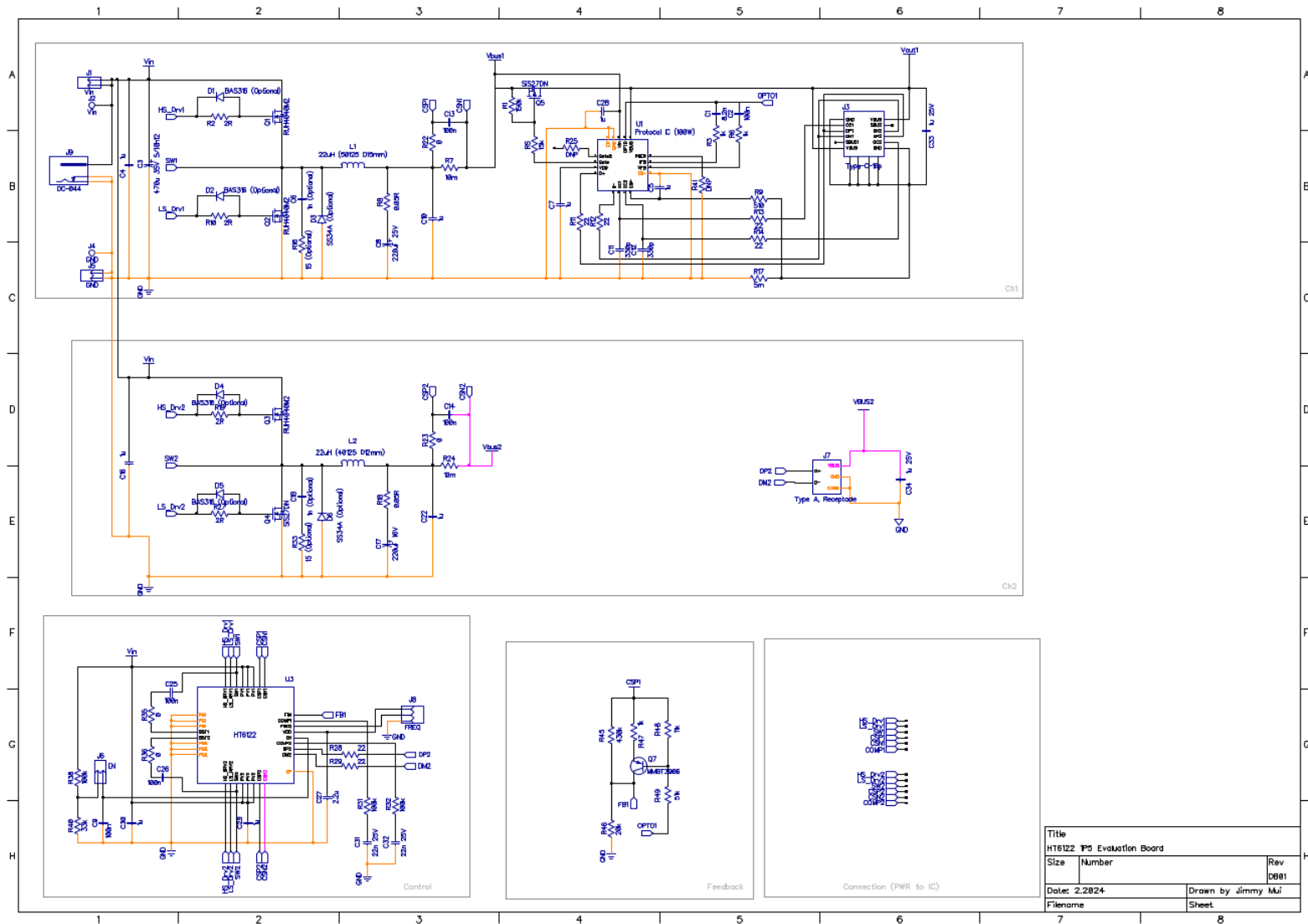
Parameter	Value
Vin	12V
Vout, Iout	12V, 3A (Type-C)
Fsw	150kHz
Test Time	20min

Component	Temperature
U3 (HT6122)	41.9 °C
L1 (22uH)	41.7 °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

#	RefDes	Value	Name	Pattern	#	RefDes	Value	Name	Pattern
1	C1	8.2n	CAP_0603	CAP_0603	25	Q1, Q2, Q3	RUH4040M2	NMOS_PDFN3333	PDFN3333
2	C2, C9, C13, C14, C25, C26	100n	CAP_0603	CAP_0603	26	Q4	SiS27DN	NMOS_PDFN3333	PDFN3333
3	C3	470u 35V 5/10h12	470u 35V 5/10h12	CAPPR-5/10h10.5	27	Q5	SiS27DN	PMOS_PDFN3333	PDFN3333
4	C4, C5, C7, C10, C16, C22, C28, C29, C30	1u	CAP_0603	CAP_0603	28	Q7	MMBT3906W	PNP Transistor, 30V, 200mA, SOT323	SOT323
5	C6, C18	1n (Optional)	CAP_0603	CAP_0603	29	R1	150k	RES_0603	RES_0603
6	C8	220uF 25V	220uF 25V	CAPPR-2.5/6.3h11	30	R2, R10, R19, R27	2R	RES_0603	RES_0603
7	C11, C12	330p	CAP_0603	CAP_0603	31	R3, R6, R47	1k	RES_0603	RES_0603
8	C17	220uF 16V	220uF 16V	CAPPR-2.5/6.3h11	32	R5	15k	RES_0603	RES_0603
9	C27	2.2u	CAP_0603	CAP_0603	33	R7, R24	10m	RES_1206	RES_1206
10	C31, C32	22n 25V	CAP_0603	CAP_0603	34	R8, R18	0.05R	RES_1206	RES_1206
11	C33, C34	1u 25V	CAP_0603	CAP_0603	35	R9	510	RES_0603	RES_0603
12	D1, D2, D4, D5	BAS316 (Optional)	BAS316	SOD-323	36	R11, R12, R13, R14, R28, R29	22	RES_0603	RES_0603
13	D3, D6	SS34A	SMA	SMA	37	R16, R33	15 (Optional)	RES_0603	RES_0603
14	J1	Vin	P2/2.54	HDR-1x2T/2.54/5x2	38	R17	5m	RES_1206	RES_1206
15	J2	Vin	Pad2.5/1.5		39	R22, R23, R35, R36	0	RES_0603	RES_0603
16	J3	TYPE-C CONNECTOR	Type-C-16p	Type-C-16p-longlead	40	R25, R41	DNP	RES_0603	RES_0603
17	J4	GND	Pad2.5/1.5		41	R31, R32, R38	100k	RES_0603	RES_0603
18	J5	GND	P2/2.54	HDR-1x2T/2.54/5x2	42	R40	33k	RES_0603	RES_0603
19	J6	EN	P2/2.54	HDR-1x2T/2.54/5x2	43	R45	430k	RES_0603	RES_0603
20	J7	Type A, Receptacle	292303-1	USB-Type-A	44	R46	20k	RES_0603	RES_0603
21	J8	FREQ	P3/2.54	HDR-1x2T/2.54/3x1	45	R48	11k	RES_0603	RES_0603
22	J9	DC-044	DC-044	DC-044	46	R49	51k	RES_0603	RES_0603
23	L1	22uH (50125 size)	D15mm, 1.0mm Wire	D17mm	47	U1	Protocol IC (65W)	HUSB350	QFN-16/4x4x0.65
24	L2	22uH (50125 size)	D15mm, 1.0mm Wire	D17mm	48	U3	HT6122	HT6122 (V1P5)	HTT_QFN32/5x5_L_long_pad