Reference Design Part number:	PSV-EBAD-150CCM
Description:	The PSV-EBAD-150CCM evaluation board has been developed in partnership with Salom Europe Ltd, a leading custom power supply manufacturer for the consumer market. It has been optimised for low-cost general-purpose applications up to 150W by combining a Pulsiv OSMIUM AC to DC front-end reference design with a continuous conduction mode Flyback converter (CCM) and offers: • A 4-point average efficiency of 91.66% • No inrush current • No input voltage derating

REVISION

REVISION	MODIFICATION DETAILS AND EXPLANATION	DESIGNED	DATE
A	(1). Preliminary	李杰毅	2024.06.25

APPROVED BY	CHECKED BY	ENGINEERED BY	EXECUTED BY
	 	李杰毅	栗明慧

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1. GENERAL DESCRIPTIONS

An adjustable switching mode power supply (SMPS) with a total typical power rating of 150 watts for charging and operating associated portable electronic devices. The power output will be able to deliver 20 volts typical at 7.5 amps. The power supply can also provide a 5 volt 0.1 amp Auxiliary supply
Warranty: 18 months.
Note： This is an evaluation board and not available for sale as a finished product. Since it is PCBA board without housing, engineer should not touch the PCBA board during testing procedure to avoid electric shock.

2. ELECTRICAL REQUIREMENTS

Description	Condition	Specification
Rated input voltage	N/A	100-240VAC
Actual voltage (with 10% tolerance)	N/A	90-264VAC
Input frequency	N/A	50/60Hz
No load Power	Input 230VAC Input 115VAC	<300mW <300mW
No load Output voltage	Actual voltage1 Actual voltage2	19-21VDC 4.5-5.5VDC
Output voltage1 0~7.5A	Actual voltage	19-21VDC
Output voltage2 0~0.1A	Actual voltage	4.5-5.5VDC
Output current	i) 20V ii)Load CV12VDC to CV19VDC	i) 7.5A ii) 7.5A-8.25A
Absolute maximum output voltage	23V RMS	
Absolute maximum output current	9A RMS	
Output voltage ring	1. 1st Cycle Over/Under Shoot. Following an Output Voltage Over/Under-shoot, the output of the power supply shall not exhibit ringing characteristics of greater than 50% of the peak over/under-shoot voltage value during its 1st cycle. 2. Subsequent Cycles Over/Under Shoot. Each subsequent ring cycle shall be less than or equal to 50% of the previous cycle.	

<table>
<tr><th>Description</th><th colspan="4">Condition</th><th>Specification</th></tr>
<tr><td>Ripple</td><td colspan="5">Using a 20MHz bandwidth filter, the maximum peak-to-peak ripple voltage shall be 400 mVp-p for all modes, and all loads from 0 to ILoad. Measurements are to be conducted with a with 10 µF E-cap & 0.1 µF MLCC capacitor placed across the VOUT and common Ground.</td></tr>
<tr><td>Efficiency</td><td colspan="5"><table>
<tr><td>Requirement</td><td>Reference</td><td>115 VAC</td><td>230 VAC</td></tr>
<tr><td>Efficiency (min) @ 20V mode</td><td>COC/DOE</td><td>88%</td><td>88%</td></tr>
</table></td></tr>
<tr><td>Short circuit protection</td><td colspan="5">TBD</td></tr>
</table>

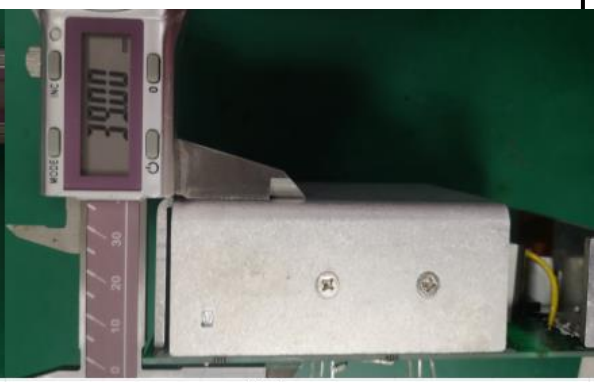
Description	Condition	Specification
Battery Discharge	TBD	
EMI/ESD	Class B FCC15. ANSI C63.4-1992	
Safety standard	UL62368-1	
AC line transients	Combination Wave Testing is to be conducted per the current edition of EN 61000-4-5. Line to Line 1KVtest level shall be used.	

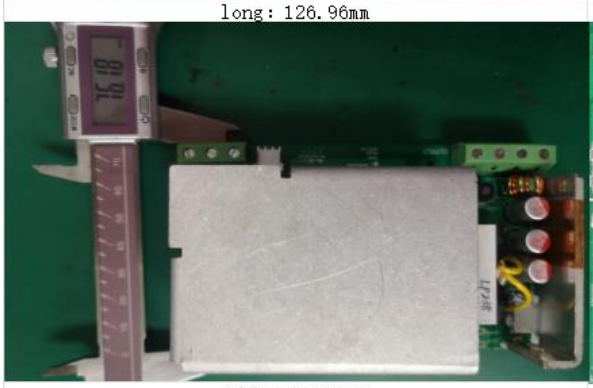
3. MECHANICAL REQUIREMENTS

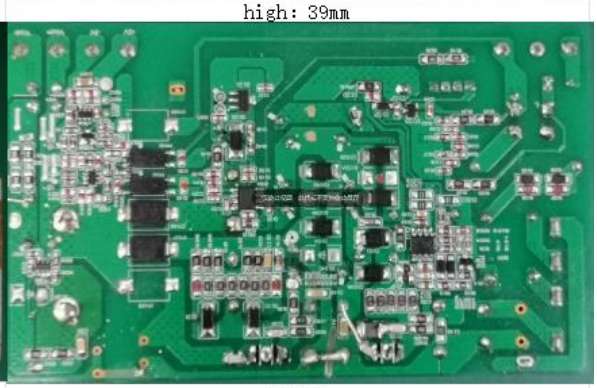
3.1 Weight (±5g)
About 330g

3.2 Sample display


long: 126.96mm


high: 39mm


Wide: 76.18mm


Bottom

4. ENVIRONMENTAL REQUIREMENTS

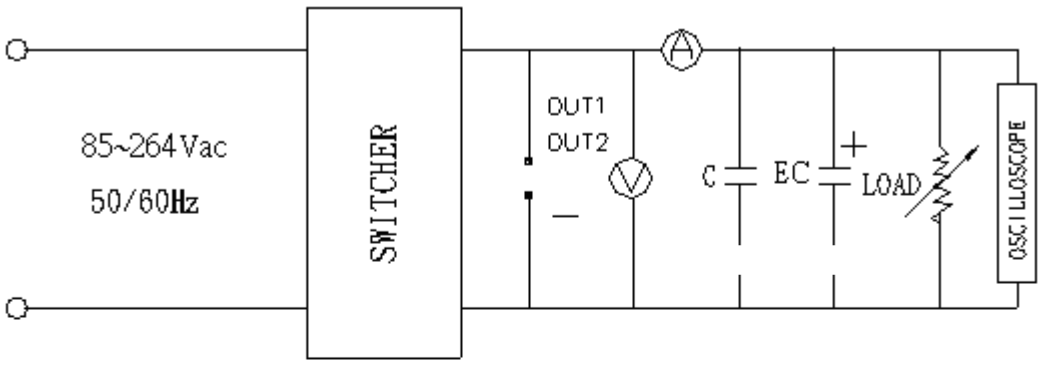
4.1 Operating temperature
-10℃~+35℃@ 90% RH (non-condensing)

4.2 Storage temperature
-40℃~+85℃

4.3 Temperature rise
35deg Maximum. Temperature rise of the case surface.(at input voltage 90~264VAC , ambient 25℃±3℃)

5. ELECTRICAL INFORMATION AND PARAMETER

5.1 Test circuit



Ⓐ ——— CURRENT METER

Ⓥ ——— VOLTAGE METER

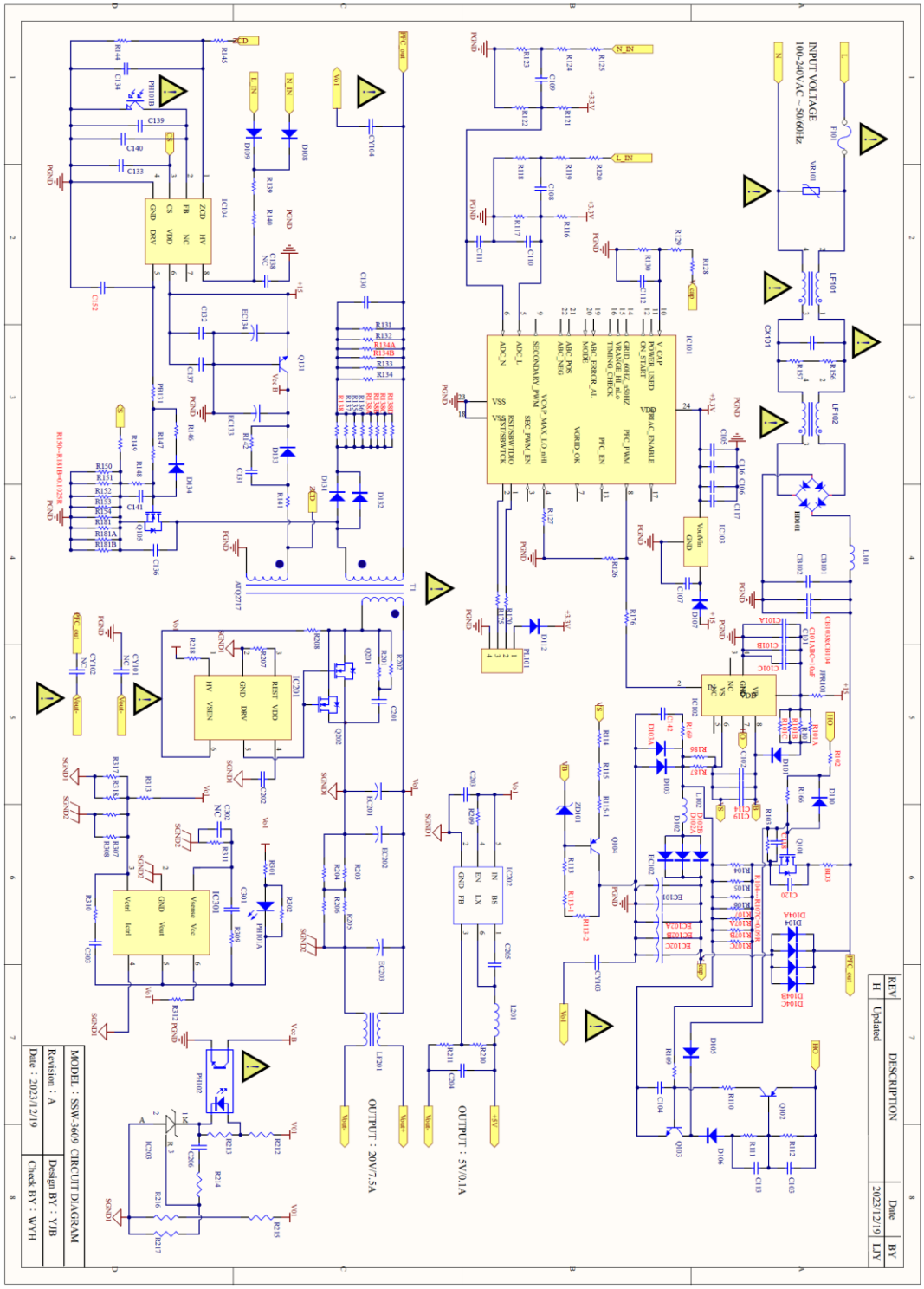
LOAD ——— ELECTRIC LOAD (C.V MODE)

C ——— CAPACITOR(0.1uF/50V)

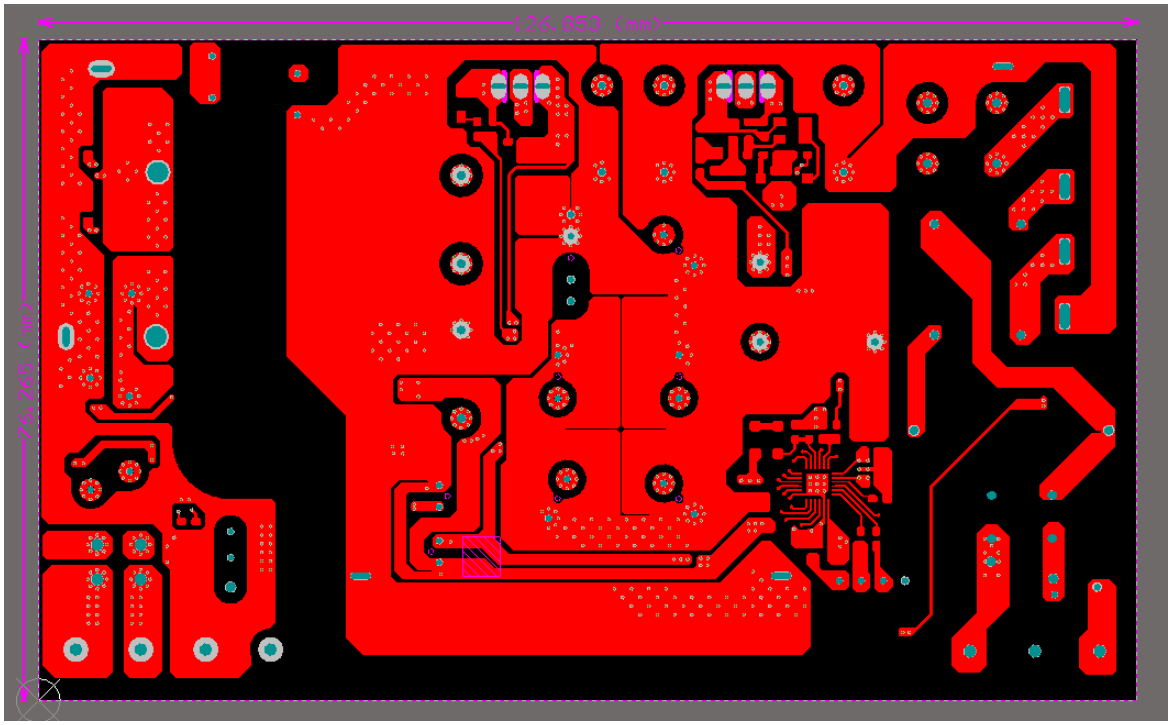
EC ——— ELECTROLYSIS CAPACITOR (47uF/50V)

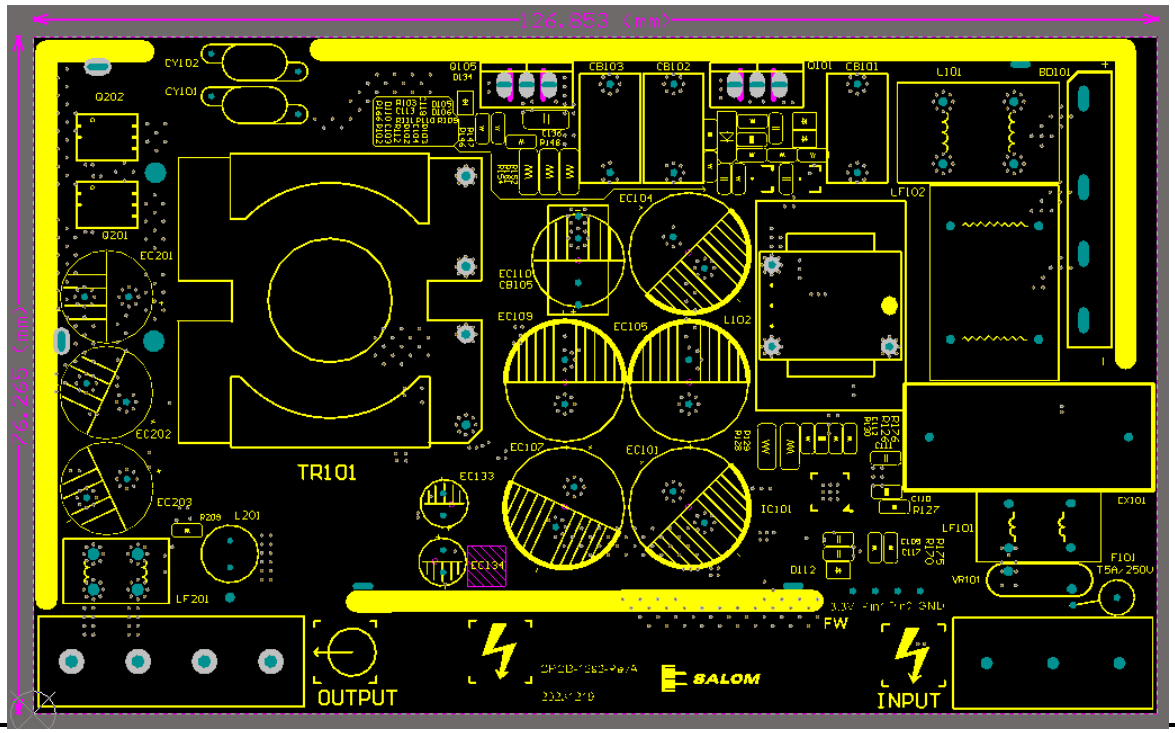
P ——— PLUG

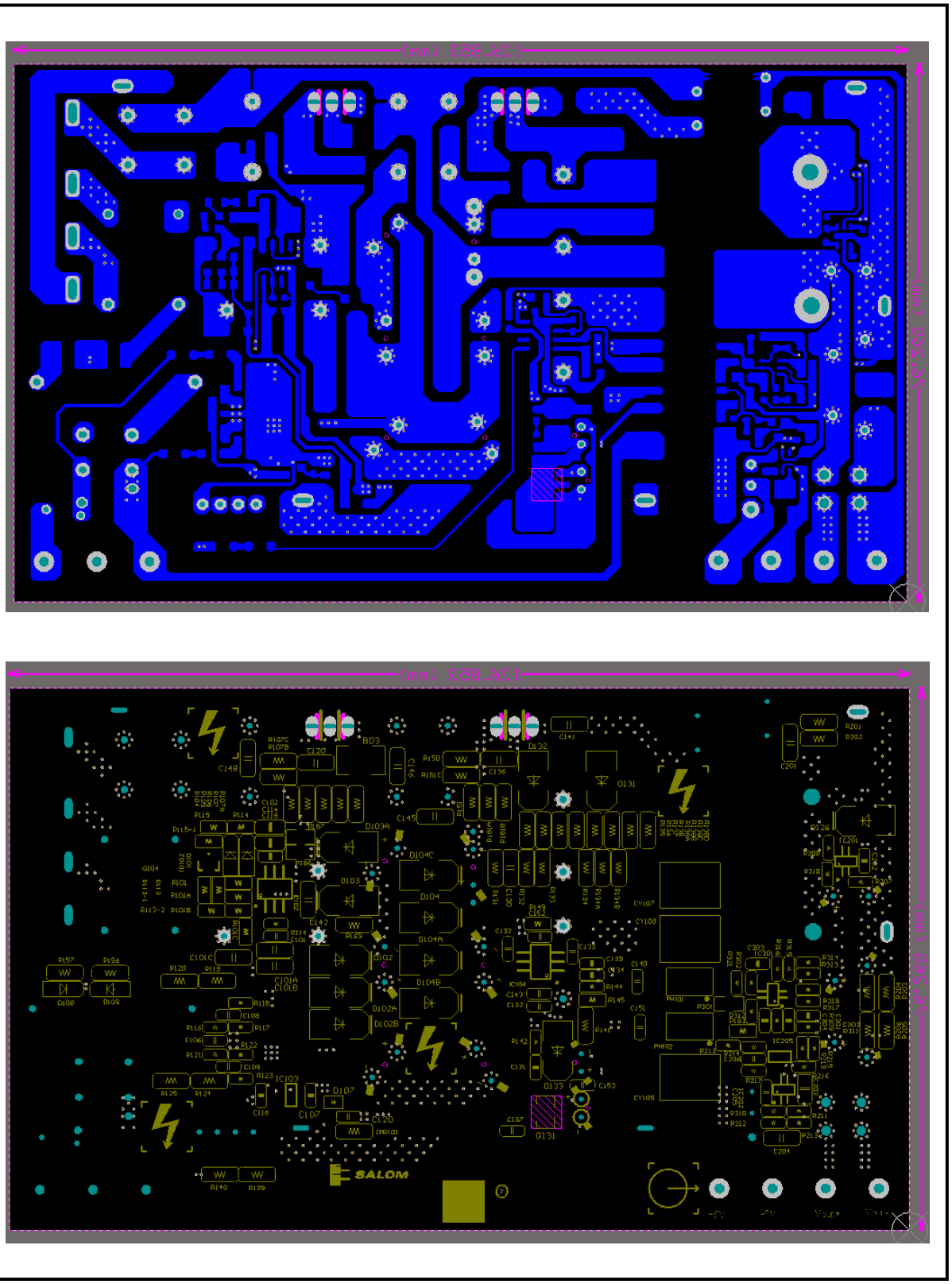
5.2 Circuit drawing



5.3 PCB layout







5.4. BOM LIST

ITEM	DESIGNATION	DESCRIPTION	SPECIFICATION	MANUFACTURER	PART NUMBER	QTY
1	C103,C113	CHIP CAP	2.2nF,50V.0603	WALSIN VIKING(光頡)	0603B222K500CTHF MC03KTB500222HF	2
2	C104	CHIP CAP	0.15nF,50V.0603	YAGEO	CC0603GRNPO9BN151	1
3	C105	CHIP CAP	0.1uF,50V.0603	WALSIN VIKING(光頡)	0603B104K500CTHF MC03KTB500104HF	1
4	C110,C111 C112	CHIP CAP	10nF,50V.0603	WALSIN VIKING(光頡)	0603B103K500CTHF MC03KTB500103HF	3
5	C117	CHIP CAP	10uF,10V.0603	WALSIN	0603X106K100CTHF	1
6	C118	CHIP CAP	15pF,50V.0603	VIKING(光頡) WALSIN	MC03JTN500150HF 0603N150J500LTHF	1
7	D105,D106 D112,D134	CHIP D	75V,0.15A,SOD-123	德昌 銀河電器 JF	1N4148W 1N4148WG 1N4148WH	4
8	D110	CHIP D	1A/200V	JF	F3	1
9	IC101	CHIP IC	QFN24 3.3V	Pulsiv	PSV-AD-150-Q24IvR	1
10	Q102	CHIP Q		SEMTECH YJ(楊杰)	MMBT3906HAF MMBT3906 YJ(楊杰)	1
11	Q103	CHIP Q	40V 0.2A	SEMTECH DIODES	MMBT3904HAF MMBT3904-7-F	1
12	Q201,Q202	CHIP MOS	Mosfet, 120V,7mR, DFN5*6	LIPTAI 东微	MDG007R120SL SFS12R05GNF	2
13	R128	CHIP R	1M 5% 1206		1M 5% 1206	1
14	R129	CHIP R	510K 5% 1206		510K 5% 1206	1
15	R103,R126 R127,R130 R148,R209	CHIP R	10K 5% 0603		10K 5% 0603	6
16	R170,R175 R176	CHIP R	0R 5% 0603		0R 5% 0603	3
17	R146	CHIP R	9.1R 5% 0603		9.1R 5% 0603	1
18	R147	CHIP R	150R 5% 0603		150R 5% 0603	1
19	R181C,R154 R181,R181A R181B	CHIP R	0.82R 1% 1206		0.82R 1% 1206	5
20	R102	CHIP R	10R 5% 0603		10R 5% 0603	1
21	R166	CHIP R	82R 5% 0603		82R 5% 0603	1
22	R109 R110 R111	CHIP R	1K 1% 0603		1K 1% 0603	4

	R112					
23	BD3	CHIP R	9A 磁珠	钧寶 HongyeX	FBMA-11-453215-900A90T01 BCMS453215A800	1
24	C148,C146 C145,C119 C142,C101A C101B,C101C C101D,C140 C151,C132A CY105,C302 C304					NC
25	C101,C107 C114	CHIP CAP	1uF,50V.0603	WALSIN VIKING(光頡)	0603B105K500CTHF MC03KTB500105HF	3
26	C102	CHIP CAP	10uF,25V.0805	WALSIN VIKING(光頡)	0805X106K250CTHF MC05KTX250106HF	1
27	C106,C116	CHIP CAP	10uF,10V.0603	WALSIN	0603X106K100CTHF	2
28	C108,C109	CHIP CAP	10nF,50V.0603	WALSIN VIKING(光頡)	0603B103K500CTHF MC03KTB500103HF	2
29	C130,C201	CHIP CAP	2.2nF.1000V.1206	WALSIN VIKING(光頡)	1206B222K102CTHF MC06KTB102222 HF	2
30	C131	CHIP CAP	220pF,200V.0603	WALSIN VIKING(光頡)	0603B221K201CTHF MC03KTB201221HF	1
31	C132,C137 C153,C205 C206,C303	CHIP CAP	0.1uF,50V.0603	WALSIN VIKING(光頡)	0603B104K500CTHF MC03KTB500104HF	6
32	C133	CHIP CAP	22pF,50V.0603	WALSIN VIKING(光頡)	0603N220J500LTHF MC03JTN500220HF	1
33	C134	CHIP CAP	1pF,50V.0603	YAGEO	CC0603CRNPO9BN1R0	1
34	C120,C136 C141	CHIP CAP	47pF.1000V.1206O	WALSIN VIKING(光頡)	1206N470J102LTHF MC06JTN102470HF	3
35	C139	CHIP CAP	220pF,50V.0603	WALSIN VIKING(光頡)	0603N221J500LTHF MC03JTN500221 HF	1
36	C140	CHIP CAP	1nF,50V.0603	VIKING(光頡) YAGEO	MC03KTB500102HF CC0603KRX7R9BB102HF	1
37	C202	CHIP CAP	220nF,50V.0603	WALSIN VIKING(光頡)	0603B224K500CTHF MC03KTB500224	1
38	C203	CHIP CAP	4.7uF,25V.0805	WALSIN VIKING(光頡)	0805B475K250CTHF MC05KTX250475HF	1
39	C204	CHIP CAP	22uF,16V.1206	WALSIN	1206B226M160CTHF	1
40	C301	CHIP CAP	33nF,50V.0805	YAGEO 風華高科	CC0805KRX7R9BB333 0805B333K500NT	1
41	CY107,CY108	SMD CAP		奇發	CT7-400VAC-Y1-E-102M	2
42	D104A,D104C D126					NC
43	D102A	CHIP CAP	100pF,1000V.1206	YAGEO	CC1206JKNPOCBN101HF	1

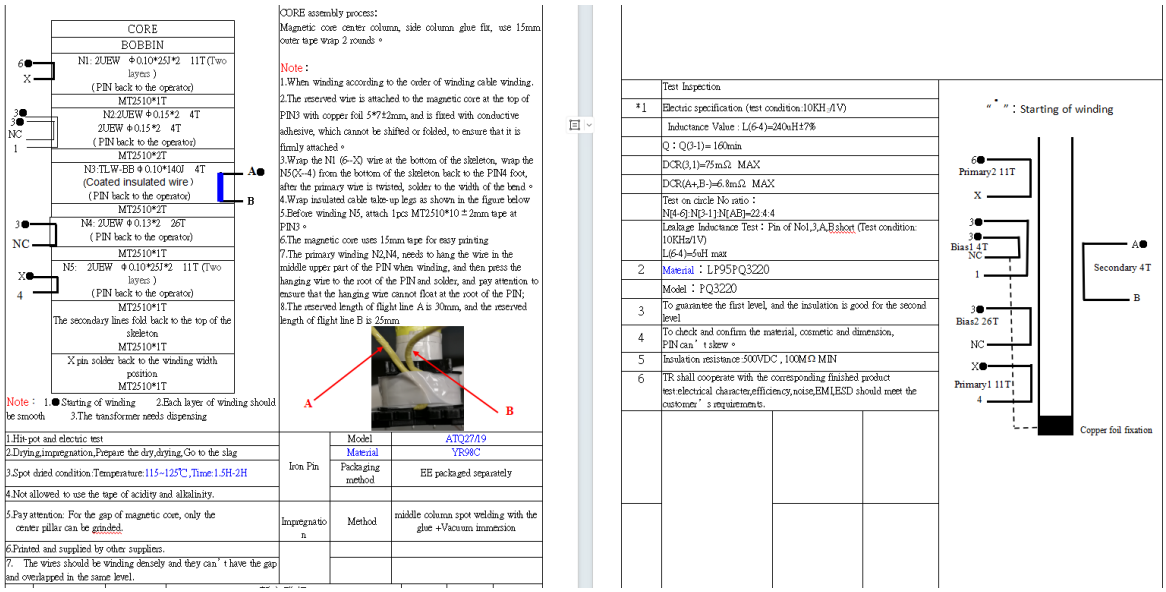
44	D101	CHIP D	1A/600V	JF	U1J	1
45	D102,D102B	CHIP D	5A/600V	JF	ES5JB	2
46	D107	CHIP D	75V,0.15A,SOD-123	德昌 銀河電器 JF	1N4148W 1N4148WG 1N4148WH	1
47	D108,D109	CHIP D	1A/1000V	HP 晶导	A7H HP 1N4007W	2
48	D131 D132	CHIP D	2A/1000V	JF	S2M	2
49	D133	CHIP D	2A/1000V	晶導 JF	RS2M RS2M	1
50	D103,D103A D104,D104B	CHIP D	3A/600V	JF	ES3JB	4
51	ZD101	CHIP ZENER	11.4-12.6V SOD-123	JF BC 德昌	MM1Z5242B MM1Z5242B-HAF MMSZ12VCW	1
52	IC102	CHIP IC		ON	FAN73611MX	1
53	IC103	CHIP IC	3.3V 100mA	Microne	ME6203A33M3G	1
54	IC104	CHIP IC		SOUTHCHIP	SC3005ESEER	1
55	IC201	CHIP IC		SOUTHCHIP	SC3501SBER	1
56	IC202	CHIP IC		Dioo	DIO62845BST6	1
57	IC205	CHIP IC	150mA 37V SOT-23 1%	BC	MMTL431-HAF 1%	
58	IC301	CHIP IC	3.5-36V 0.19mA	芯熠微	uP7320BK	1
59	PH101,PH102	CHIP PH	CTR:130~260 SMD	EVERLIGHT	EL1018(TA)-VG	2
60	Q104	CHIP Q		NXP	PBHV9050T	1
61	Q131	CHIP Q	100V 0.2A	ARK(成都方舟)	DMX1015E	1
62	R157,R158 R321,R315 R316,R314 R213,R210A R211A					NC
63	R101,R101A R101B,R101C	CHIP R	39R 5% 0805		39R 5% 0805	4
64	R104,R105 R106,R107 R107A	CHIP R	0.51R 1% 1206		0.51R 1% 1206	5
65	R107B,R107C	CHIP R	1R6 1% 1206		1R6 1% 1206	2
66	R301	CHIP R	360R 1% 0805		360R 1% 0805	1

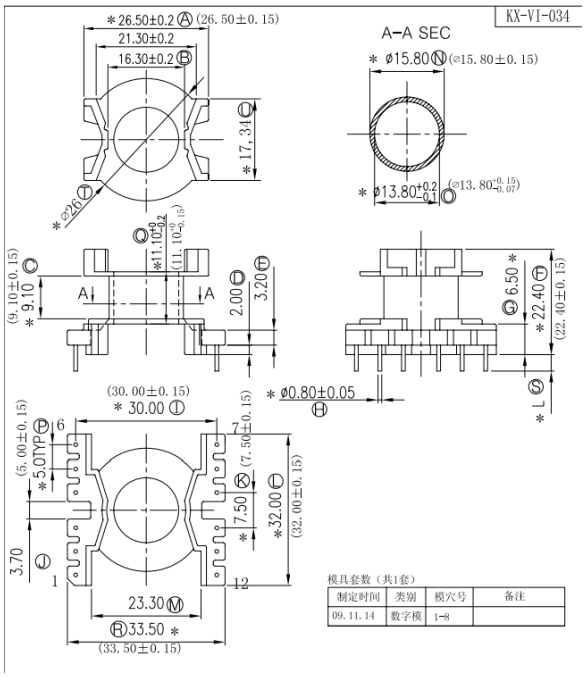
67	R214,R311	CHIP R	1K 1% 0603		1K 1% 0603	2
68	R113,R113-1 R113-2	CHIP R	560K 5% 0805		560K 5% 0805	3
69	R114	CHIP R	5.1K 5% 0805		5.1K 5% 0805	1
70	R115,R115-1	CHIP R	3K 5% 0805		3K 5% 0805	2
71	R116,R117 R121,R122	CHIP R	1M 1% 0603		1M 1% 0603	4
72	R118,R123 R130,R302 R309	CHIP R	10K 1% 0603		10K 1% 0603	5
73	R119,R124	CHIP R	510K 1% 1206		510K 1% 1206	2
74	R120,R125	CHIP R	1M 1% 1206		1M 1% 1206	2
75	R131,R132 R133,R134 R134A	CHIP R	750K 5% 1206		750K 5% 1206	5
76	R135,R136 R137,R138 R138A,R138B R138C,R138D	CHIP R	100R 5% 1206		100R 5% 1206	8
77	R139,R140	CHIP R	1K 1% 1206		1K 1% 1206	2
78	R141	CHIP R	2.2R 1% 1206		2.2R 1% 1206	1
79	R142,R208 R218	CHIP R	20R 1% 0603		20R 1% 0603	3
80	R144	CHIP R	47K 1% 0603		47K 1% 0603	1
81	R145	CHIP R	200K 1% 0603		200K 1% 0603	1
82	R149	CHIP R	510R 1% 0805		510R 1% 0805	1
83	R150,R151 R152	CHIP R	0.82R 1% 1206		0.82R 1% 1206	3
84	R201,R202	CHIP R	20R 5% 1206		20R 5% 1206	2
85	R203,R204 R205,R206	CHIP R	6mR	旺詮	LR1206-21R006F4	4
86	R207,R210	CHIP R	100K 1% 0603		100K 1% 0603	2
87	R211	CHIP R	19.1K 1% 0603		19.1K 1% 0603	1
88	R212	CHIP R	24K 1% 0603		24K 1% 0603	1
89	R215	CHIP R	56K 1% 0603		56K 1% 0603	1
90	R216	CHIP R	8.2K 1% 0603		8.2K 1% 0603	1

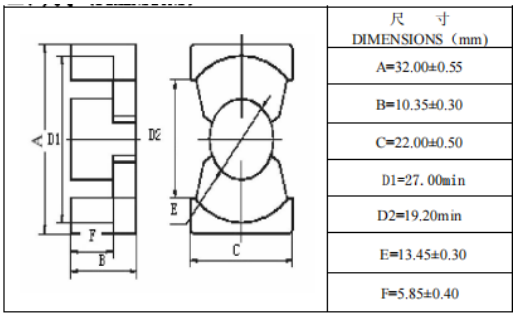
91	R217	CHIP R	330K 1% 0603		330K 1% 0603	1
92	R313	CHIP R	36K 1% 0603		36K 1% 0603	1
93	R310	CHIP R	2.4K 1% 0603		2.4K 1% 0603	1
94	R312	CHIP R	240R 1% 0603		240R 1% 0603	1
95	R317	CHIP R	5.1K 1% 0603		5.1K 1% 0603	1
96	R318	CHIP R	470K 1% 0603		470K 1% 0603	1
97	JPR101	CHIP R	0R 1% 1206		0R 1% 1206	1
98	R186,R187	CHIP R	0R 1% 0805		0R 1% 0805	2
99	BD101	CHIP BD	25A.1000V	JF	GBJ2510H	1
100	CB101,CB102 CB103	DIP CAP	0.22uF/450VDC	塑镕	MPP224K5130611P0	3
101	CX101	DIP X CAP	1.5uF/275VAC	NDF	MPX155KB225L250	1
102	VR101	VARISTOR	470V	STE	STE-10D471KB-Q(H1-14mm)	1
103	EC101,EC104 EC105,EC107 EC109	DIP CAP	120uF/250V Φ 13*20mm 5mm	承興	KM127M250J30RR0EH3FP0	5
104	EC110	DIP CAP	4.7uF/400V Φ 10*20mm 5mm	立隆	RUX4R7M2GSA-1020	1
105	EC133,EC134	DIP CAP	10uF/100V Φ5*11mm 2.5mm	SAMXON 冠坤	EKM106M2AD11TUSAP SK100M100D11P077P25R	2
106	EC201,EC202 EC203	DIP CAP	1000uF/25V Φ 10*16mm 5mm	承興	PC108M025G16RR0NB2FP0	3
107	F101	DIP FUSE	5A/250V HF	LANSON(良盛)	3NT1500APH	1
108	Q101	DIP MOS	650V/25A,0.32Ω	立泰	MHFIRF25N65	1
109	Q105	DIP MOS	700V/30A,0.098Ω	立泰 东微	MHFS110R65C OSG65R200FEF	1
110	L102	PFC 电感	SPL-ATQ23.7-0012		SPL-ATQ23.7-0012	1
111	TR101	Transformer	SHT-1216		SHT-1216	1
112	LF101	DIP LF	40uH min	友德盛	SLF-15X11X15-40uH	1
113	LF102	DIP LF	4mH min	友德盛	SLF-22X15X21-4mH	1
114	L101	DIP L	105uH	友德盛	SL-22X22X12.5-105uH	1
115	LF201	DIP LF	80uH min	友德盛	SLF-15X11X6-80uH	1
116	L201	DIP L	10uH	友德盛	SL-8X10.5-10uH	1

117	INPUT	3pin 输入端子			KF128-7.5-3P	1
118	OUTPUT	2pin 输出端子			KF128-7.5-4P	2
119	FW	烧录端子				1
120	HSK01	散热片		2.5T 鋁板	CHSK-360	1
121	HSK02	散热片		2.5T 鋁板	CHSK-361	1
122		螺絲			SCW-104	2
123		PCB	126.90*76.30*1.6T FR-4 双面板		CPCB-1292	1
124		Solder Bar			SRB Sn99.3Cu0.7 HF	5g
125		Solder wire			0.3Ag0.7Cu99Sn 0.8φ	1g
126		锡膏	WTO-LF 3800 HF		WTO-LF 3800 HF	0.3g
127		助焊剂		愛法	EF-6850	0.00 12 加 侖
128		SILICON			JD-715	2mL
129		SILICON		新亞	SLD-8854	2mL
130		散熱膏			ES6230	0.4g

6. Magnetic component design







尺 寸 DIMENSIONS（mm）
A=32.00±0.55
B=10.35±0.30
C=22.00±0.50
D1=27. 00min
D2=19.20min
E=13.45±0.30
F=5.85±0.40

磁芯参数（CORE PARAMETERS）	
有效磁路长度（Effective Length Le)	55.5mm
有效截面积（Effective Corss Area Ae)	170.0mm^2
有效体积（Effective Volume Ve)	9435.0mm^3
重量(Weight W)	42.0g/prs

Item	P/N	SPEC. /N	Page
FERRITE CORE	LP95 PQ32/20	LTP16080111XMD	3 of 6

7. Efficiency

Input Voltage	90 VAC / 60 Hz	115 VAC / 60 Hz	230 VAC / 50 Hz
Output Current	100 %, 75 %, 50 %, 25 %, 10 % of Full Load		
Measured Point of Output Voltage	End of PCB		
Duration of Burn-in	30 Minutes		

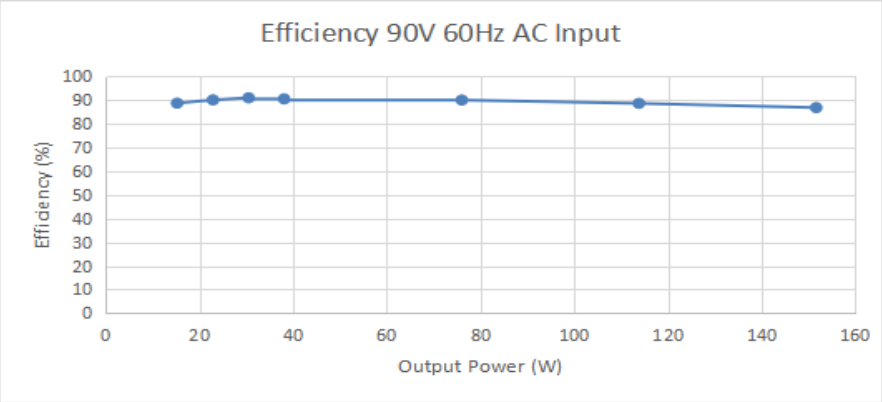
Efficiency test data

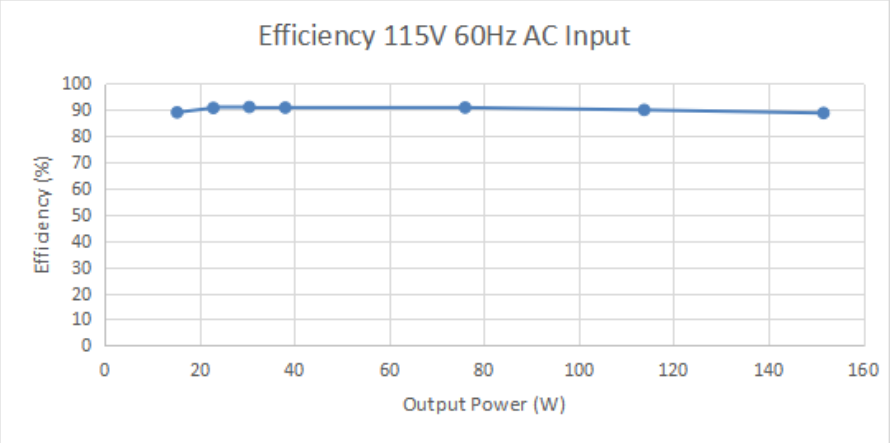
VIN,AC (V / Hz)	VBUS,PCB (V)	IOUT (A)	PBUS,PCB (W)	PIN (W)	η(%)	ηAV,4-Points (%)
90V 60Hz	20.218	7.5	151.63	174.5	86.9	89.08
	20.23	5.625	113.79	128.28	88.7	
	20.269	3.75	76	84.356	90.1	
	20.304	1.875	38.07	42.023	90.59	
	20.333	1.5	30.5	33.5	91.04	-
	20.348	1.125	22.89	25.39	90.16	-
	20.324	0.75	15.24	17.168	88.79	-

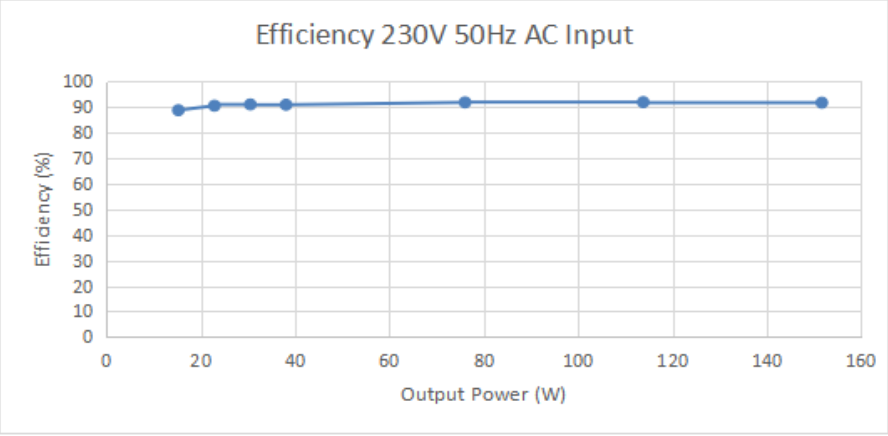
Efficiency test data

$V_{IN,AC}$ (V / Hz)	$V_{BUS,PCB}$ (V)	I_{OUT} (A)	$P_{BUS,PCB}$ (W)	P_{IN} (W)	η(%)	$\eta_{AV,4\text{-}Points}$ (%)	Power Factor
115V 60Hz	20.217	7.5	151.62	170.71	88.82	90.16	0.908
	20.23	5.625	113.79	126.43	90.01		0.855
	20.27	3.75	76.01	83.612	90.91		0.852
	20.305	1.875	38.07	41.891	90.88		0.811
	20.323	1.5	30.48	33.46	91.11	-	0.768
	20.349	1.125	22.89	25.22	90.77	-	0.703
	20.322	0.75	15.24	17.112	89.07	-	0.618
230V 50Hz	20.219	7.5	151.64	165.23	91.78	91.66	0.837
	20.229	5.625	113.78	123.68	92		0.798
	20.27	3.75	76.01	82.717	91.89		0.704
	20.305	1.875	38.07	41.85	90.97		0.543
	20.332	1.5	30.5	33.48	91.09	-	0.486
	20.348	1.125	22.89	25.27	90.59	-	0.432
	20.324	0.75	15.24	17.16	88.83	-	0.372

Efficiency graphs







8. No Load Power Consumption

Input Voltage	115 VAC / 60 Hz	230 VAC / 50 Hz
Standby Current	0A	
Requirement	Reference ErP(multi-port) <300mW	

No Load Power Consumption test data

VIN,AC (V / Hz)	PIN (mW)	Requirement (mW)
115 / 60	181.87	<300mW
230 / 50	287.78	<300mW

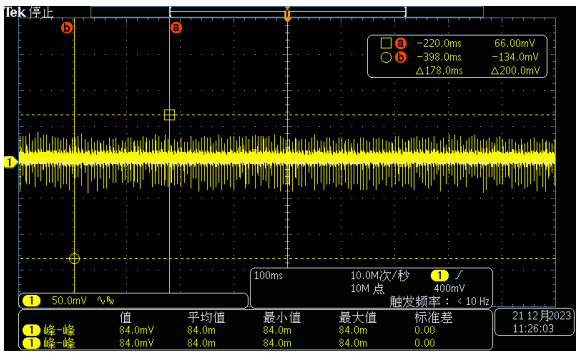
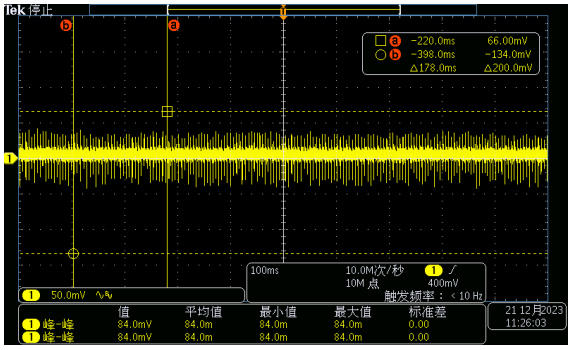
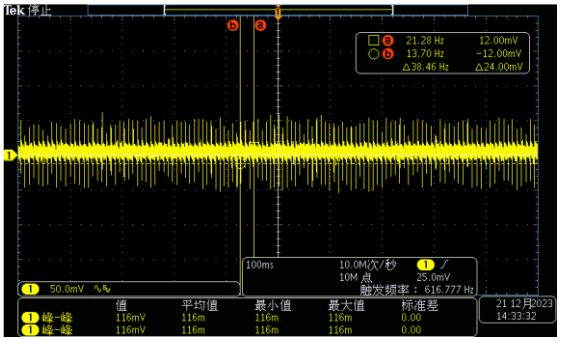
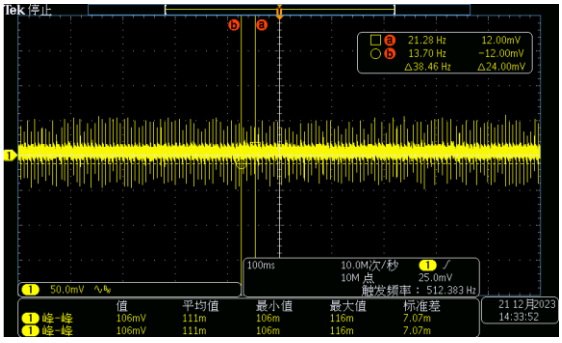
9. Ripple Voltage

Input Voltage	90 VAC / 60Hz	115 VAC / 60 Hz	230 VAC / 50 Hz	264 VAC / 50 Hz
Output Current	No Load & Full Load			
Measured Point of Output Voltage	End of PCB			
Bandwidth	20 MHz (with 10 µF E-cap & 0.1 µF MLCC)			
Requirement	<400 mV			

Ripple Voltage test data

Mode	$V_{BUS,SET}$ (V)	$V_{IN,AC}$ (V / Hz)	$V_{BUS,PK-PK}$ (mV)	Requirement (mV)
No Load	20V	90 V_{AC} / 60Hz	84	<400 mV
		115 V_{AC} / 60 Hz	94	
		230 V_{AC} / 50 Hz	116	
		264 V_{AC} / 50 Hz	106	
Full Load		90 V_{AC} / 60Hz	360	
		115 V_{AC} / 60 Hz	324	
		230 V_{AC} / 50 Hz	344	
		264 V_{AC} / 50 Hz	336	

20 V / 0 A Ripple Voltage test waveform

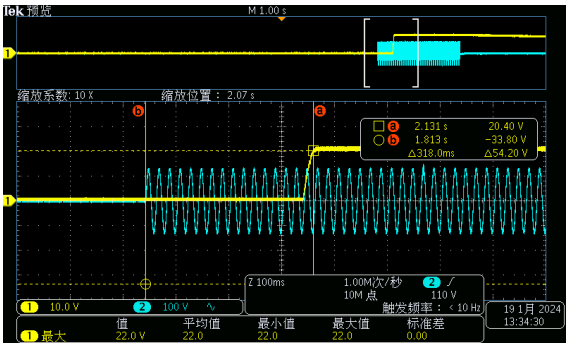
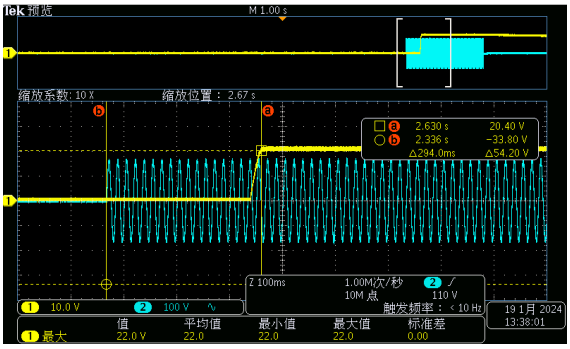
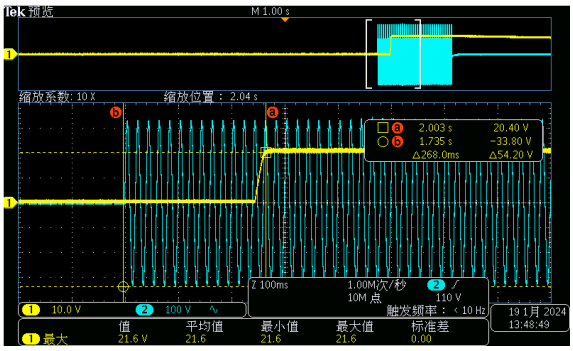
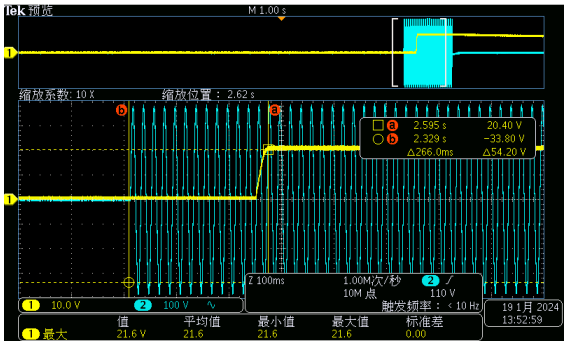
90 VAC / 60Hz	115 VAC / 60 Hz
	
230 VAC / 50 Hz	**115 VAC / 60 Hz**
	

10.Turn-on Delay Time

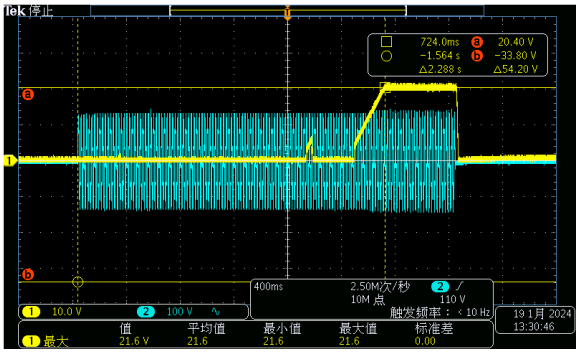
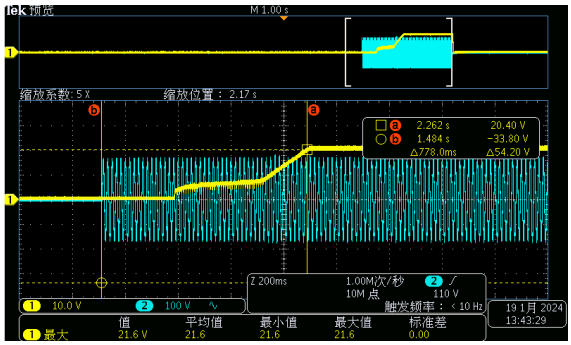
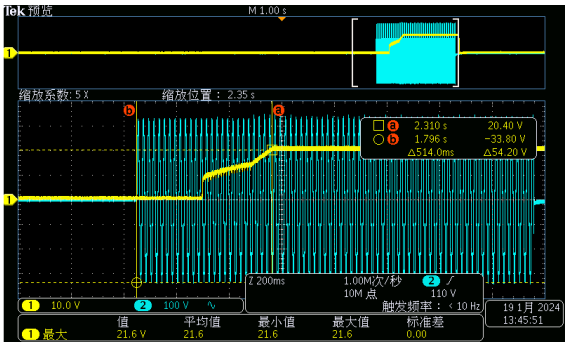
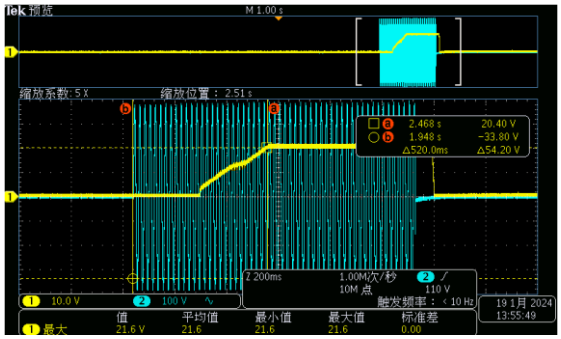
Input Voltage	90 V_{AC} / 60Hz	115 V_{AC} / 60 Hz	230 V_{AC} / 50 Hz	264 V_{AC} / 50 Hz
Output Current	No Load & Full Load			
Measured Point of Output Voltage	End of PCB			
Requirement	< 3 S			

$V_{IN,AC}$ (V / Hz)	T_{ON} (S)		Requirement (S)
	0A	7.5A	
90 V_{AC} / 60Hz	0.318	2.288	< 3 S
115 V_{AC} / 60 Hz	0.294	0.778	
230 V_{AC} / 50 Hz	0.268	0.514	
264 V_{AC} / 50 Hz	0.266	0.52	

20 V / 0 A Turn-on Delay Time test waveform

90 VAC / 60Hz	115 VAC / 60 Hz
	
230 VAC / 50 Hz	**115 VAC / 60 Hz**
	

20 V / 7.5 A Turn-on Delay Time test waveform

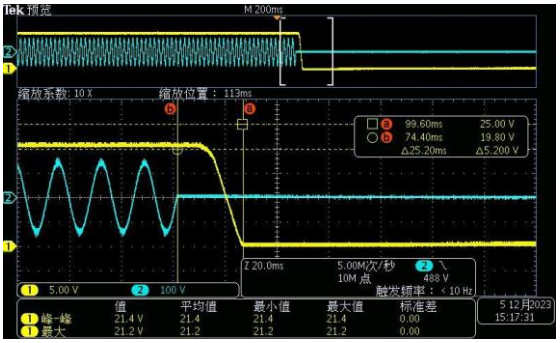
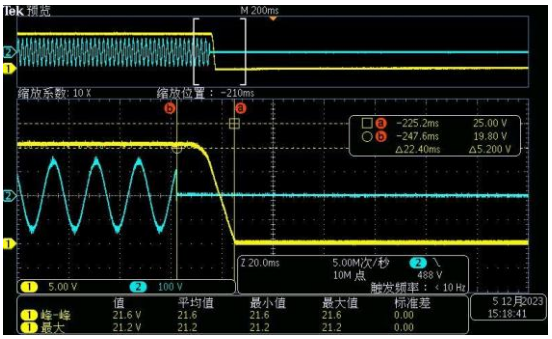
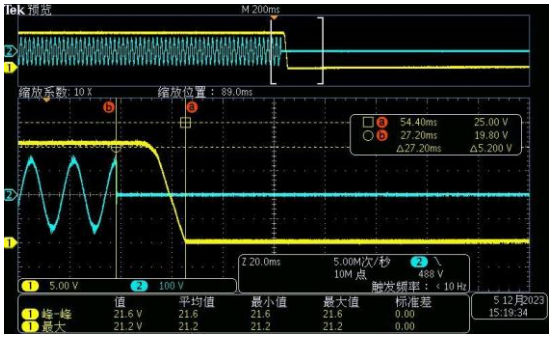
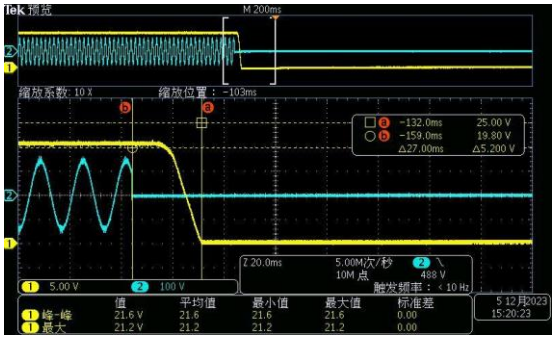
90 VAC / 60Hz	115 VAC / 60 Hz
	
230 VAC / 50 Hz	**115 VAC / 60 Hz**
	

11.Hold-up Time

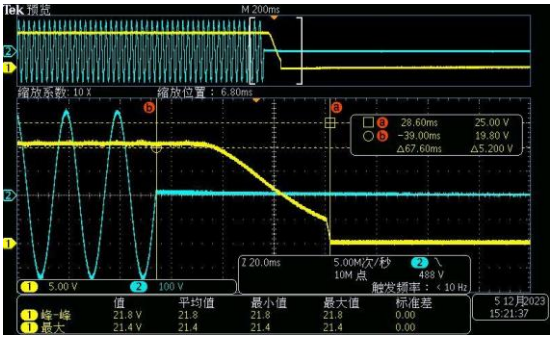
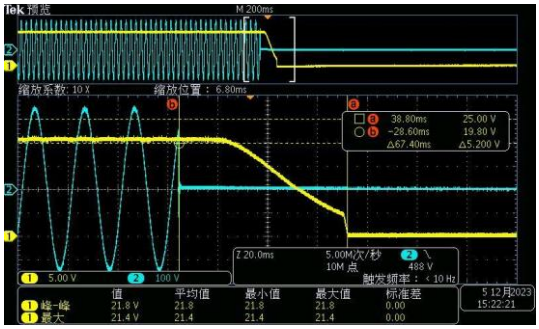
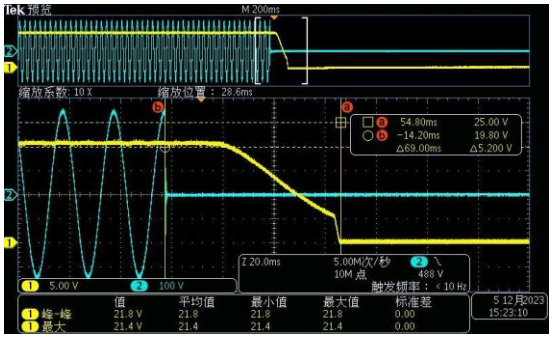
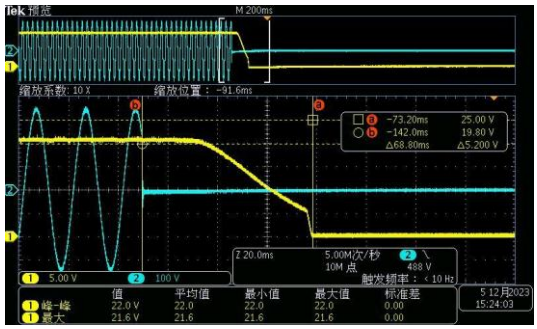
Input Voltage	100 V_{AC} / 60Hz	240 V_{AC} / 50 Hz
Output Current	Full Load	
Angle of AC Off	0° 、45° 、90° 、135°	
Requirement	> 10 mS @ Typical AC Input for 115Vac	

$V_{IN,AC}$ (V / Hz)	Angle of AC Off	$T_{HOLD-UP}$ (mS)	Requirement (mS)
100 V_{AC} / 60Hz	0°	25.2	> 10
	45°	22.4	
	90°	27.2	
	135°	27	
264 V_{AC} / 50Hz	0°	67.6	
	45°	67.4	
	90°	69	
	135°	68.8	

20 V / 7.5 A 100VAC / 60Hz test waveform

0°	45°
	
90°	**135°**
	

20 V / 7.5 A 240VAC / 50Hz test waveform

0°	45°
	
90°	**135°**
	

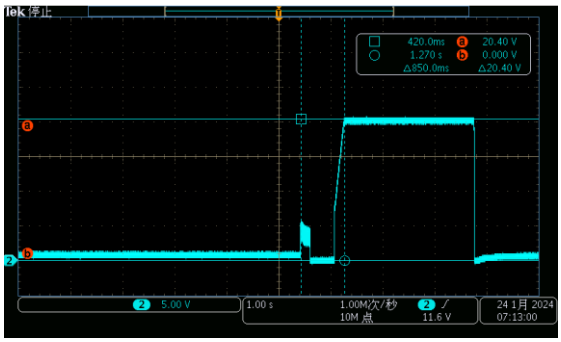
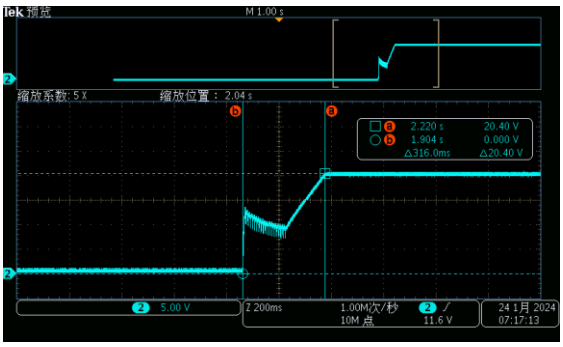
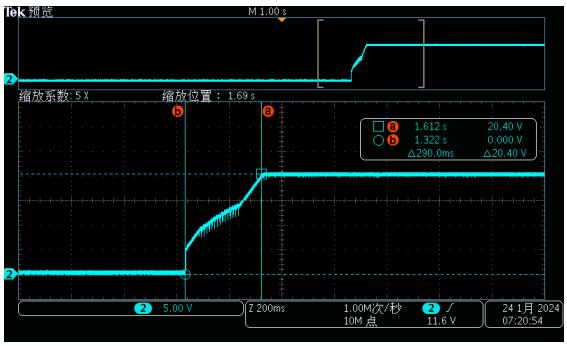
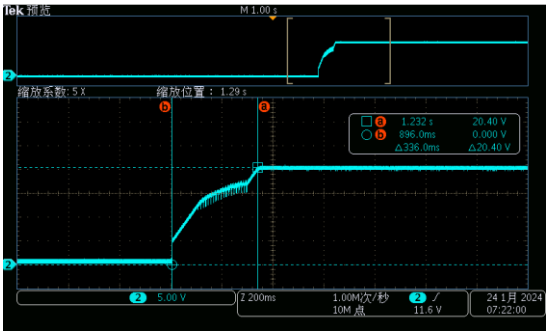
12.Rise Time

Input Voltage	90 VAC / 60Hz	115 VAC / 60 Hz	230 VAC / 50 Hz	264 VAC / 50 Hz
Output Current	Full Load			
Angle of AC Off	0°			
Rise Time Requirement	< 5 S			
Overshoot Overshoot	< 10 %			

Rise Time test data

VIN,AC (V / Hz)	TRISE (mS)	Requirement (S)
90 VAC / 60Hz	850	< 5S
115 VAC / 60 Hz	316	
230 VAC / 50 Hz	290	
264 VAC / 50 Hz	336	

Rise Time test waveform

90 V_{AC} / 60Hz	115 V_{AC} / 60 Hz
	
230 V_{AC} / 50 Hz	**264V_{AC} / 50 Hz**
	

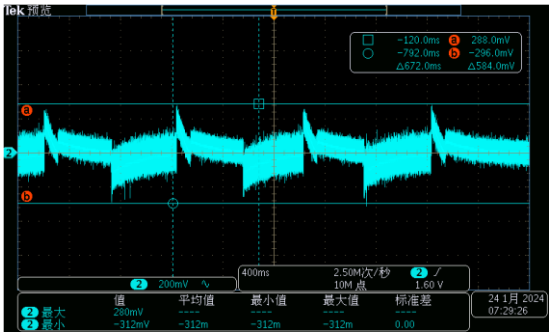
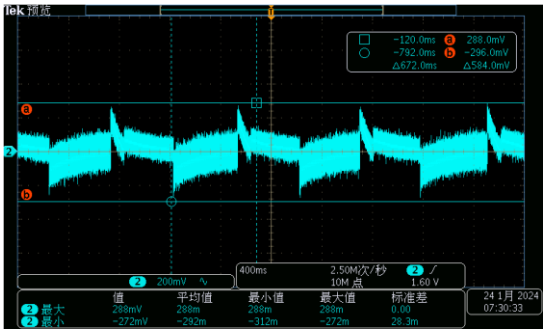
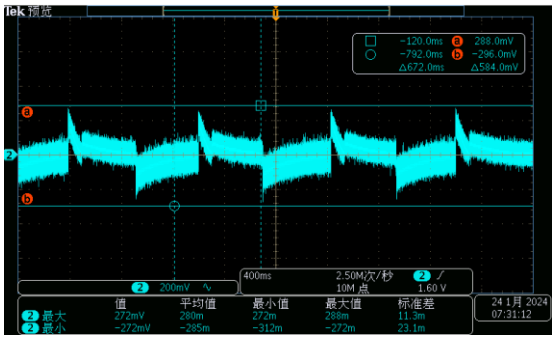
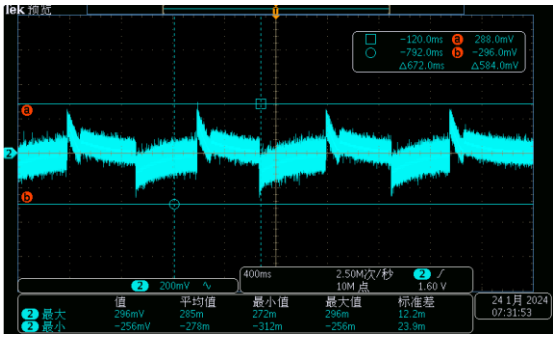
13.overshoot & undershoot

Input Voltage	90 V_{AC} / 60Hz	115 V_{AC} / 60 Hz	230 V_{AC} / 50 Hz	264 V_{AC} / 50 Hz
Output Current	Full Load			
Angle of AC Off	0°			
Overshoot	< 500mV			
undershoot	< 500mV			

overshoot & undershoot test data

$V_{IN,AC}$ (V / Hz)	Overshoot (mV)	Undershoot (mV)	Requirement
90 V_{AC} / 60Hz	280	312	< 500mV
115 V_{AC} / 60 Hz	288	272	
230 V_{AC} / 50 Hz	272	272	
264 V_{AC} / 50 Hz	296	256	

overshoot & undershoot test waveform

90 VAC / 60Hz	115 VAC / 60 Hz
	
230 VAC / 50 Hz	**264 VAC / 50 Hz**
	

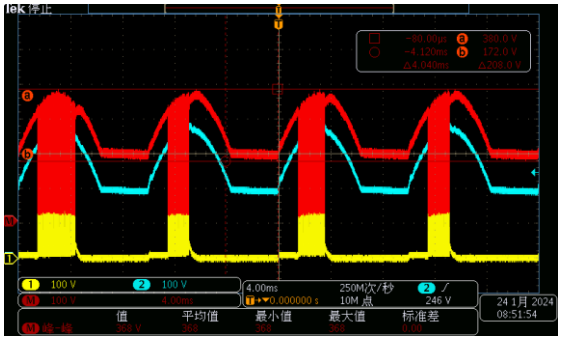
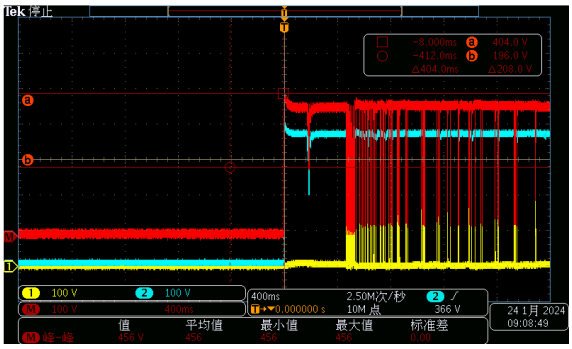
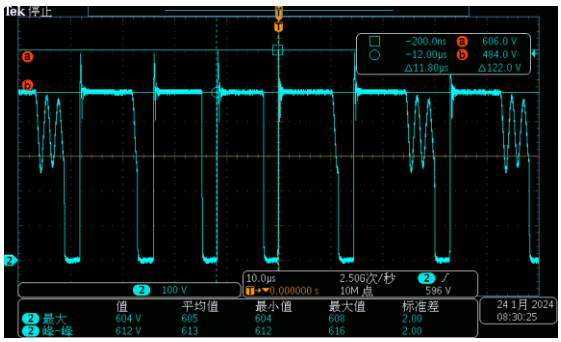
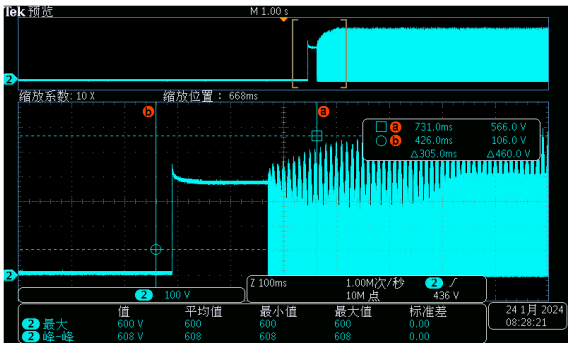
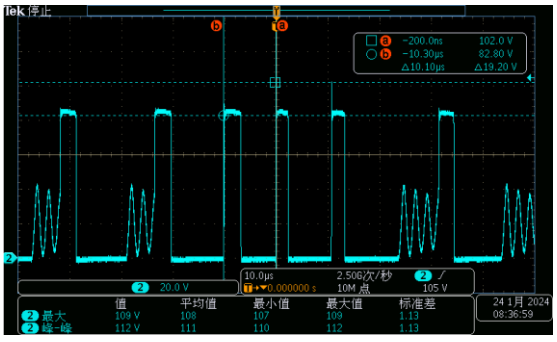
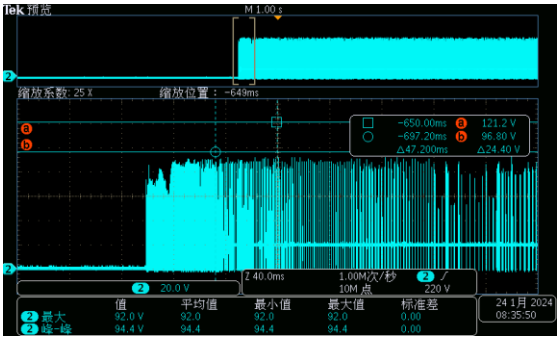
14. Stress on Switching Parts

Input Voltage	**264 V_{AC} / 50 Hz**
Output Current	**Full Load**
Output Current	**Defined by Different Parts**

Stress on Switching Parts test data

Location	Part No.	Condition	$V_{BUS,SET}$ (V)	V_{DS} (V)	Requirement (V)
Q101	MHFIRF25N65	**Normal**	**20**	368	**< 615**
		Turn-on	**20**	456	**(650 * 0.95)**
Q105	MHFS110R65C	**Normal**	**20**	608	**< 615**
		Turn-on	**20**	612	**(650 * 0.95)**
Q201&Q202	MDG007R120SL	**Normal**	**20**	94.4	**< 114**
		Turn-on	**20**	112	**(120 * 0.95)**

Stress on Switching Parts test waveform

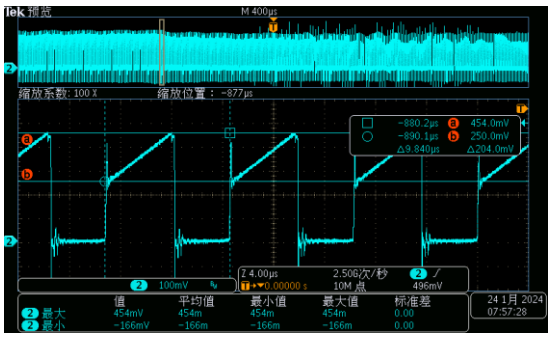
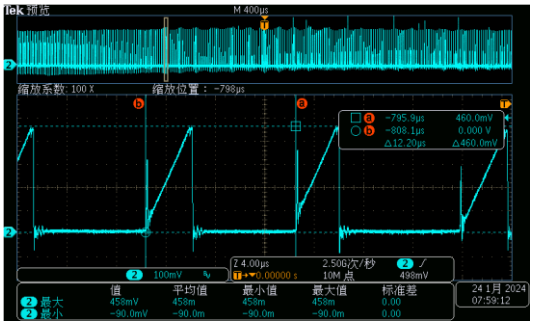
Q101 Normal	Q101 Turn on
	
Q105 Normal	**Q105 Turn on**
	
Q201&Q202 Normal	**Q201&Q202 Turn on**
	

15. Flux Density on Transformer

Input Voltage	90 VAC / 60 Hz	264 VAC / 50Hz
Output Current	Full Load	
Requirement	< 0.35	

VBUS,SET (V)	I OUT (A)	VIN,AC (V / Hz)	I P,MAX (A)	BMAX	Requirement
20	7.5	90 / 60	4.429	0.284	< 0.35
		264 / 50	4.487	0.287	

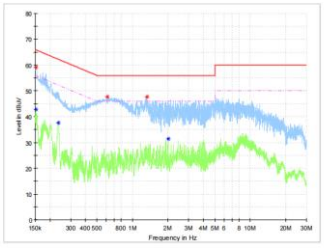
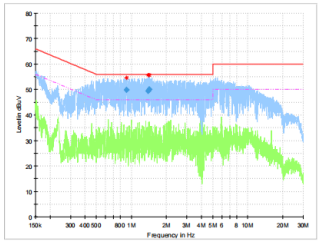
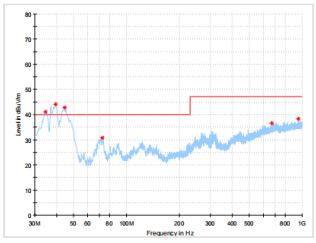
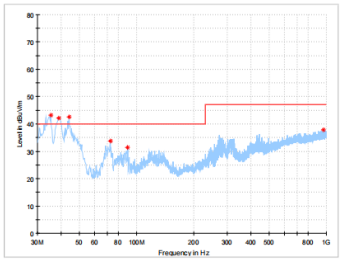
Flux Density on Transformer test waveform

90 VAC / 60 Hz	264 VAC / 50Hz
	

16. EMI

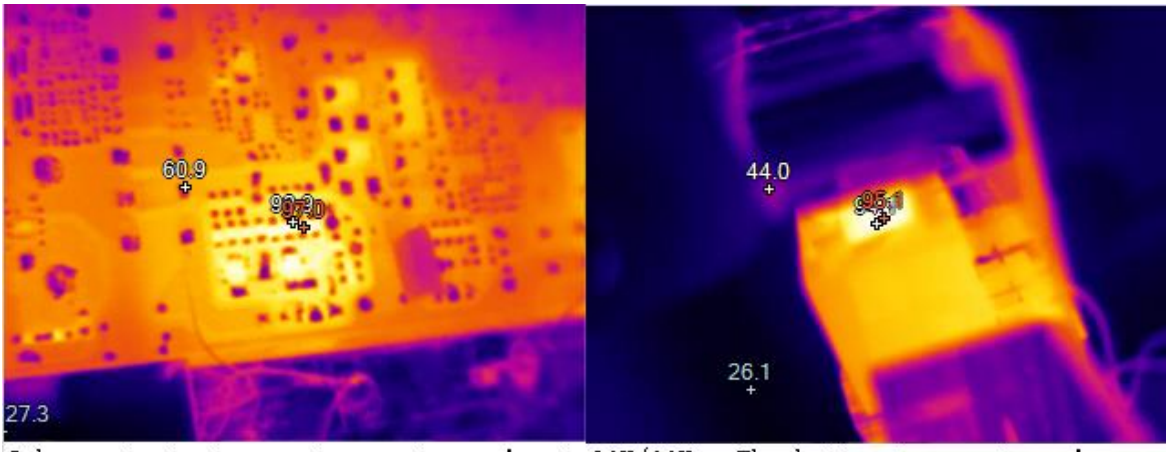
Input Voltage	115 VAC / 60Hz	230 VAC / 50 Hz
Output Current	Full Load	
Test Mode	CE、RE	
Requirement	Below the limit	

EMI test waveform

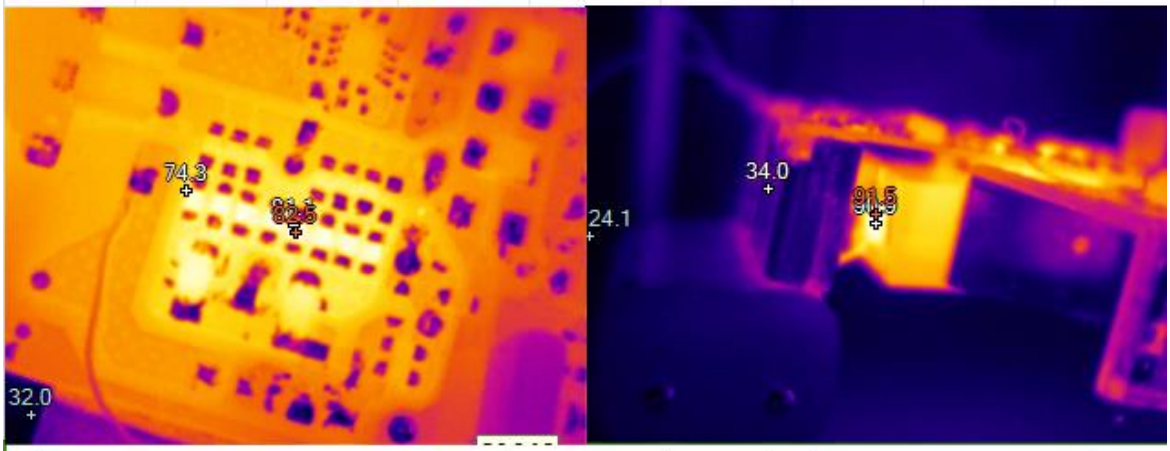
115 VAC / 60Hz CE	230 VAC / 50 Hz CE
	
115 VAC / 60Hz RE	230 VAC / 50 Hz RE
	

17.Temperature

Input Voltage	90 VAC / 60Hz	230 VAC / 50 Hz
Output Current	Full Load	
Test Mode	2 hours test at room temperature,Test the maximum temperature of the product	



2 hours test at room temperature, input 90V/60Hz. The bottom temperature is up to 97℃, and the transformer wire package is 95.1℃



2 hours test at room temperature, input 230V/50Hz. The bottom temperature is up to 82.5℃, and the transformer wire package is 91.1℃

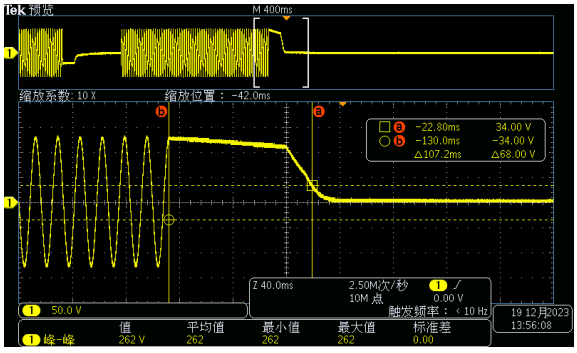
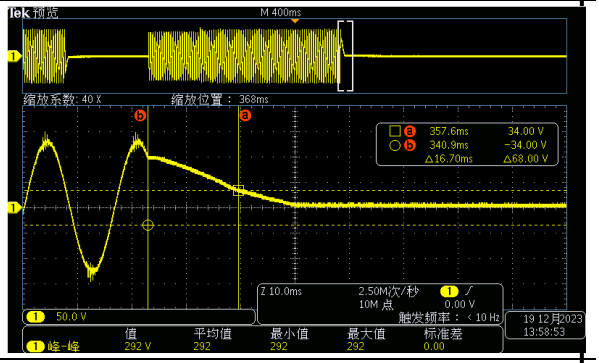
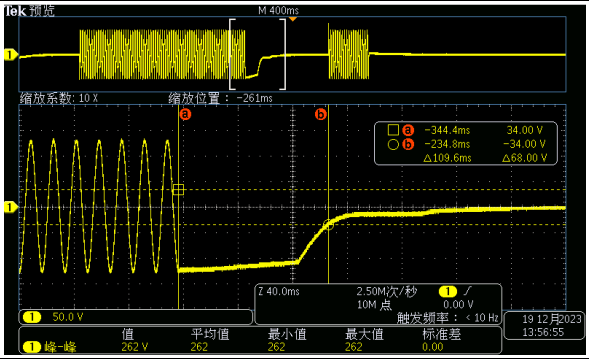
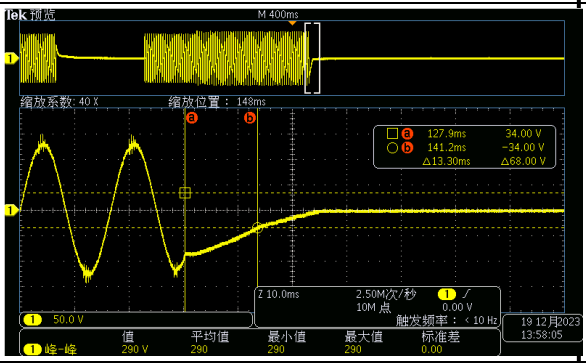
18.X Capacitor discharge time

Input Voltage	90 V_{AC} / 60Hz	264 V_{AC} / 50 Hz
Output Current	No Load & Full Load	
Requirement	Test the time when different input voltages fall from peak or trough to 34V, requiring < **<1S**	

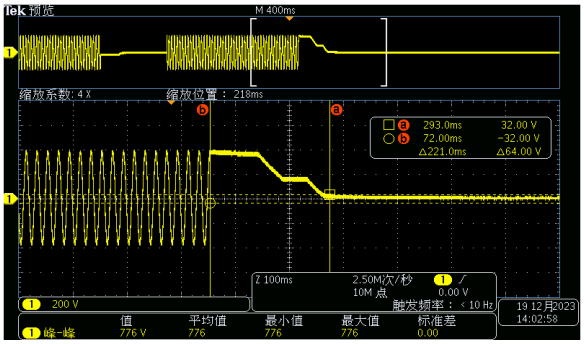
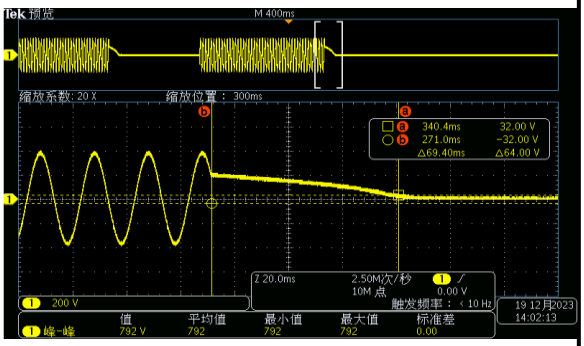
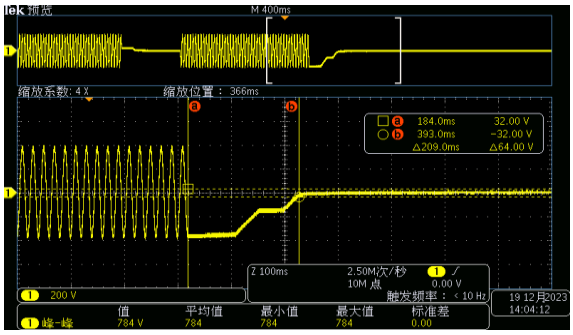
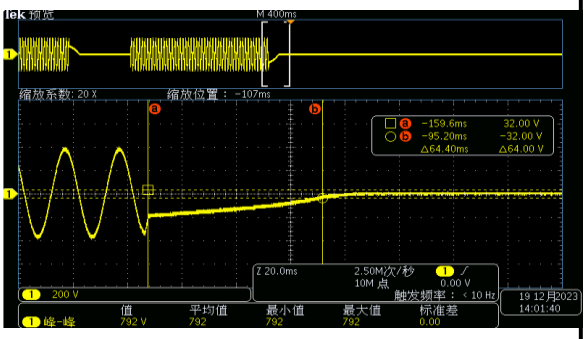
X Capacitor discharge time test data

Input Voltage	No Load peak	No Load trough	Full Load peak	Full Load trough	Requirement
90 V_{AC} / 60Hz	107.2mS	16.7mS	109.6mS	13.3mS	<1S
264 V_{AC} / 50 Hz	221mS	69.4mS	209mS	64.4mS	<1S

X Capacitor discharge time test waveform

90 V_{AC} / 60Hz No Load peak	90 V_{AC} / 60Hz No Load trough
	
90 V_{AC} / 60Hz Full Load peak	**90 V_{AC} / 60Hz Full Load trough**
	

X Capacitor discharge time test waveform

264 VAC / 50 Hz No Load peak	264 VAC / 50 Hz No Load trough
	
264 VAC / 50 Hz Full Load peak	**264 VAC / 50 Hz Full Load trough**
	

19. Inrush

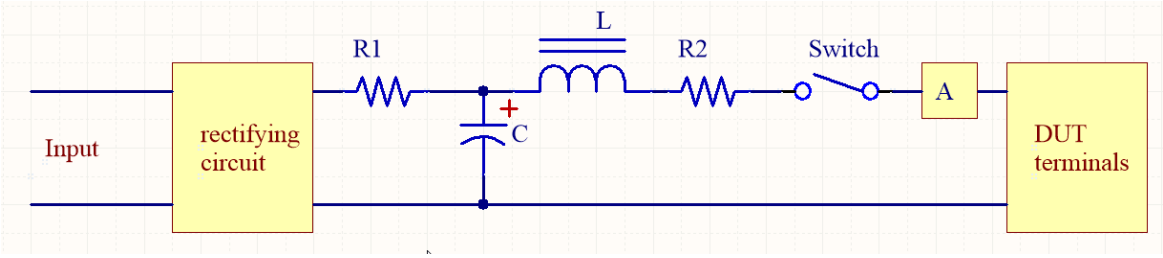
Input Voltage	230 VAC / 50Hz
Test	Test the input impulse current using phase compensation
I max	90A
After 100uS I max	5A

Test connection mode

The measurement setup to determine the inrush current of the DUT is given in Figure below.

The measurement set-up and procedure are fully matched with IEC 63129:2020:

Determination of inrush current characteristics of lighting products.



Input voltage = 230VAC

DUT device under test – Power supply unit

L inductance = 100uH

R2 Adjustment resistance = 0.582 ohm

R1, C Load resistance = 47 ohm

C Load capacitance = 767uF

Test procedure:

1)Connect the DUT terminal to circuit terminal

2)All energy storage components of the DUT shall be discharged.

3)Turn-on the switch

4)Wait until the voltage across the capacitor C stabilized at 325V.

5)Turn on the switching unit and record the voltage across C and the current through the DUT as a function of the time.

6)Determine the inrush current pulse duration as below:

It should be noted that current peak before 100us is caused by filter capacitance in resonance with the line inductance. The current through the line capacitances shall be ignored in the time frame of 100us, if their average energy is less than 10% of the energy of the inrush current.

Inrush test waveform