润新微电子
RUNXIN MICROELECTRONICS

華潤微电子
CR MICRO

设计参考手册

Design Reference Manual

润新微电子（大连）有限公司
公司网址：www.runxin micro.com

GaN 氮化镓
25.2V10A 252W 适配器设计参考手册

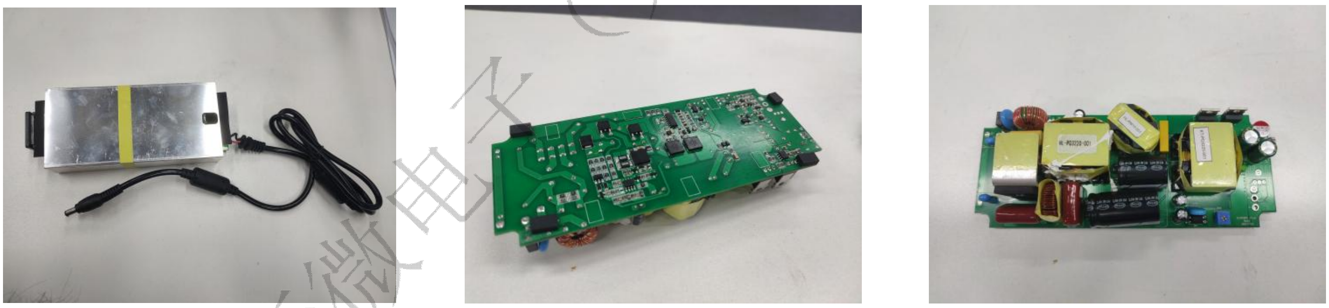
（VER：1.0）

	签　名	日　　期
设计	庄梦苏	2022.06.07
审核	邢志刚	
批准	王宏周	

GaN 氮化镓 25.2V10A252W适配器 设计参考手册	版本:A1 252W-25.2V10A
	文档版本：VER：1.0

基于氮化镓设计的 252W-25.2V10A 适配器外观图(外型尺寸:L*W*H/176*76*36mm)

PCBA 图



主要特性：

1、整机采用高效率电路架构：PFC+LLC电路模式，满功率输出可达93.32%以上超高效率；

2、全电压输入设计，工作电压范围 90VAC~264VAC；

3、（最大252W输出功率），25.2V_{DC}/10A；

4、具有输出过流保护、短路保护、过温保护等功能；

5、输出符合“DOE&COC”6 级能效标准；

6、通过 GB4943 EN55022 ClassB 的 EMI 测试标准

7、通过 EFT 4KV 测试标准；

8、温升测试满足国内 CCC 认证标准和国际 IEC62368 认证标准。

版本更改说明			
时间	更改内容	版本升级	备注
	初版发布	V1.0	

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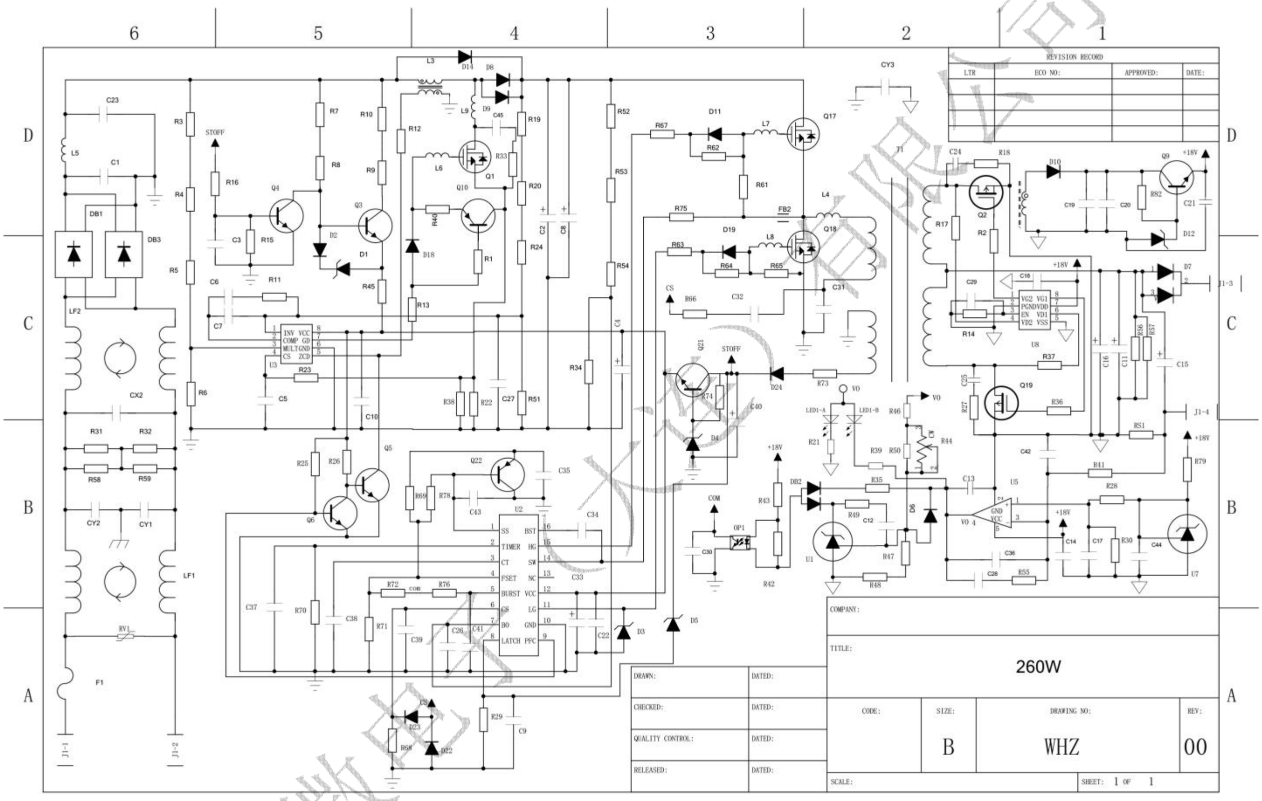
一 DEMO 参数信息

描述	符号	最小	额定值	最大	单位	备注
一，输入特性						
输入电压范围	VIN	90	230	264	Vac	单相输入
输入频率范围	FLINE	47	50/60	63	Hz	
待机功耗	Pstb		1347		mW	
二，输出特性(220V 输入时测试)						
最大输出功率264.6W						
输出电压	VOUT	23.94	25.2	26.46	V	
输出电流（最大为 OCP）	IOUT	0	10	10	A	

三，性能描述						
3.1 性能描述						
描述	符号	最小	典型值	最大	单位	备注
25.2V 输出， 100%负载效率	η		93.99		%	@230V_{AC}
25.2V 输出， 平均效率	η		93.03		%	25/50/75/100% @230V_{AC}
25.2V 输出， 平均效率	η		91.91		%	25/50/75/100% @115V_{AC}
电压调整率				±3	%	
负载调整率				±3	%	
电压纹波与噪声	$V_{R@N}$			86.664	mV	115/230Vac
启动时间	T_{ST_DELAY}	<2			s	
EMI		EN55022B				
3.2 保护特性						
短路保护		输出关闭（打嗝模式），可自恢复				
过流保护		输出关闭（打嗝模式），可自恢复				
过温保护		输出关闭，可自恢复				
3.3 环境特性						
工作温度		0		40	℃	
工作湿度		20%		90%	R.H.	
储存温度		-40		60	℃	
储存湿度		0%		95%	R.H.	
外部尺寸	W*H*L	176*76*36			mm	
单只产品重量	Weight				g	

二 电源结构

2.1电原理图


6
5
4
3
2
1
D
C
B
A
REVISION RECORD
LTR
ECO NO:
APPROVED:
DATE:
DRAWN:
DATED:
CHECKED:
DATED:
QUALITY CONTROL:
DATED:
RELEASED:
DATED:
COMPANY:
TITLE:
260W
CODE:
SIZE:
B
DRAWING NO:
WHZ
REV:
00
SCALE:
SHEET: 1 OF 1
U2
U3
U5
U8
T1
LF1
LF2
DB1
DB3
F1
RV1
CX2
CY1
CY2
CY3
OP1
STOFF
+18V
VO
COM
CS
J1-1
J1-2
J1-3
J1-4

2.1 材料清单

润新微电子（大连）有限公司

初始BOM物料清单

客户 ：力博　产品名称：25.2V 10A 252W 氮化镓适配器　产品型号：　版本：V0　日期：2022.4.11

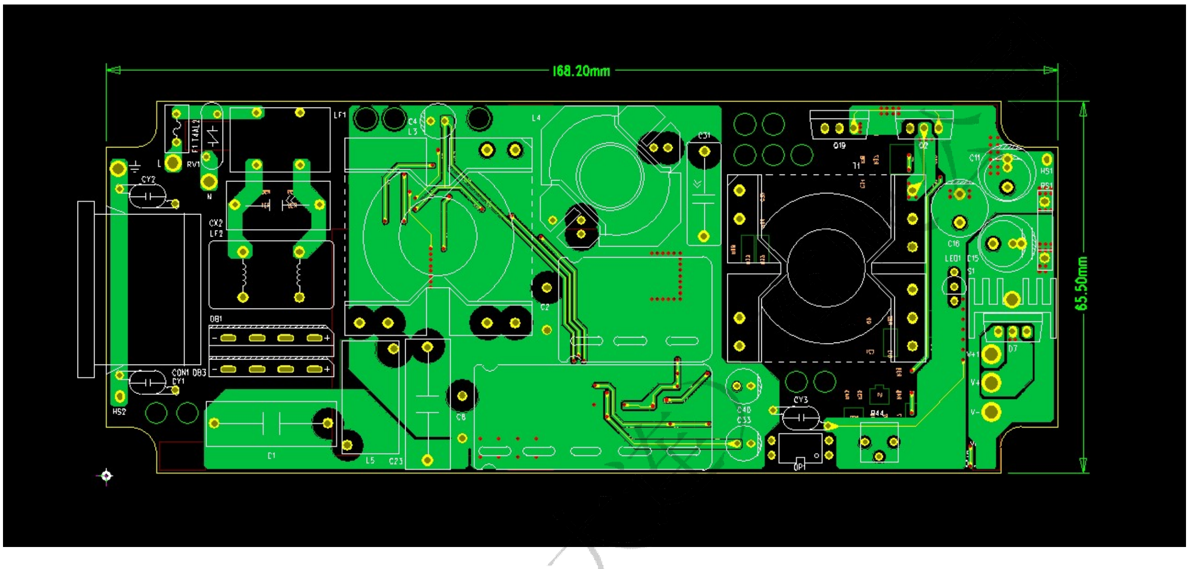
层次	子项物料代码	物料名称	规格型号	单位	用量	位置号	联系电话	厂家
一		成品	25.2V 10A 252W 氮化镓适配器 产品型号：	PCS	1		无	
二		装配件	25.2V 10A 252W 氮化镓适配器 产品型号：	PCS	1		无	
1		AC线	美式三插+梅花尾AC线L=250mm SVT 18AWG/3C；（41/0.16BS*2.0+填充：10根604#棉线绞成一股+棉纸 OD：6.2mm）；外被：PVC黑色+编织层：PP纱黑色OD6.5mm 美式三插+梅花尾 （RoHS）品牌：	PCS	1			
2		DC线	2464 16AWG L=1M Φ5.5*2.1*10mm 尾卡带磁环，DC头带磁环	PCS	1			
3		外壳上盖	上盖L176.4*W76.5*H17.5mm 黑色PC 环保 阻燃94V-0 125℃	PCS	1			
4		外壳下盖	下盖L176.4*W76.5*H20mm 黑色PC 环保 阻燃94V-0 125℃	PCS	1			
5		玛拉胶带	L180*W55mm 厚度T=0.08mm 品牌：	PCS	1			
6		麦拉片1	L166*W63mm 厚度T=0.3mm 黑色 PP材质 品牌：	PCS	1			
7		麦拉片2	L66*W152mm 厚度T=0.3mm 黑色 PP材质 品牌：	PCS	1			
8		散热片下壳	L148.8*W71.3*H29.6*T1.5mm 铝材（刚旭能）	PCS	1			
9		散热片上壳	L148.8*W71.3*H8*T1.0mm 铝材（刚旭能）	PCS	1			
10		散热片桥堆	L27*W22*H17.8*T2.0mm L形散热片铝材（刚旭能）	PCS	1			
11		硅胶帽套	Φ16*12*6 为TO-220 品牌:零度	PCS	1			
12		十字沉头螺丝	十字沉头螺丝,KM3.0×10mm,镀镍,螺丝头直径5.0mm 品牌:	PCS	1			
13		十字沉头螺丝	十字沉头螺丝,KM3.0×12mm,镀镍,螺丝头直径5.0mm 品牌:	PCS	1			
14		螺母	M3 六角螺母 内径3mm 外径5mm 高度2mm 镀镍	PCS	1			
15		导热硅胶片	64*40*1.5MM 灰色 硬度18 Shore C-40℃~150℃。UL94V0。导热系数3.0W/mK品牌:	PCS	1			
16		压条	L26.3*W6.9mm 厚度T=2.0mm 品牌：昌荣发	PCS	1	FOR Q2,Q19		
17		硅胶脚垫	硅胶脚垫 10*6*3.0mm单面背胶 黑色 零度	PCS	4			
18		橡胶脚垫	Φ8.5*2.5mm 防火橡胶 品牌：汉联	PCS	4			
19		圆头螺丝	M2.8*10mm 表面镀锌、白色 加硬处理	PCS	4	FOR 塑胶外壳		
三		插件主板	25.2V 10A 252W 氮化镓适配器 产品型号：	PCS	1		无	
1		AC梅花插座	3pin 梅花插座ST-A04-002KC-015-S4(G) L火线在插座一端打UL3239 18# 红色 L=45mm 另一端打钉子 N零线在插座一端打UL3239 18# 黑色L=50mm另一端打端子 G大地线在插座一端打UL3239 18#黄绿线 L=40mm另一端打钉子品牌：	PCS	1	CON1		
2		方形保险丝	T5A 250V 慢断 Φ8.3*8.0*4mm 品牌:良胜	PCS	1	F1		
3		压敏电阻	STE-10D471 470V ±10% Φ10mm PIN距7.5mm 脚长3.4±0.2mm品牌:至敏	PCS	1	ZV1	尚兴伟13828899258	
4		共模电感	2mH (min) T16*8*7mm Φ0.7mm*2P*20TS 品牌：格瑞安	PCS	1	LF1	姜工15899789503	
5		X2电容	0.47uF 474K 275V X2 P=15 18*15*8 品牌：伟迪	PCS	1	CX2	尚兴伟13828899258	
6		共模电感	SQ电感SQ1515 15mH（min） 0.20*1.5*37TS 尺寸L20*W11*21H mm 脚距8*10mm品牌：格瑞安	PCS	1	LF2	姜工15899789503	
7		整流桥堆	GBU1010 1000V 10A 品牌：	PCS	2	DB1，DB3	王兴武13500068975	
8		金属薄膜电容	CBB21 MPX 450V/225J P=20MM 品牌：威迪	PCS	2	C1,C23	尚兴伟13828899258	
9		差模电感	差模电感 L=200uH（min）磁环KS065-125A φ0.7*1P*58TS 品牌：	PCS	1	L5	姜工15899789503	

10		PFC电感	HL-PQ3220-001 L=220uH±5% 磁芯材质PC95 线径0.1mm*80*1P*35TS	PCS	1	L3	王总13632921161	
11		谐振电感	HL-RM10-003 L=70uH±5% 磁芯材质PC95 线径0.1mm*80*24.5TS	PCS	1	L4	王总13632921161	
12		变压器	PQ3220-002 L=420uH±5% 磁芯材质PC95	PCS	1	T1	王总13632921161	
13		电解电容	68uF 450V 105℃ Φ18*26mm PIN距7.5±0.5mm 卧式长脚 品牌:	PCS	1	C2		
14		电解电容	120uF 450V 105℃ Φ18*41mm PIN距7.5±0.5mm 卧式长脚 品牌:	PCS	1	C8		
15		电解电容	100uF 35V 105℃ Φ6.3*11mm PIN距2.5mm 脚长3.4±0.2mm 高频低阻 品	PCS	3	C4，C33,C40		
16		电解电容	1000uF 35V 105℃ Φ10*20mm PIN距5mm 脚长3.4±0.2mm 高频低阻 品牌:	PCS	2	C16,C11		
17		固态电容	470uF 35V 105℃ Φ8*12mm PIN距3.5mm 脚长3.4±0.2mm 品牌:	PCS	1	C15		
18		谐振电容	CBB21 HMPS 223J630V P=15MM HMPS630S22J0I200 带壳子 品牌：伟迪	PCS	1	C31	尚兴伟13828899258	
19		Y电容	332M/400VAC PIN=10mm Y5V 125℃ 脚长3.4±0.2mm 品牌：威迪	PCS	1	CY3	尚兴伟13828899258	
20		Y电容	471M/400VAC PIN=10mm Y5V 125℃ 脚长3.4±0.2mm 品牌：威迪	PCS	2	CY1，CY2	尚兴伟13828899258	
21		插件MOS管	CRTT067N10N 100V 147A TO-220 RDS=6.7mR 品牌：华润微	PCS	2	Q2,Q19	邓工18061188505	
22		光电耦合器	EL817C DIP-4 品牌：百鸿或者亿光	PCS	1	OP1		
23		可调电位器	1K% BOURNS3362P102 品牌：百斯特	PCS	1	R44		
24		跳线	ф1.0×10mm	PCS	1	RS1		
25		绿灯	LED 翠绿 ф3×5.5mm 品牌:宏彩光电	PCS	1	LED1		
五		贴片件	25.2V 10A 252W 氮化镓适配器 产品型号:	PCS	1		无	
1		贴片电阻	2MΩ ±1% 1206 1/4W品牌:国巨	PCS	11	R7,R8,R3,R4,R5,R19,R52,R31,R32,R58,R59		
2		贴片电阻	33KΩ ±5% 1206 1/4W品牌:国巨	PCS	2	R9,R10		
3		贴片电阻	620KΩ ±5% 1206 1/4W品牌:国巨	PCS	1	R24		
4		贴片电阻	1MΩ ±1% 1206 1/4W品牌:国巨	PCS	3	R20,R53,R54		
5		贴片电阻	51KΩ ±5% 1206 1/4W品牌:国巨	PCS	1	R12		
6		贴片电阻	2KΩ ±5% 1206 1/4W品牌:国巨	PCS	2	R56,R57		
7		贴片电阻	4.7Ω ±5% 1206 1/4W品牌:国巨	PCS	1	R75		
8		贴片电阻	5.1Ω ±5% 1206 1/4W品牌:国巨	PCS	1	R73		
9		贴片电阻	110Ω ±5% 1206 1/4W品牌:国巨	PCS	1	R68		
10		贴片电阻	6.2KΩ ±5% 1206 1/4W品牌:国巨	PCS	1	R66		
11		贴片电阻	10Ω ±5% 1206 1/4W品牌:国巨	PCS	3	R18,R27,R33		
12		贴片电阻	100Ω ±5% 0805 1/8W品牌:国巨	PCS	1	R64		
13		贴片电阻	3Ω ±5% 0805 1/8W品牌:国巨	PCS	1	R1		
14		贴片电阻	20Ω ±5% 0805 1/8W品牌:国巨	PCS	1	R40		
15		贴片电阻	680Ω ±5% 0805 1/8W品牌:国巨	PCS	1	R23		
16		贴片电阻	22KΩ ±1% 0805 1/8W品牌:国巨	PCS	1	R51		
17		贴片电阻	5.1KΩ ±5% 0805 1/8W品牌:国巨	PCS	1	R45		
18		贴片电阻	10KΩ ±5% 0805 1/8W品牌:国巨	PCS	4	R15,R71,R29,R49		
19		贴片电阻	100KΩ ±5% 0805 1/8W品牌:国巨	PCS	4	R16,R61,R65,R78		
20		贴片电阻	30KΩ ±5% 0805 1/8W品牌:国巨	PCS	1	R11		
21		贴片电阻	39KΩ ±5% 0805 1/8W品牌:国巨	PCS	1	R6		
22		贴片电阻	5.1Ω ±5% 0805 1/8W品牌:国巨	PCS	2	R63,R67		
23		贴片电阻	240Ω ±5% 0805 1/8W品牌:国巨	PCS	1	R13		
24		贴片电阻	15KΩ ±1% 0805 1/8W品牌:国巨	PCS	1	R34		
26		贴片电阻	51Ω ±5% 0805 1/8W品牌:国巨	PCS	1	R62		
27		贴片电阻	47Ω ±5% 0805 1/8W品牌:国巨	PCS	1	R76		
28		贴片电阻	1.2KΩ ±5% 0805 1/8W品牌:国巨	PCS	1	R72		
29		贴片电阻	820KΩ ±5% 0805 1/8W品牌:国巨	PCS	1	R70		
30		贴片电阻	2.4KΩ ±5% 0805 1/8W品牌:国巨	PCS	1	R69		
31		贴片电阻	3KΩ ±5% 0805 1/8W品牌:国巨	PCS	2	R74，R82		
32		贴片电阻	330Ω ±5% 0805 1/8W品牌:国巨	PCS	2	R37,R17		
33		贴片电阻	2Ω ±5% 0805 1/8W品牌:国巨	PCS	2	R36,R2		
34		贴片电阻	20KΩ ±5% 0805 1/8W品牌:国巨	PCS	1	R14		
35		贴片电阻	56KΩ ±5% 0805 1/8W品牌:国巨	PCS	1	R21		
38		贴片电阻	2.4KΩ ±1% 0805 1/8W品牌:国巨	PCS	1	R48		
39		贴片电阻	2.2KΩ ±1% 0805 1/8W品牌:国巨	PCS	1	R43		
40		贴片电阻	2KΩ ±1% 0805 1/8W品牌:国巨	PCS	1	R42		
41		贴片电阻	270Ω ±1% 0805 1/8W品牌:国巨	PCS	1	R47		
42		贴片电阻	24KΩ ±1% 0805 1/8W品牌:国巨	PCS	1	R46		
43		贴片电阻	3.3KΩ ±1% 0805 1/8W品牌:国巨	PCS	1	R35		
44		合金电阻	150mΩ ±1% 2512 2W	PCS	2	R22,R38		

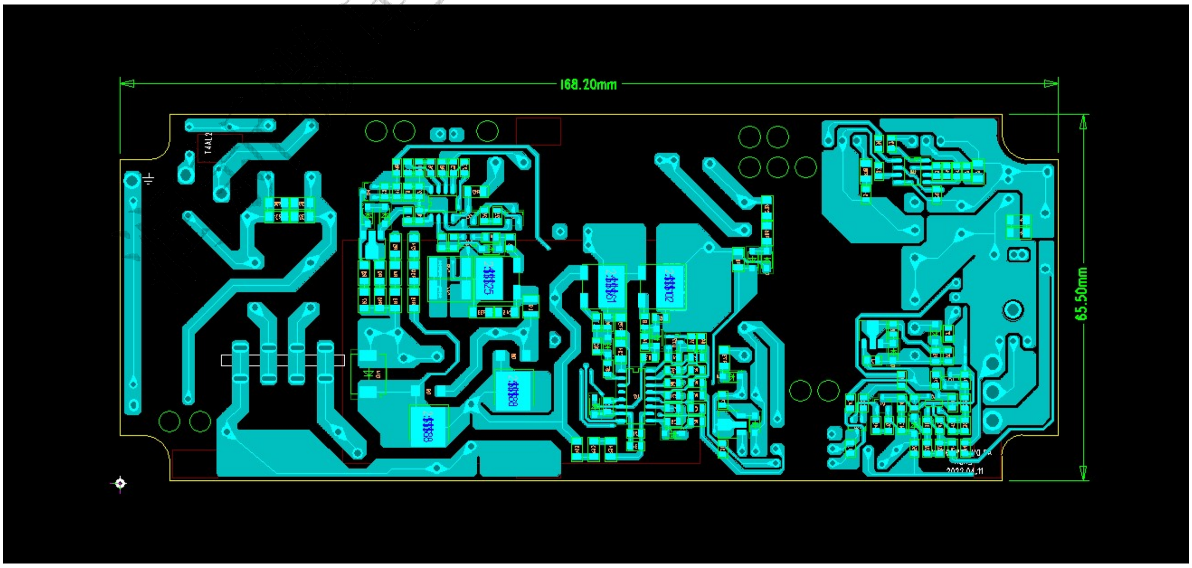
45		贴片电容	100nF ±10% 100V X7R 1206 104K 品牌：国巨	PCS	1	C34		
46		贴片电容	150pF ±10% 500V X7R 1206 151K 品牌：国巨	PCS	2	C32,C45		
47		贴片电容	100nF ±10% 50V X7R 0805 104K品牌:国巨	PCS	6	C9,C3,C10,C7,C39,C12		
48		贴片电容	10nF ±10% 50V X7R 0805 103K品牌:国巨	PCS	1	C30		
49		贴片电容	4.7nF ±10% 50V X7R 0805 472K品牌:国巨	PCS	2	C26,C41		
50		贴片电容	470pF ±10% 50V X7R 0805 471K品牌:国巨	PCS	1	C5		
51		贴片电容	560pF ±10% 50V X7R 0805 561K品牌:国巨	PCS	1	C38		
52		贴片电容	1uF ±10% 50V X7R 0805 105K品牌:国巨	PCS	6	C22,C37,C18,C21,C19,C20		
53		贴片电容	680pF ±10% 50V X7R 0805 681K品牌:国巨	PCS	1	C43		
54		贴片电容	2.2uF ±10% 50V X7R 0805 225K品牌:国巨	PCS	2	C6,C35		
55		贴片电容	2.2nF ±10% 100V X7R 0805 222K 品牌:国巨	PCS	2	C24,C25		
56		贴片电容	220nF ±10% 50V X7R 0805 224K品牌:国巨	PCS	1	C29		
57		贴片磁珠	0805 100MHz 30Ω Bead0805S300A60T 宝仁弘	PCS	1	L7		
58		贴片磁珠	0805 100MHz 300Ω Bead0805S301A60T 宝仁弘	PCS	2	L6,L8		
59		珠	1210 100MHz 300ΩIDC:5A Bead1210S301A50T 宝仁弘	PCS	1	L9		
60		贴片三极管	BCX56 1A 80V SOT89 品牌:先科/ST	PCS	2	Q9,Q21		
61		贴片三极管	MMBT2222A NPN,0.6A,40V,SOT-23 品牌:长电	PCS	1	Q4		
62		贴片三极管	2N2907 600mA 60V SOT-23 品牌:时科	PCS	2	Q10,Q22		
63		贴片三极管	2SC4548 SOT-89 VCE=400V 0.1A 品牌：长电	PCS	1	Q3		
64		贴片二极管	BAW56 SOT-23 VCE=60V 1A 品牌：长电	PCS	1	DB2		
65		贴片二极管	1N4148W 150mA 75V SOD-123 品牌:长电	PCS	6	D2,D18,D11,D19,D22,D23		
66		贴片二极管	RS07M F7 1A 1000V SOD-123FL 品牌：长电	PCS	2	D24，D10		
67		快恢复二极管	MUR1060G TO-252 10A 600V 品牌：平伟	PCS	2	D8,D9		
68		快恢复二极管	SF1006NCS TO-252-2L 10A 600V 品牌：海矽美	PCS	2	D8,D9 替代料		
69		贴片二极管	ES5J 5A 600V SMC 长电	PCS	1	D14		
70		贴片稳压二极	BZT52B15 15V SOD-123F 品牌：长电	PCS	2	D1,D4		
71		贴片稳压二极	BZT52C27V 27V 1/2W SOD-123品牌:长电	PCS	1	D5		
72		贴片稳压二极	BZT52C12V 12V 1/2W SOD-123品牌:长电	PCS	1	D12		
73		氮化镓MOS	RX65T300HS2A(DCHH02-001) DFN 8×8 650V 9A 品牌：润新微	PCS	2	Q17,Q18		
74		氮化镓MOS	RX65T125HS2A DFN 8×8 650V 18A 品牌：润新微	PCS	1	Q1		
76		贴片IC	MMBT431LT1 2.495V≥36V 0.5% SOT-23 品牌:龙晶微	PCS	1	U1		
77		贴片IC	MP6924AGS-Z SOIC8 品牌：MPS	PCS	1	U8		
78		贴片IC	MP44014GS SOIC8 品牌:MPS	PCS	1	U3		
79		贴片IC	HR1000AGS SOIC16，MPS	PCS	1	U2		
80		PCB板	FR-4 S/S 20ZCu 94V-0 双面板 松香168.2*66.55*1.6mm 双面绿油 品牌：	PCS	1			

2.2 Demo 板 PCB 结构示意

顶层布线图


168.20mm
65.50mm

底层布线图


168.20mm
65.50mm

三 变压器设计

3.1 开关变压器KT -PQ3220

润 新 微 电 子（大连）有 限 公 司

技 术 规 范

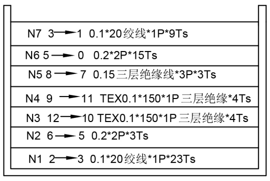
标 题: 开关变压器KT-PQ3220-002

版本号：A
修改号：03
第 1 页 共 2页

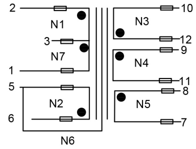
1. 电气特性

1.1 感量: PIN2-3 420uH±5%
1.2 漏感：PIN2-3 20uH MAX
测试条件:10KHz 0.25V,PIN5.PIN6.
PIN10.PIN11.PIN12. 短路
1.3 高压测试
1.3.1 初级-次级 3750VAC 10mA 1MIN
1.3.3 次级-磁芯 3750VAC 10mA 1MIN

2. 绕线结构图


N7 3→1 0.1*20绞线*1P*9Ts
N6 5→0 0.2*2P*15Ts
N5 8→7 0.15三层绝缘线*3P*3Ts
N4 9→11 TEX0.1*150*1P 三层绝缘*4Ts
N3 12→10 TEX0.1*150*1P 三层绝缘*4Ts
N2 6→5 0.2*2P*3Ts
N1 2→3 0.1*20绞线*1P*23Ts

3.原理图


2
N1
3
N7
1
5
N2
6
N6
10
N3
12
9
N4
11
8
N5
7

4.绕线描述

序号	位号	挡墙	绕线描述					挡墙	绝缘胶带层数
			起点	终点	线径 m/m	圈数	绕线方式		
1	N1	0mm	2	3	0.1*20*1P绞线	23	密绕 两层	0mm	2TS
2	N2	0mm	6	5	0.2*3P	3	居中密绕	0mm	2TS
3	N3	0mm	12	10	TEX0.1*150*1P 三层绝缘线	4	密绕	0mm	2TS
4	N4	0mm	9	11	TEX0.1*150*1P 三层绝缘线	4	密绕	0mm	2TS
5	N5	0mm	8	7	0.15*3P 三层绝缘线	3	居中密绕	0mm	2TS
6	N6	0mm	5		0.2*2P	15	密绕	0mm	2TS
7	N7	0mm	3	1	0.1*20*1P绞线	9	密绕	0mm	3TS
8									
9									
10									
11									
12									

注：

<<注意事项>>
1.N1.N7 绕组为绞线，N3.N4绕组为多股三层绝缘线
2.PIN4 拔掉，PIN3剪掉2/3. 3.气隙研磨中柱. 4.Pin1.2.3.5.6.7.8.9.10.11.12.套TEFLON TUBE.
5.装好CORE反包处理后外露磁芯要求再包 TAPE 2 TS.
6.变压器底部靠近次级一侧磁芯需要做反包处理
7. 在磁芯中柱气隙点AB胶
变压器磁芯外需用自粘铜箔长25mm*宽10mm接PIN5脚，再沿线包方向包自粘铜箔宽6mm一圈

序号	版本	变更时间	变更内容
0			
1			
2			
3			

THIRD ANGLE PROJECTION 第三角法	颜色 COLOR	材质 MATERIAL	比例 SCALE	单位 UNIT	重量 WEIGHT	图版 PLATE	是否符合RoHS MEASURE UP RoHS	表面处理 SURFACE PROCESSING
	-	-	1:1	mm	-	A4	YES	-

承认 APPROVED	确认 CHECKED	检图 CHECKED	制图 DRAWING

范围 RANGE	公差 TOLERANCE		
	M0	M1	M2
L≤6	±0.05	±0.05	±0.10
6<L≤30	±0.08	±0.10	±0.20
30<L≤80	±0.10	±0.15	±0.25
80<L≤180	±0.15	±0.20	±0.30
L>180	±0.20	±0.30	±0.50

机种 MODEL	25.2V10A	页次 PAGE	1/3
品名 DWG. NO.		日期 DATE	

润 新 微 电 子（大连）有 限 公 司

技 术 规 范

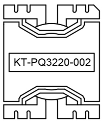
标 题: 开关变压器KT-PQ3220-002

版本号：A
修改号：03
第 2 页 共 2页

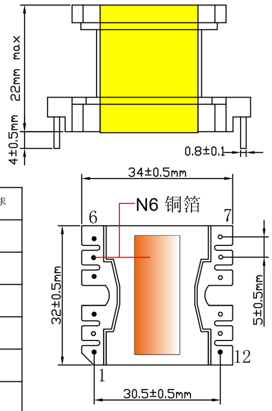
6.标签

6.1 标签纸可用透明印刷，打印或是激光打印均可，
但应保证字体清晰可见，且标贴纸的粘性良好，能耐130° C不易脱落.
6.2 标签内容应包括以下内容：

KT-PQ3220-002


KT-PQ3220-002

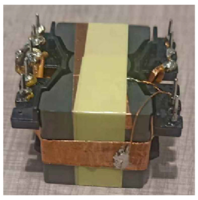
俯视图


22mm max
4±0.5mm
0.8±0.1
34±0.5mm
N6 铜箔
6
7
1
12
32±0.5mm
5±0.5mm
30.5±0.5mm

7.材料清单

序号	物料名称	规格描述	品牌指定或安规要求
1	骨架	PHENOLIC T375J/T373J Minimum V-2 150 Degree C	QMFZ2
2	磁芯	PQ3220	使用PC95材质
3	铜线	2UEW 130°C	OBMW2
4	三层绝缘线	TIW-2/TEX-E/TEX-ECEW3/TEX-ELZ 130°C	OBJT2
5	胶带	1350-1, 1350F-1, 1351-1, PZ, CT, WF 130° C	OANZ2
6	凡立水	BC-359 130°C	UL认证
7	套管	TEFLON TUBE TFT/TFS/2T-TFT/547RTURBO117E/TURBO117F /TFE-SW-600	YDPU2
8	铜箔	0.025 x 12mm	不限

8. 磁芯接线示意图



注：
1. 骨架规格：PQ3220 12PIN。
2. 要求外露磁芯包TAPE 2TS（宽度22mm）
3. N6 铜箔贴于变压器底部磁芯表面并用0.2mm的铜线焊接于PIN5

9. 包装要求

变压器包装要采用泡沫包装以免变压器变形。

序号	版本	变更时间	变更内容
0			
1			
2			
3			

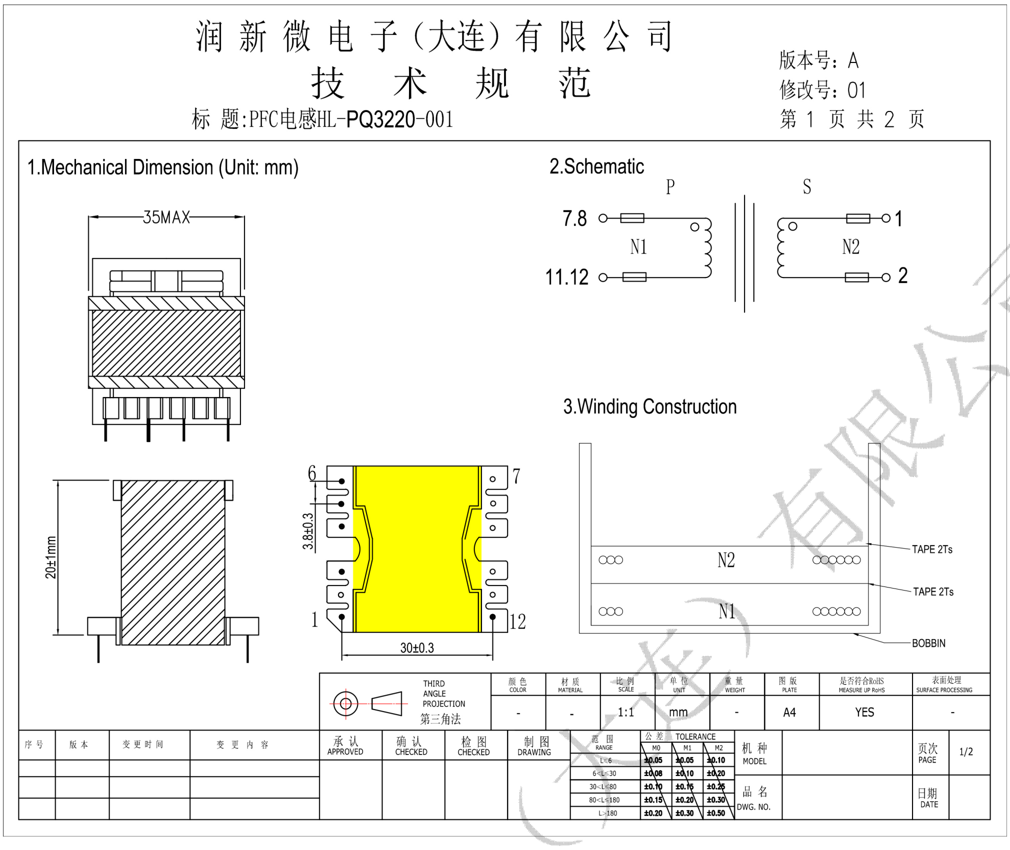
THIRD ANGLE PROJECTION 第三角法	颜色 COLOR	材质 MATERIAL	比例 SCALE	单位 UNIT	重量 WEIGHT	图版 PLATE	是否符合RoHS MEASURE UP RoHS	表面处理 SURFACE PROCESSING
	-	-	1:1	mm	-	A4	YES	-

承认 APPROVED	确认 CHECKED	检图 CHECKED	制图 DRAWING

范围 RANGE	公差 TOLERANCE		
	M0	M1	M2
L≤6	±0.05	±0.05	±0.10
6<L≤30	±0.08	±0.10	±0.20
30<L≤80	±0.10	±0.15	±0.25
80<L≤180	±0.15	±0.20	±0.30
L>180	±0.20	±0.30	±0.50

机种 MODEL	25.2V10A	页次 PAGE	2/3
品名 DWG. NO.		日期 DATE	

3.2 PFC电感



润新微电子（大连）有限公司
技术规范
标 题:PFC电感HL-PQ3220-001

版本号：A
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第 1 页 共 2 页

1.Mechanical Dimension (Unit: mm)

2.Schematic

3.Winding Construction

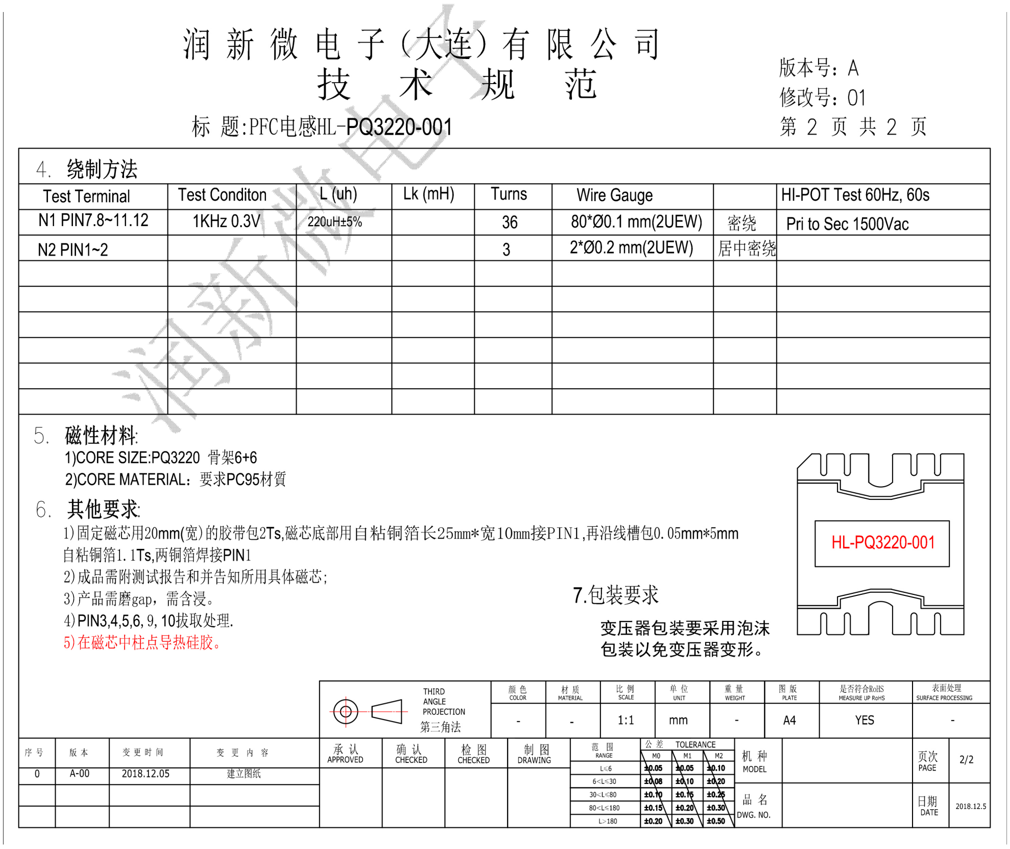
35MAX
20±1mm
3.8±0.3
30±0.3
6
7
1
12
P
S
7.8
11.12
N1
N2
1
2
N2
N1
TAPE 2Ts
TAPE 2Ts
BOBBIN
THIRD ANGLE PROJECTION
第三角法

颜色 COLOR	材质 MATERIAL	比例 SCALE	单位 UNIT	重量 WEIGHT	图版 PLATE	是否符合RoHS MEASURE UP RoHS	表面处理 SURFACE PROCESSING
-	-	1:1	mm	-	A4	YES	-

序号	版本	变更时间	变更内容	承认 APPROVED	确认 CHECKED	检图 CHECKED	制图 DRAWING

范围 RANGE	公差 TOLERANCE M0	M1	M2
L≤6	±0.05	±0.05	±0.10
6<L≤30	±0.08	±0.10	±0.20
30<L≤80	±0.10	±0.15	±0.25
80<L≤180	±0.15	±0.20	±0.30
L>180	±0.20	±0.30	±0.50

机种 MODEL		页次 PAGE	1/2
品名 DWG. NO.		日期 DATE	



润新微电子（大连）有限公司
技术规范
标 题:PFC电感HL-PQ3220-001

版本号：A
修改号：01
第 2 页 共 2 页

4. 绕制方法

Test Terminal	Test Conditon	L (uh)	Lk (mH)	Turns	Wire Gauge		HI-POT Test 60Hz, 60s
N1 PIN7.8~11.12	1KHz 0.3V	220uH±5%		36	80*Ø0.1 mm(2UEW)	密绕	Pri to Sec 1500Vac
N2 PIN1~2				3	2*Ø0.2 mm(2UEW)	居中密绕	

5. 磁性材料:
1)CORE SIZE:PQ3220 骨架6+6
2)CORE MATERIAL：要求PC95材質

6. 其他要求:
1)固定磁芯用20mm(宽)的胶带包2Ts,磁芯底部用自粘铜箔长25mm*宽10mm接PIN1,再沿线槽包0.05mm*5mm自粘铜箔1.1Ts,两铜箔焊接PIN1
2)成品需附测试报告和并告知所用具体磁芯;
3)产品需磨gap，需含浸。
4)PIN3,4,5,6,9,10拔取处理.
5)在磁芯中柱点导热硅胶。

7.包装要求

变压器包装要采用泡沫包装以免变压器变形。

HL-PQ3220-001
THIRD ANGLE PROJECTION
第三角法

颜色 COLOR	材质 MATERIAL	比例 SCALE	单位 UNIT	重量 WEIGHT	图版 PLATE	是否符合RoHS MEASURE UP RoHS	表面处理 SURFACE PROCESSING
-	-	1:1	mm	-	A4	YES	-

序号	版本	变更时间	变更内容	承认 APPROVED	确认 CHECKED	检图 CHECKED	制图 DRAWING
0	A-00	2018.12.05	建立图纸				

范围 RANGE	公差 TOLERANCE M0	M1	M2
L≤6	±0.05	±0.05	±0.10
6<L≤30	±0.08	±0.10	±0.20
30<L≤80	±0.10	±0.15	±0.25
80<L≤180	±0.15	±0.20	±0.30
L>180	±0.20	±0.30	±0.50

机种 MODEL		页次 PAGE	2/2
品名 DWG. NO.		日期 DATE	2018.12.5

四 测试数据

4.1 测试工具

名称	品牌	型号
交流源	远方	DPS1020
功率仪	远方	WT1800
电子负载	艾德克斯（ITECH）	IT8512A+
示波器	RIGOL	MDO5204
万用表	FULKE	17B+

4. 2 测试报告请见附件

序号	测试项目	测试结果
1	Turn on time 开机时间	PASS
2	Hold up time 关机保持时间	PASS
3	Input Current 输入电流	PASS
4	Power Factor 功率因素	PASS
5	Efficiency 效率	PASS
6	Power Consumption 待机功率	PASS
7	Inrush Current 倾入电流（浪涌）	PASS
8	Rise time 输出上升时间	PASS
9	Overshoot&Undershoot 过充和欠充	PASS
10	Ripple voltage&noise 纹波和噪声	PASS
11	Line&Load Regulation 过载调整率	PASS
12	Over Current Protection 过流保护	PASS
13	Short Circuit Protection 段路保护	PASS
14	Over Voltage Protection 过压保护	PASS
15	Over Temperature Protection 温升	PASS
16	EMI	PASS
17	Components De-rating 器件降级	PASS

Turn On Time Test

←

	Tested By：25.2V10A 252W	**Test date：2022/05/05**

1.Test condition:

Input voltage：115Vac
Input frequency：60Hz
Ambient temperature：25±5℃
Output Load：Full Load

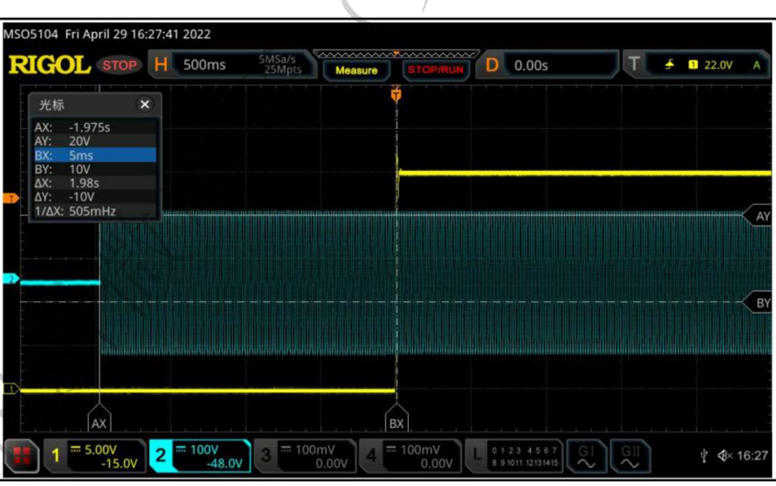
2.Test equipment:

AC Source:	DPS1020_V100	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512A+	**Power meter:**	YOKOGAWA WT1800

3.Test result:

Test condition			**SPEC**	**Test result (S)**	**Judge**	**Note**
AC Input		**DC Load**				
Vin	**Fin**			**1#**	**Pass/Fail**	
115V	60Hz	Full load	3S	1.98	Pass	

4.Test waveform or photos:


MSO5104 Fri April 29 16:27:41 2022

光标
AX: -1.975s
AY: 20V
BX: 5ms
BY: 10V
ΔX: 1.98s
ΔY: -10V
1/ΔX: 505mHz

RIGOL
STOP
H
500ms
5MSa/s
25Mpts
Measure
STOP/RUN
D
0.00s
T
22.0V
A
AY
BY
AX
BX
1 5.00V -15.0V
2 100V -48.0V
3 100mV 0.00V
4 100mV 0.00V
L
GI
GII
16:27

Hold up Time Test

←

	Tested By：25.2V10A 252W	**Test date：2021/05/05**

1.Test condition:

Input voltage：115Vac
Input frequency：60Hz
Ambient temperature：25±5℃
Output Load：Full Load

2.Test equipment:

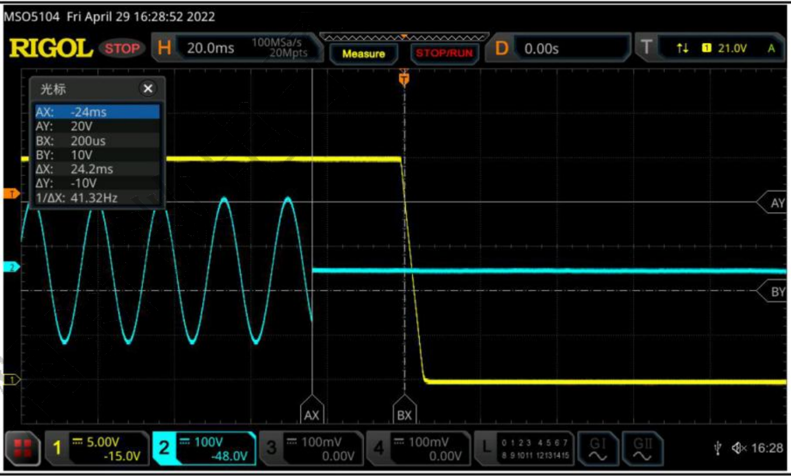
AC Source:	DPS1020_V100	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512A+	**Power meter:**	YOKOGAWA WT1800

3.Test result:

Test condition			**SPEC**	**Test result (ms)**	**Judge**	**Note**
AC Input		**DC Load**				
Vin	**Fin**			**1#**	**Pass/Fail**	
115V	60Hz	Full load	>20mS	24.2	Pass	

4.Test waveform or photos:

115V60HZ



MSO5104 Fri April 29 16:28:52 2022

光标
AX: -24ms
AY: 20V
BX: 200us
BY: 10V
ΔX: 24.2ms
ΔY: -10V
1/ΔX: 41.32Hz

RIGOL
STOP
H 20.0ms
100MSa/s
20Mpts
Measure
STOP/RUN
D 0.00s
T
1 21.0V
A
AY
BY
AX
BX
1 5.00V -15.0V
2 100V -48.0V
3 100mV 0.00V
4 100mV 0.00V
L 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
GI
GII
16:28

Input Current Test

←

	Tested By: 25.2V10A 252W	**Test date: 2022/05/05**

1.Test condition:

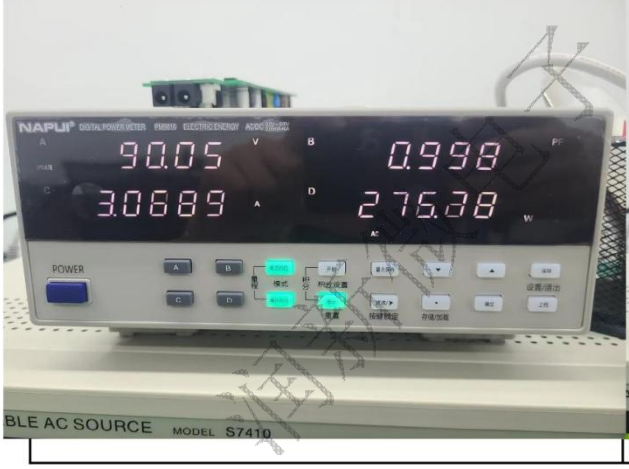
Input voltage：90Vac/264Vac
Input frequency：47Hz/63Hz
Ambient temperature：25±5℃
Output Load：Full Load

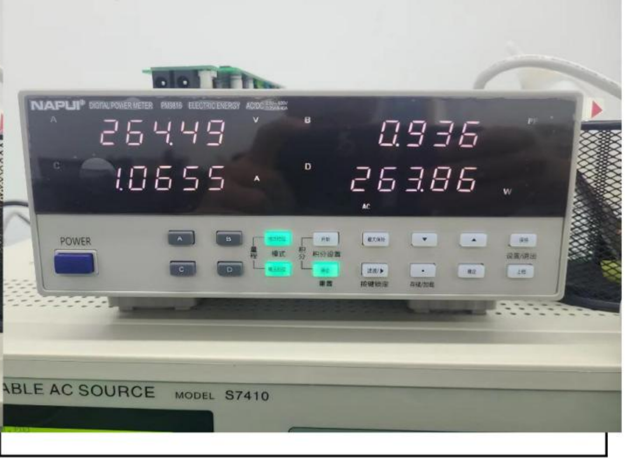
2.Test equipment:

AC Source:	DPS1020_V100	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512A+	**Power meter:**	YOKOGAWA WT1800

3.Test result:

Test condition			**SPEC**	**Test result (A)**		**Judge**	**Note**
AC Input		**DC Load**					
Vin	**Fin**			**1#**	**2#**	**Pass/Fail**	
90V	63Hz	Full load	<3.2A	3.0689		Pass	
264V	47Hz			1.0655		Pass	


NAPUI
90.05
0.998
3.0689
275.38
POWER
BLE AC SOURCE
MODEL S7410


NAPUI
264.49
0.936
1.0655
263.86
POWER
ABLE AC SOURCE
MODEL S7410

Power Factor Test

←

	Tested By: **25.2V10A 252W**	**Test date:** **2022/05/05**

1.Test condition:

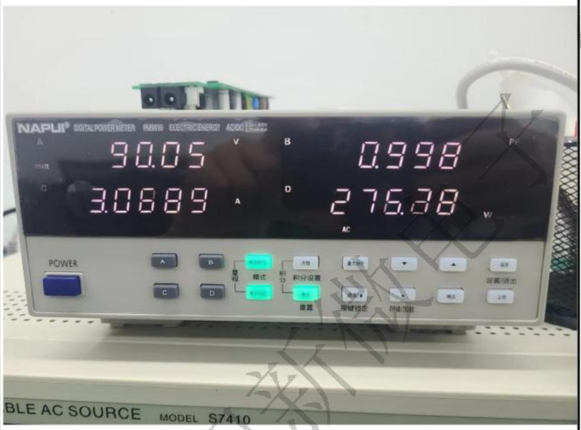
Input voltage：90Vac/264Vac
Input frequency：47Hz/63Hz
Ambient temperature：25±5℃
Output Load：Full Load

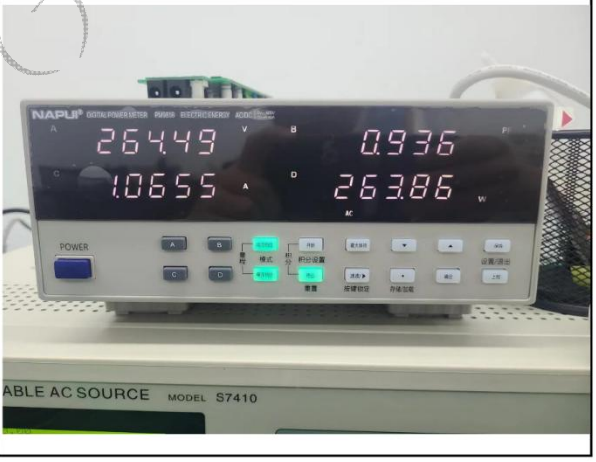
2.Test equipment:

AC Source:	DPS1020_V100	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512A+	**Power meter:**	YOKOGAWA WT1800

3.Test result:

Test condition			**SPEC**	**Test result**		**Judge**	**Note**
AC Input		**DC Load**					
Vin	**Fin**			**1#**	**2#**	**Pass/Fail**	
90V	63Hz	Full load	＞0.92	0.998		Pass	
264V	47Hz			0.936		Pass	


NAPUI
90.05
0.998
3.0889
276.38
POWER
BLE AC SOURCE
MODEL S7410


NAPUI
264.49
0.936
1.0655
263.86
POWER
ABLE AC SOURCE
MODEL S7410

Efficiency Test

←

Tested By：25. 2V10A 252W **Test date：2022/01/06**

1.Test condition:

Input voltage：115Vac/230Vac
Input frequency：50Hz/60Hz
Ambient temperature：25±5℃
Output Load：10%、25%、50%、75%、100%Full Load

2.Test equipment:

AC Source:	TET S7410	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512A+	**Power meter:**	PM9816

3.Test result:

S/N	Input & Output		10%load	25%load	50%load	75%load	100%load	Average efficiency	Spec	Judge	Note
			1A	2.5A	5A	7.5A	10A			Pass/Fail	
1#	115Vac/60Hz	Input power	0.000W	68.400W	134.370W	201.480W	270.590W	91.91%		Pass	
		Output voltage	0.000V	24.870V	24.850V	24.840V	24.840V				
		Output power	0.000W	62.175W	124.250W	186.300W	248.400W				
		Efficiency	#DIV/0!	90.90%	92.47%	92.47%	91.80%				
	230Vac/50Hz	Input power	0.000W	68.750W	132.960W	197.900W	264.290W	93.03%		Pass	
		Output voltage	0.000V	24.870V	24.870V	24.850V	24.840V				
		Output power	0.000W	62.175W	124.350W	186.375W	248.400W				
		Efficiency	#DIV/0!	90.44%	93.52%	94.18%	93.99%				

Power Consumption Test			←
	Tested By：25.2V10A 252W	**Test date：2022/01/06**	

1.Test condition:

Input voltage：230Vac
Input frequency：50Hz
Ambient temperature：25±5℃
Output Load：no Load

2.Test equipment:

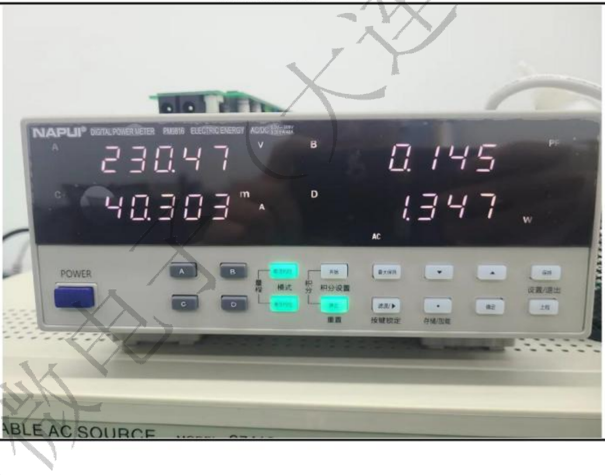
AC Source:	DPS1020_V100	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512A+	**Power meter:**	YOKOGAWA WT1800

3.Test result:

Test condition			SPEC	Test result (W)	Judge	Note
AC Input		DC Load				
Vin	Fin			1#	Pass/Fail	
230V	50Hz	no load	<1.5W	1.347	Pass	

4.Test waveform or photos:

230V50HZ



Inrush current Test		←
	Tested By：25.2V10A 252W	**Test date：2022/05/05**

1.Test condition:

Input voltage：230Vac
Input frequency：50Hz
Ambient temperature：25±5℃
Output Load：Full Load

2.Test equipment:

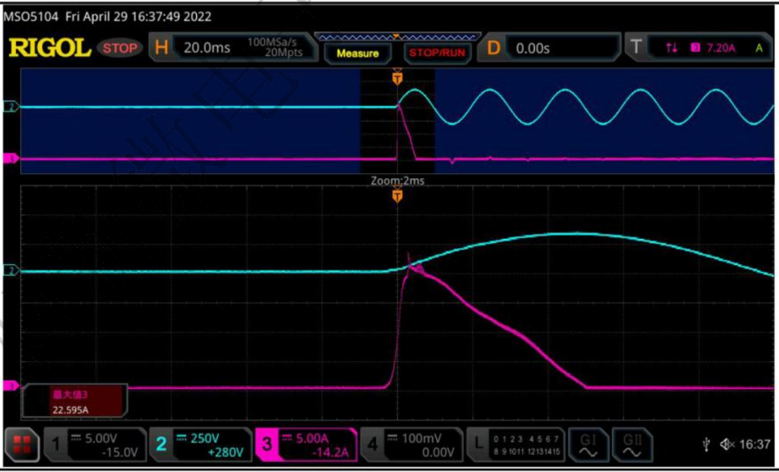
AC Source:	DPS1020 V100	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512A+	**Power meter:**	YOKOGAWA WT1800

3.Test result:

Test condition			SPEC			Test result			Judge	Note
AC Input		DC Load	Inrush Current(A)	Fuse I^2t (A^2S)	Bridge Rectifiers Ipeak (A&mS)	Inrush Current (A)	Fuse I^2t (A^2S)	Bridge Rectifiers Ipeak (A&mS)	Pass/Fail	
Vin	Fin									
230V	50Hz	Full load			201A@8.3mS	22.595			Pass	

4.Test waveform or photos:

230V50HZ


MSO5104 Fri April 29 16:37:49 2022
RIGOL
STOP
H 20.0ms
100MSa/s
20Mpts
Measure
STOP/RUN
D 0.00s
T
7.20A
A
Zoom:2ms
最大值3
22.595A
1 5.00V -15.0V
2 250V +280V
3 5.00A -14.2A
4 100mV 0.00V
L 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
GI
GII
16:37

Rise time Test		←
	Tested By：25.2V10A 252W	**Test date：2022/05/05**

1.Test condition:

Input voltage：115Vac
Input frequency：60Hz
Ambient temperature：25±5℃
Output Load：Full Load

2.Test equipment:

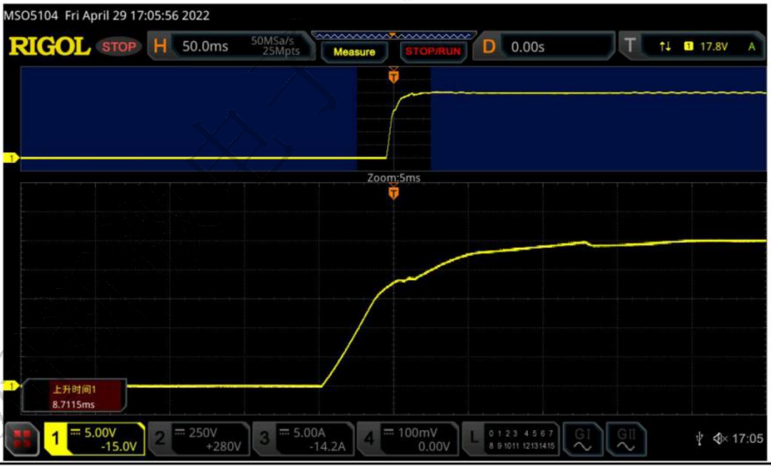
AC Source:	DPS1020_V100	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512A+	**Power meter:**	YOKOGAWA WT1800

3.Test result:

Test condition			SPEC	Test result (ms)	Judge	Note
AC Input		DC Load				
Vin	Fin			1#	Pass/Fail	
115V	60Hz	Full load	<10mS	8.7115	Pass	

4.Test waveform or photos:

115V 60HZ


MSO5104 Fri April 29 17:05:56 2022
RIGOL
STOP
H 50.0ms
50MSa/s
25Mpts
Measure
STOP/RUN
D 0.00s
T
17.8V
A
Zoom:5ms
上升时间1
8.7115ms
1 5.00V -15.0V
2 250V +280V
3 5.00A -14.2A
4 100mV 0.00V
L 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
GI
GII
17:05

Overshoot&Undershoot Test		←
	Tested By：25.2V10A 252W	**Test date：2022/05/05**

1.Test condition:

Input voltage：90Vac/264Vac
Input frequency：47Hz/63Hz
Ambient temperature：25±5℃
Output Load：Full Load

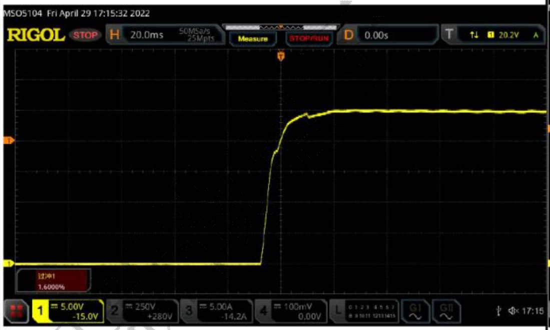
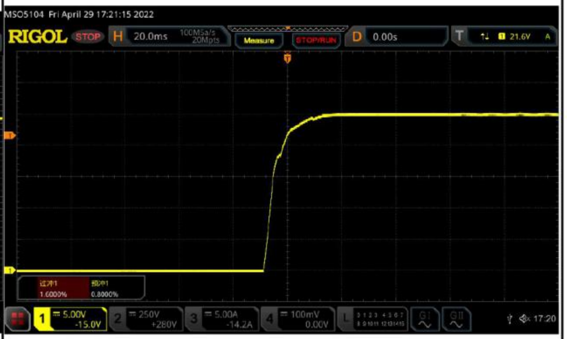
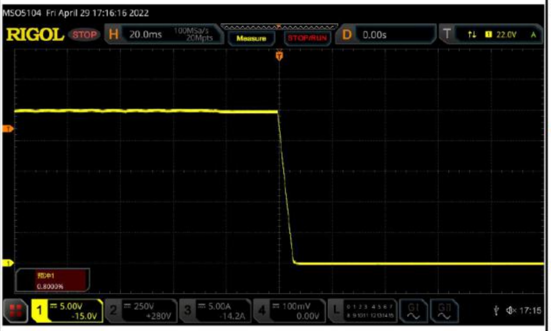
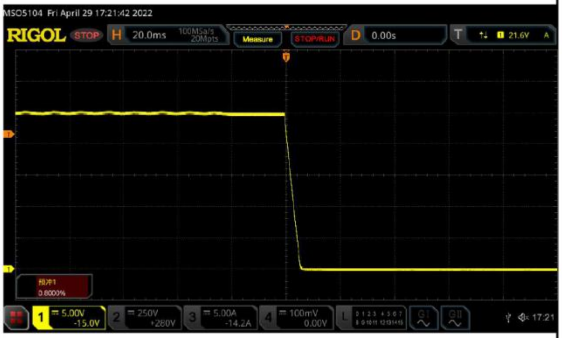
2.Test equipment:

AC Source:	DPS1020_V100	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512A+	**Power meter:**	YOKOGAWA WT1800

3.Test result:

Test Items	Test condition			SPEC	Test result (%)		Judge	Note
	AC Input		DC Load		1#	2#	Pass/Fail	
	Vin	Fin						
Overshoot	90V	63Hz	Full load	<10%	1.6		Pass	
	264V	47Hz			1.6		Pass	
Undershoot	90V	63Hz	Full load	＜5%	0.8		Pass	
	264V	47Hz			0.8		Pass	

4.Test waveform or photos:

Test Items	90V 60HZ	264V 47HZ
Overshoot	 MSO5104 Fri April 29 17:15:32 2022 RIGOL STOP H 20.0ms 50MSa/s 25Mpts Measure STOP/RUN D 0.00s T 20.2V A 过冲1 1.6000% 1 5.00V -15.0V 2 250V +280V 3 5.00A -14.2A 4 100mV 0.00V 17:15	 MSO5104 Fri April 29 17:21:15 2022 RIGOL STOP H 20.0ms 100MSa/s 20Mpts Measure STOP/RUN D 0.00s T 21.6V A 过冲1 1.6000% 预冲1 0.8000% 1 5.00V -15.0V 2 250V +280V 3 5.00A -14.2A 4 100mV 0.00V 17:20
Undershoot	 MSO5104 Fri April 29 17:16:16 2022 RIGOL STOP H 20.0ms 100MSa/s 20Mpts Measure STOP/RUN D 0.00s T 22.0V A 预冲1 0.8000% 1 5.00V -15.0V 2 250V +280V 3 5.00A -14.2A 4 100mV 0.00V 17:15	 MSO5104 Fri April 29 17:21:42 2022 RIGOL STOP H 20.0ms 100MSa/s 20Mpts Measure STOP/RUN D 0.00s T 21.6V A 预冲1 0.8000% 1 5.00V -15.0V 2 250V +280V 3 5.00A -14.2A 4 100mV 0.00V 17:21

Ripple voltage&noise Test

←

	Tested By：25.2V10A 252W	**Test date：2022/05/05**

1.Test condition:

Input voltage：115Vac/230Vac
Input frequency：50Hz/60Hz
Ambient temperature：25±5℃
Output Load：Full Load

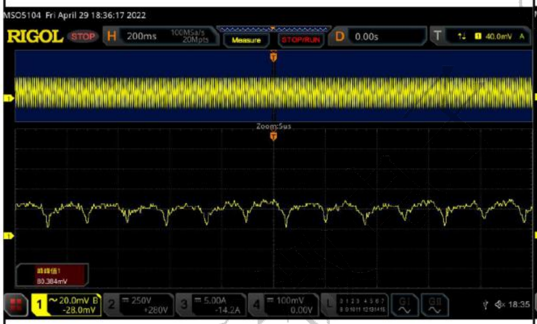
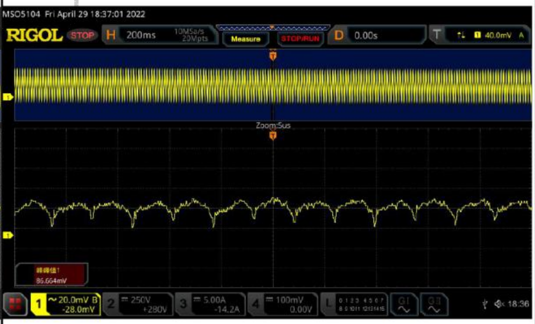
2.Test equipment:

AC Source:	DPS1020 V100	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512A+	**Power meter:**	YOKOGAWA WT1800

3.Test result:

Test condition			SPEC	Test result (mVp-p)		Judge	Note
AC Input		DC Load					
Vin	Fin			1#	2#	Pass/Fail	
115V	60Hz	Full load		80.384		Pass	
230V	50Hz			86.664		Pass	

4.Test waveform or photos:

115V 60HZ	230V 50HZ
	

MSO5104 Fri April 29 18:36:17 2022
RIGOL
STOP
H 200ms
100MSa/s 20Mpts
Measure
STOP/RUN
D 0.00s
T
40.0mV A
Zoom:5us
峰峰值1
80.384mV
1 ~20.0mV B -28.0mV
2 250V +280V
3 5.00A -14.2A
4 100mV 0.00V
18:35

MSO5104 Fri April 29 18:37:01 2022
RIGOL
STOP
H 200ms
10MSa/s 20Mpts
Measure
STOP/RUN
D 0.00s
T
40.0mV A
Zoom:5us
峰峰值1
86.664mV
1 ~20.0mV B -28.0mV
2 250V +280V
3 5.00A -14.2A
4 100mV 0.00V
18:36

Line&Load Regulation Test

←

	Tested By：25.2V10A 252W	Test date：2022/05/05

1.Test condition:

Input voltage：90Vac/264Vac
Input frequency：47Hz/63Hz
Ambient temperature：25±5℃
Output Load：Full Load

2.Test equipment:

AC Source:	DPS1020_V100	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512A+	**Power meter:**	YOKOGAWA WT1800

3.Test result:

Items **S/N**	**Input** **Load**	**90Vac**	**100Vac**	**240Vac**	**264Vac**	**Max.**	**Min.**	**Line Regulation**	**SPEC**			**Judge**
									Output voltage	**Load Regulation**	**Line Regulation**	**Pass/Fail**
1#	0%	24.892V	24.892V	24.882V	24.882V	/	/	/				
	25%	24.695V	24.635V	24.695V	24.635V	/	/	/				
	50%	24.508V	24.428V	24.498V	24.428V	/	/	/				
	75%	24.322V	24.322V	24.322V	24.322V	/	/	/				
	100%	24.120V	24.125V	24.125V	24.125V	0.00%	0.02%	0.02%				
Min.		1.58%	1.24%	1.52%	1.24%	/	/	/				
Max.		1.57%	1.90%	1.57%	1.86%	/	/	/				
Load Regulation		1.90%				/	/	/				

Over Current Protection Test

←

	Tested By：25.2V10A 252W	**Test date：2022/05/05**

1.Test condition:

Input voltage：90Vac/264Vac
Input frequency：47Hz/63Hz
Ambient temperature：25℃、40℃
Output Load：0A~OCP

2.Test equipment:

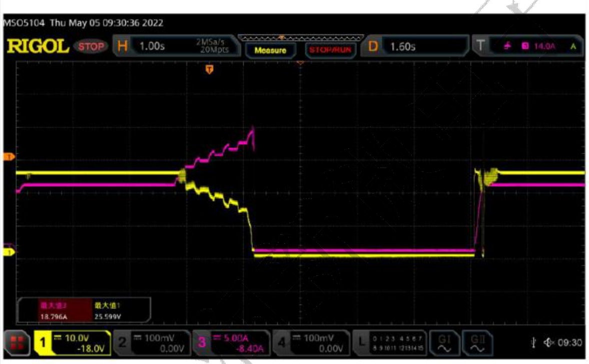
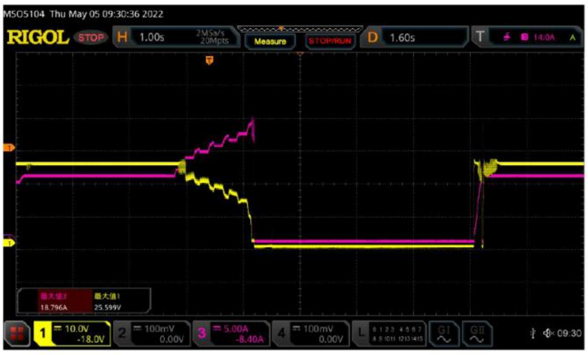
AC Source:	DPS1020_V100	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512A+	**Power meter:**	PF9800

3.Test result:

3.1 25℃Test

Test condition			**SPEC**	**Test result**			**Judge**	**Note**
AC Input		**DC Load**		**1#**		**2#**		
Vin	**Fin**			**Current (A)**	**Protection mode**	**Protection mode**	**Pass/Fail**	
90V	63Hz	0A~OCP	20A	18.796	Hiccup→Self-recovery	constant power→chopping current	Pass	
264V	47Hz			18.796	Hiccup→Self-recovery		Pass	

4.Test waveform or photos:

90V 60HZ	**264V 47HZ**
	

Short Circuit Protection Test		←
	Tested By：25.2V10A 252W	**Test date：2022/05/05**

1.Test condition:

Input voltage：90Vac/264Vac
Input frequency：47Hz/63Hz
Ambient temperature：25±5℃
Output Load：Short

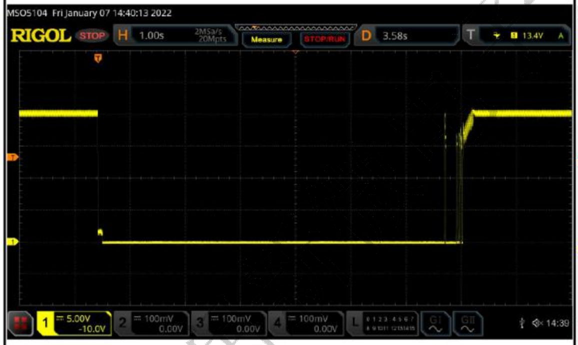
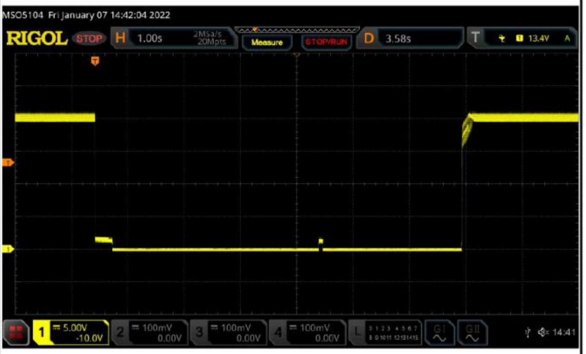
2.Test equipment:

AC Source:	DPS1020 V100	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512A+	**Power meter:**	YOKOGAWA WT1800

3.Test result:

Test condition			SPEC	Test result		Judge	Note
AC Input		DC Load		1#			
Vin	Fin			Power (W)	Protection mode	Pass/Fail	
90V	63Hz	short		252W	Hiccup→Self-recovery	Pass	
264V	47Hz			252W	Hiccup→Self-recovery	Pass	

4.Test waveform or photos:

90V60HZ	264V47HZ
	

MSO5104 Fri January 07 14:40:13 2022
RIGOL
STOP
H 1.00s
2MSa/s 20Mpts
Measure
STOP/RUN
D 3.58s
T
13.4V
1 5.00V -10.0V
2 100mV 0.00V
3 100mV 0.00V
4 100mV 0.00V
14:39

MSO5104 Fri January 07 14:42:04 2022
RIGOL
STOP
H 1.00s
2MSa/s 20Mpts
Measure
STOP/RUN
D 3.58s
T
13.4V
1 5.00V -10.0V
2 100mV 0.00V
3 100mV 0.00V
4 100mV 0.00V
14:41

Over Temperature Protection Test

←

Tested By：25.2V10A 252W

Test date：2022/05/05

1.Test condition:

Input voltage：90Vac/264Vac
Input frequency：47Hz/63Hz
Ambient temperature：Rated temperature→OTP
Output Load：Full Load
(During testing, the UUT needs to be wrapped by a blanket tightly and evenly.)

2.Test equipment:

AC Source:	DPS1020_V100	**Temperature humidity chamber:**	
DC Load:	IT8512A+	**Thermograph:**	KEYSIGHT 34970A

3.Test result:

Test condition	**Input Voltage**	**90V**	**264V**			**Spec**		**Judge**	**Note**
	Output Load	**Full Load**				**Rated value**	**De-rating**	**Pass/Fail**	
	Ambient temperature	**35.0°C**	**35.0°C**						
	Test Time	**2H**	**2H**		**2H**				
Location	**Description**	**Measure data(℃)**							
RV1	压敏电阻	94	80						灌胶工艺
LF1	共模电感	114	77						
L5	差模电感	110	76						
L3	线圈	117	91.2						
L3	磁芯	112	93.07						
C8	输入电容	103	91						
C2	输入电容	104	92						
L4	线圈	113	95.67						
L4	磁芯	111	92.98						
C40	VCC电容	103	93						
CY3	Y电容	104	98						
OP1	光耦	102	97						
T1	线圈	118	97.13						
T1	磁芯	110	95.68						
C16	输出电容	103	93.81						
Q1	XG65T125	120	96.95						
Q18	XG65T230	114	100.34						

EMI Test		←
	Tested By：25.2V10A 252W	**Test date：2022/05/05**

1.Test condition:

Input voltage：115Vac/230Vac
Input frequency：50Hz/60Hz
Ambient temperature：25±5℃
Output Load：Full Load

2.Test equipment:

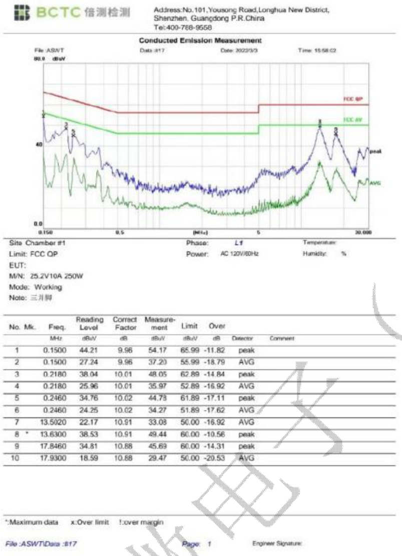
EMI equipment:			
DC Load:	cement resistor		

3.Test result:

Mode	110V	230V

Conduction-L

110V


FCC QP
FCC AV
peak
AVG
80.0 dBuV
40
0.0
0.150
0.5
(MHz)
5
30.000

BCTC 倍测检测
Address:No.101,Yousong Road,Longhua New District,
Shenzhen, Guangdong P.R.China
Tel:400-788-9558

Conducted Emission Measurement
File :ASWT Data :#17 Date: 2022/3/3 Time: 15:58:02

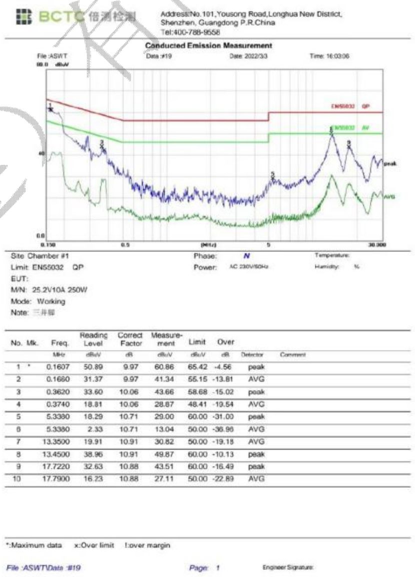
Site Chamber #1 Phase: L1 Temperature:
Limit: FCC QP Power: AC 120V/60Hz Humidity: %
EUT:
M/N: 25.2V10A 250W
Mode: Working
Note: 三井脚

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure-ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	44.21	9.96	54.17	65.99	-11.82	peak	
2		0.1500	27.24	9.96	37.20	55.99	-18.79	AVG	
3		0.2180	38.04	10.01	48.05	62.89	-14.84	peak	
4		0.2180	25.96	10.01	35.97	52.89	-16.92	AVG	
5		0.2460	34.76	10.02	44.78	61.89	-17.11	peak	
6		0.2460	24.25	10.02	34.27	51.89	-17.62	AVG	
7		13.5020	22.17	10.91	33.08	50.00	-16.92	AVG	
8	*	13.6300	38.53	10.91	49.44	60.00	-10.56	peak	
9		17.8460	34.81	10.88	45.69	60.00	-14.31	peak	
10		17.9300	18.59	10.88	29.47	50.00	-20.53	AVG	

*:Maximum data x:Over limit !:over margin

File :ASWT\Data :#17 Page: 1 Engineer Signature:

230V


EN55032 QP
EN55032 AV
peak
AVG
80.0 dBuV
40
0.0
0.150
0.5
(MHz)
5
30.000

BCTC 倍测检测
Address:No.101,Yousong Road,Longhua New District,
Shenzhen, Guangdong P.R.China
Tel:400-788-9558

Conducted Emission Measurement
File :ASWT Data :#19 Date: 2022/3/3 Time: 16:03:06

Site Chamber #1 Phase: N Temperature:
Limit: EN55032 QP Power: AC 230V/50Hz Humidity: %
EUT:
M/N: 25.2V10A 250W
Mode: Working
Note: 三井脚

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure-ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1607	50.89	9.97	60.86	65.42	-4.56	peak	
2		0.1660	31.37	9.97	41.34	55.15	-13.81	AVG	
3		0.3620	33.60	10.06	43.66	58.68	-15.02	peak	
4		0.3740	18.81	10.06	28.87	48.41	-19.54	AVG	
5		5.3380	18.29	10.71	29.00	60.00	-31.00	peak	
6		5.3380	2.33	10.71	13.04	50.00	-36.96	AVG	
7		13.3500	19.91	10.91	30.82	50.00	-19.18	AVG	
8		13.4500	38.96	10.91	49.87	60.00	-10.13	peak	
9		17.7220	32.63	10.88	43.51	60.00	-16.49	peak	
10		17.7900	16.23	10.88	27.11	50.00	-22.89	AVG	

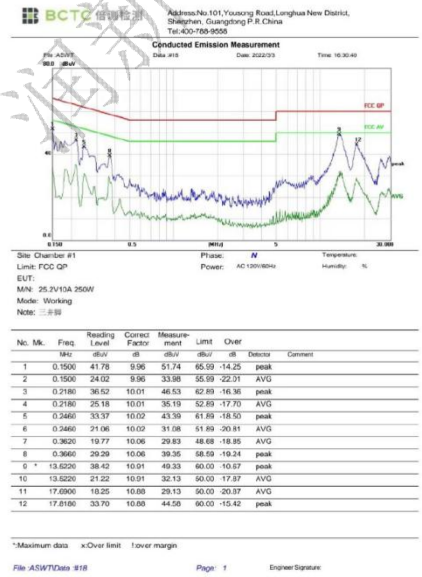
*:Maximum data x:Over limit !:over margin

File :ASWT\Data :#19 Page: 1 Engineer Signature:

Mode	110V	230V

Conduction-N

110V


FCC QP
FCC AV
peak
AVG
80.0 dBuV
40
0.0
0.150
0.5
(MHz)
5
30.000

BCTC 倍测检测
Address:No.101,Yousong Road,Longhua New District,
Shenzhen, Guangdong P.R.China
Tel:400-788-9558

Conducted Emission Measurement
File :ASWT Data :#18 Date: 2022/3/3 Time: 16:30:40

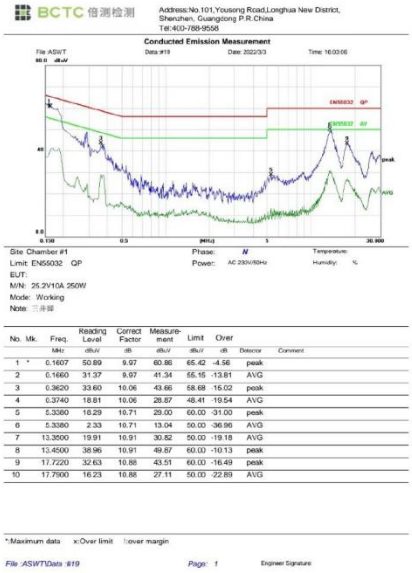
Site Chamber #1 Phase: N Temperature:
Limit: FCC QP Power: AC 120V/60Hz Humidity: %
EUT:
M/N: 25.2V10A 250W
Mode: Working
Note: 三井脚

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure-ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	41.78	9.96	51.74	65.99	-14.25	peak	
2		0.1500	24.02	9.96	33.98	55.99	-22.01	AVG	
3		0.2180	36.52	10.01	46.53	62.89	-16.36	peak	
4		0.2180	25.18	10.01	35.19	52.89	-17.70	AVG	
5		0.2460	33.37	10.02	43.39	61.89	-18.50	peak	
6		0.2460	21.06	10.02	31.08	51.89	-20.81	AVG	
7		0.3620	19.77	10.06	29.83	48.68	-18.85	AVG	
8		0.3660	29.29	10.06	39.35	58.59	-19.24	peak	
9	*	13.5220	38.42	10.91	49.33	60.00	-10.67	peak	
10		13.5220	21.22	10.91	32.13	50.00	-17.87	AVG	
11		17.6900	18.25	10.88	29.13	50.00	-20.87	AVG	
12		17.8180	33.70	10.88	44.58	60.00	-15.42	peak	

*:Maximum data x:Over limit !:over margin

File :ASWT\Data :#18 Page: 1 Engineer Signature:

230V


EN55032 QP
EN55032 AV
peak
AVG
80.0 dBuV
40
0.0
0.150
0.5
(MHz)
5
30.000

BCTC 倍测检测
Address:No.101,Yousong Road,Longhua New District,
Shenzhen, Guangdong P.R.China
Tel:400-788-9558

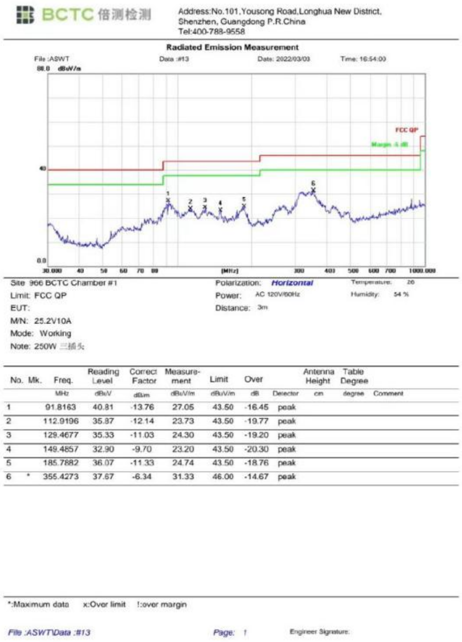
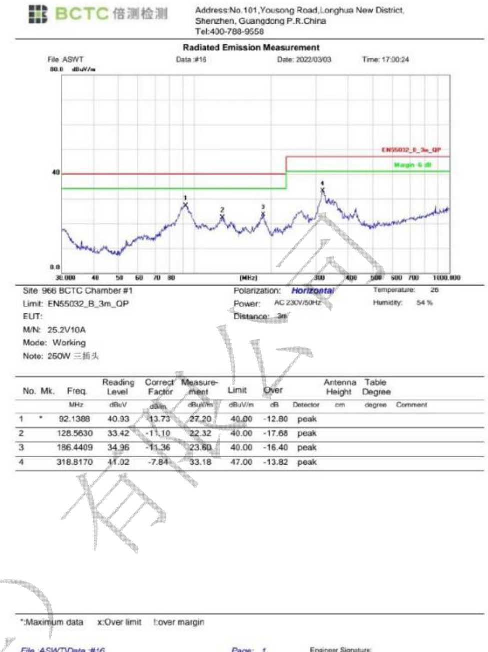
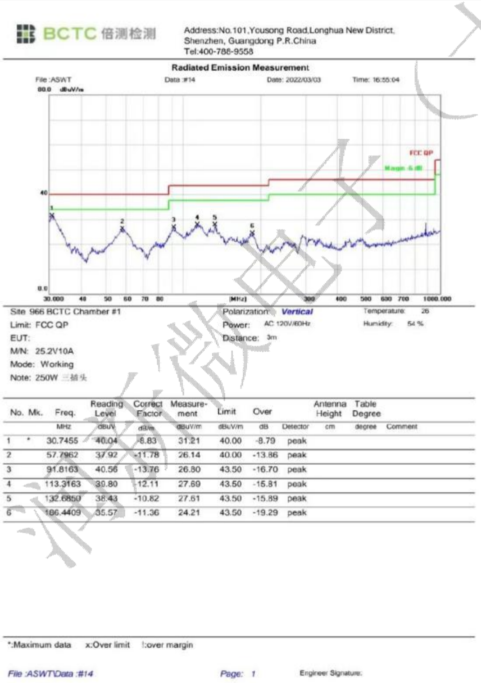
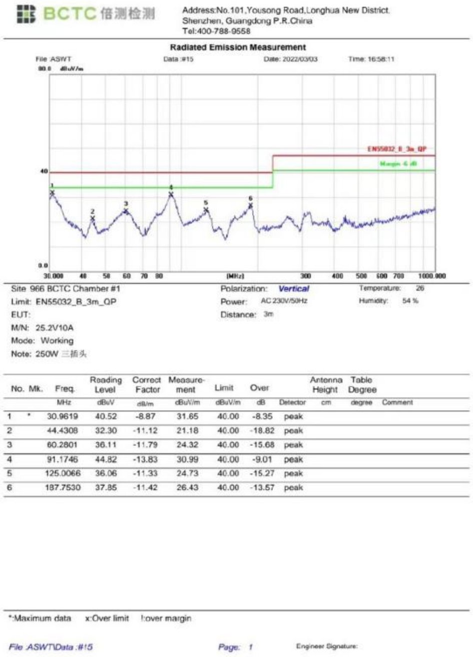
Conducted Emission Measurement
File :ASWT Data :#19 Date: 2022/3/3 Time: 16:03:06

Site Chamber #1 Phase: N Temperature:
Limit: EN55032 QP Power: AC 230V/50Hz Humidity: %
EUT:
M/N: 25.2V10A 250W
Mode: Working
Note: 三井脚

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure-ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	0.1607	50.89	9.97	60.86	65.42	-4.56	peak	
2		0.1660	31.37	9.97	41.34	55.15	-13.81	AVG	
3		0.3620	33.60	10.06	43.66	58.68	-15.02	peak	
4		0.3740	18.81	10.06	28.87	48.41	-19.54	AVG	
5		5.3380	18.29	10.71	29.00	60.00	-31.00	peak	
6		5.3380	2.33	10.71	13.04	50.00	-36.96	AVG	
7		13.3500	19.91	10.91	30.82	50.00	-19.18	AVG	
8		13.4500	38.96	10.91	49.87	60.00	-10.13	peak	
9		17.7220	32.63	10.88	43.51	60.00	-16.49	peak	
10		17.7900	16.23	10.88	27.11	50.00	-22.89	AVG	

*:Maximum data x:Over limit !:over margin

File :ASWT\Data :#19 Page: 1 Engineer Signature:

Mode	120V	230V
Radiation-Horizontal		
Mode	**120V**	**230V**
Radiation-Vertical		

Radiation-Horizontal, 120V

BCTC 倍测检测 Address:No.101,Yousong Road,Longhua New District,
Shenzhen, Guangdong P.R.China
Tel:400-788-9558

Radiated Emission Measurement

File :ASWT　Data :#13　Date: 2022/03/03　Time: 16:54:00

Site 966 BCTC Chamber #1　Polarization: *Horizontal*　Temperature: 26
Limit: FCC QP　Power: AC 120V/60Hz　Humidity: 54 %
EUT:　Distance: 3m
M/N: 25.2V10A
Mode: Working
Note: 250W 三插头

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		91.8163	40.81	-13.76	27.05	43.50	-16.45	peak			
2		112.9196	35.87	-12.14	23.73	43.50	-19.77	peak			
3		129.4677	35.33	-11.03	24.30	43.50	-19.20	peak			
4		149.4857	32.90	-9.70	23.20	43.50	-20.30	peak			
5		185.7882	36.07	-11.33	24.74	43.50	-18.76	peak			
6	*	355.4273	37.67	-6.34	31.33	46.00	-14.67	peak			

*:Maximum data　x:Over limit　!:over margin

File :ASWT\Data :#13　*Page: 1*　Engineer Signature:

Radiation-Horizontal, 230V

BCTC 倍测检测 Address:No.101,Yousong Road,Longhua New District,
Shenzhen, Guangdong P.R.China
Tel:400-788-9558

Radiated Emission Measurement

File :ASWT　Data :#16　Date: 2022/03/03　Time: 17:00:24

Site 966 BCTC Chamber #1　Polarization: *Horizontal*　Temperature: 26
Limit: EN55032_B_3m_QP　Power: AC 230V/50Hz　Humidity: 54 %
EUT:　Distance: 3m
M/N: 25.2V10A
Mode: Working
Note: 250W 三插头

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	92.1388	40.93	-13.73	27.20	40.00	-12.80	peak			
2		128.5630	33.42	-11.10	22.32	40.00	-17.68	peak			
3		186.4409	34.96	-11.36	23.60	40.00	-16.40	peak			
4		318.8170	41.02	-7.84	33.18	47.00	-13.82	peak			

*:Maximum data　x:Over limit　!:over margin

File :ASWT\Data :#16　*Page: 1*　Engineer Signature:

Radiation-Vertical, 120V

BCTC 倍测检测 Address:No.101,Yousong Road,Longhua New District,
Shenzhen, Guangdong P.R.China
Tel:400-788-9558

Radiated Emission Measurement

File :ASWT　Data :#14　Date: 2022/03/03　Time: 16:55:04

Site 966 BCTC Chamber #1　Polarization: *Vertical*　Temperature: 26
Limit: FCC QP　Power: AC 120V/60Hz　Humidity: 54 %
EUT:　Distance: 3m
M/N: 25.2V10A
Mode: Working
Note: 250W 三插头

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	30.7455	40.04	-8.83	31.21	40.00	-8.79	peak			
2		57.7962	37.92	-11.78	26.14	40.00	-13.86	peak			
3		91.8163	40.56	-13.76	26.80	43.50	-16.70	peak			
4		113.3163	39.80	-12.11	27.69	43.50	-15.81	peak			
5		132.6850	38.43	-10.82	27.61	43.50	-15.89	peak			
6		186.4409	35.57	-11.36	24.21	43.50	-19.29	peak			

*:Maximum data　x:Over limit　!:over margin

File :ASWT\Data :#14　*Page: 1*　Engineer Signature:

Radiation-Vertical, 230V

BCTC 倍测检测 Address:No.101,Yousong Road,Longhua New District,
Shenzhen, Guangdong P.R.China
Tel:400-788-9558

Radiated Emission Measurement

File :ASWT　Data :#15　Date: 2022/03/03　Time: 16:58:11

Site 966 BCTC Chamber #1　Polarization: *Vertical*　Temperature: 26
Limit: EN55032_B_3m_QP　Power: AC 230V/50Hz　Humidity: 54 %
EUT:　Distance: 3m
M/N: 25.2V10A
Mode: Working
Note: 250W 三插头

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	30.9619	40.52	-8.87	31.65	40.00	-8.35	peak			
2		44.4308	32.30	-11.12	21.18	40.00	-18.82	peak			
3		60.2801	36.11	-11.79	24.32	40.00	-15.68	peak			
4		91.1746	44.82	-13.83	30.99	40.00	-9.01	peak			
5		125.0066	36.06	-11.33	24.73	40.00	-15.27	peak			
6		187.7530	37.85	-11.42	26.43	40.00	-13.57	peak			

*:Maximum data　x:Over limit　!:over margin

File :ASWT\Data :#15　*Page: 1*　Engineer Signature:

Components De-rating Test		←
	Tested By：25.2V10A 252W	**Test date：2022/05/05**

1.Test condition:

Input voltage：90Vac/264Vac
Input frequency：47Hz/63Hz
Ambient temperature：25±5℃
Output Load：Full Load

2.Test equipment:

AC Source:	DPS1020_V100	**Oscilloscope:**	RIGOL MSO5204
DC Load:	IT8512+	**Power meter:**	YOKOGAWA WT1800

3.Test result:

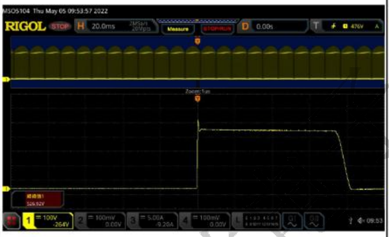
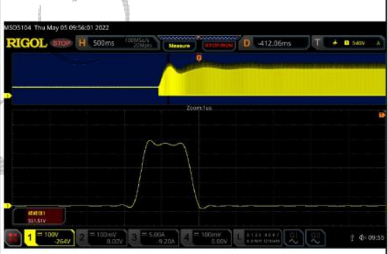
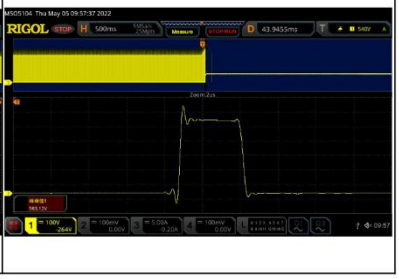
1).Input：90Vac/47Hz

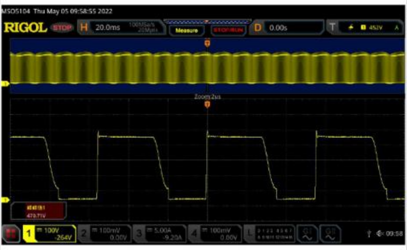
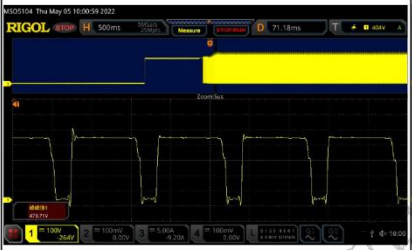
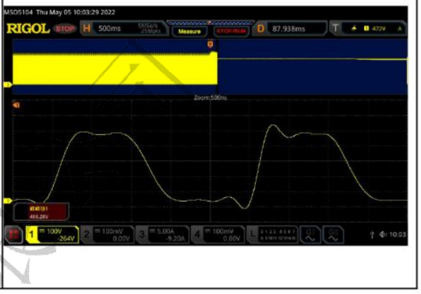
MOSFET			Component Spec				Test result										Judge	Note
							Voltage(Vmax)											
Location	Model&Type	Supplier	Vds (V)	Vgs (V)	ID (A)	IDM (A)	Normal mode	De-rating	Startup mode	De-rating	SCP &OCP	De-rating					Pass/Fail	
Q1	XG65T125HS1B		650	20	17	31	526	80.92%	551	84.77%	583	89.69%					Pass	
Q18	XG65T230HS1B		650	20	11	31	432	66.46%	460	70.77%	537	82.62%					Pass	
Q19	CR036N08N3		85	20	128	512	65.14	76.64%	64.98	76.45%	67.588	79.52%					Pass	

2).Input：264Vac/63Hz

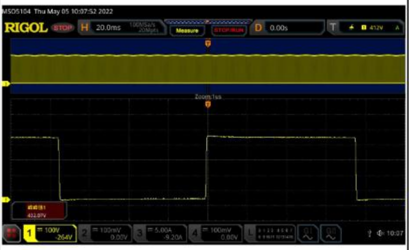
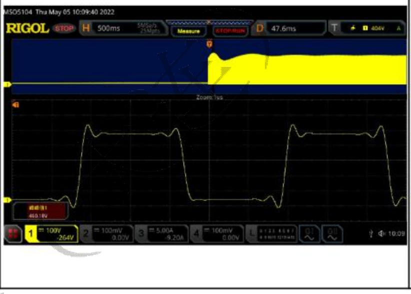
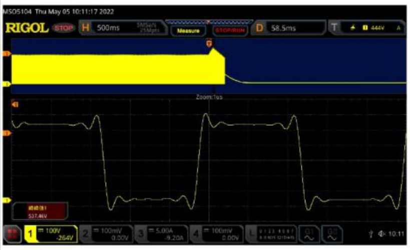
MOSFET			Component Spec				Test result										Judge	Note
							Voltage(Vmax)											
Location	Model&Type	Supplier	Vds (V)	Vgs (V)	ID (A)	IDM (A)	Normal mode	De-rating	Startup mode	De-rating	SCP &OCP	De-rating					Pass/Fail	
Q1	XG65T125HS1B		650	20	17	31	470.71	72.42%	470	72.31%	488	75.08%					Pass	
Q18	XG65T230HS1B		650	20	11	31	428	65.85%	432	66.46%	495	76.15%					Pass	
Q19	CR036N08N3		85	20	128	512	65	76.47%	65	76.47%	66	77.65%					Pass	

4.Test waveform or photos:

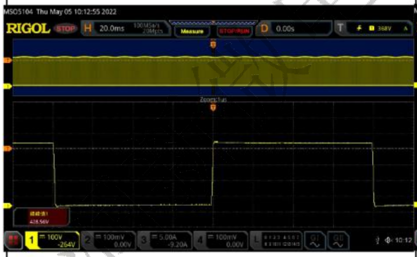
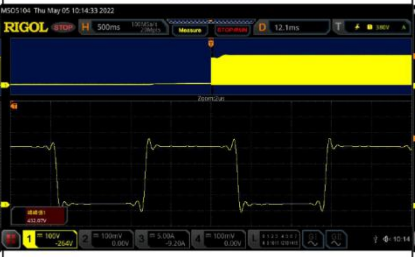
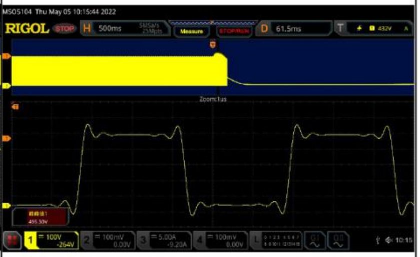
Location	Input	Voltage&Current		
		Normal mode	Startup mode	SCP mode
Q1	90V			

Location	Input	Voltage&Current		
		Normal mode	Startup mode	SCP mode
Q1	264V	 MSO5104 Thu May 05 09:58:55 2022 RIGOL STOP H 20.0ms D 0.00s	 MSO5104 Thu May 05 10:00:59 2022 RIGOL STOP H 500ms D 71.18ms	 MSO5104 Thu May 05 10:03:29 2022 RIGOL STOP H 500ms D 87.938ms

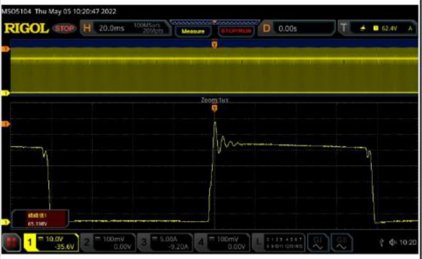
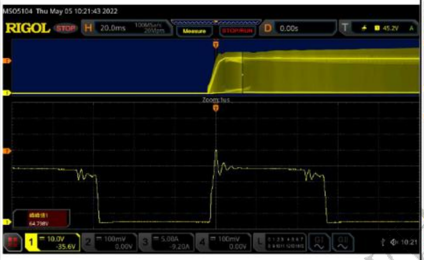
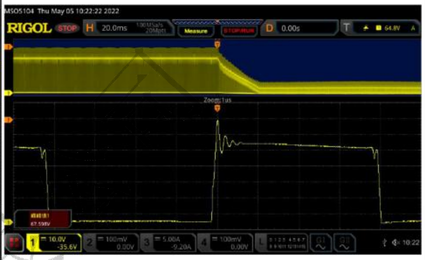
5.Test waveform or photos:

Location	Input	Voltage&Current		
		Normal mode	Startup mode	SCP mode
Q18	90V	 MSO5104 Thu May 05 10:07:52 2022 RIGOL STOP H 20.0ms D 0.00s	 MSO5104 Thu May 05 10:09:40 2022 RIGOL STOP H 500ms D 47.6ms	 MSO5104 Thu May 05 10:11:17 2022 RIGOL STOP H 500ms D 58.5ms

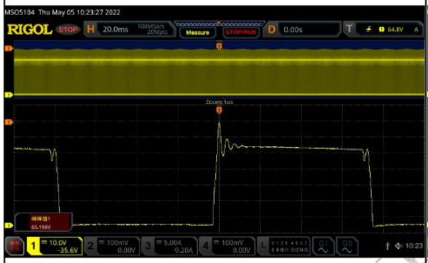
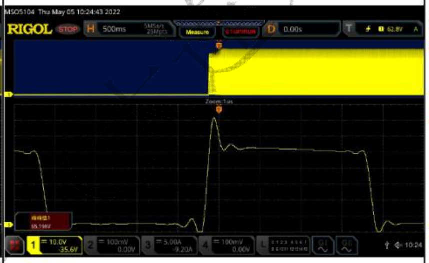
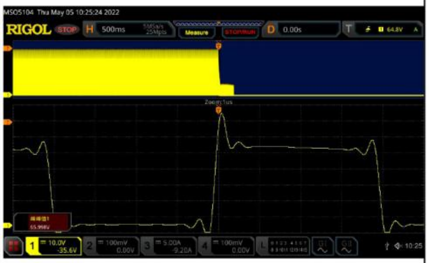
6.Test waveform or photos:

Location	Input	Voltage&Current		
		Normal mode	Startup mode	SCP mode
Q18	264V	 MSO5104 Thu May 05 10:12:55 2022 RIGOL STOP H 20.0ms D 0.00s	 MSO5104 Thu May 05 10:14:33 2022 RIGOL STOP H 500ms D 12.1ms	 MSO5104 Thu May 05 10:15:44 2022 RIGOL STOP H 500ms D 61.5ms

7.Test waveform or photos:

Location	Input	Voltage&Current		
		Normal mode	Startup mode	
Q2	90V			

8.Test waveform or photos:

Location	Input	Voltage&Current		
		Normal mode		
Q2	264V			

五、主要器件资料

5.1 氮化镓 MOS

650V GaN Power Transistor (FET)

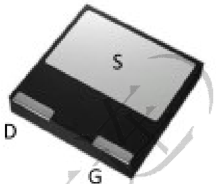
Features

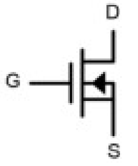
- Easy to use, compatible with standard gate drivers
- Excellent Q_G x $R_{DS(on)}$ figure of merit (FOM)
- Low Q_{RR}, no free-wheeling diode required
- Low switching loss
- RoHS compliant and Halogen-free

Product Summary		
V_{DSS}	650	V
$R_{DS(on),\ typ}$	120	mΩ
$Q_{G,\ typ}$	38	nC
$Q_{RR,\ typ}$	26	nC

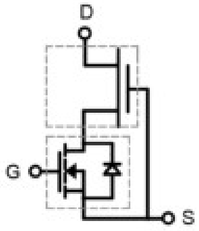
Applications

- High efficiency power supplies
- Telecom and datacom
- Automotive
- Servo motors





Schematic Symbol



Cascode Device Structure

Packaging

Part Number	Package	Packaging	Base QTY
RX65T125HS2A	DFN 8 x 8	Tape and Reel	2500

Maximum ratings, at T_C=25 °C, unless otherwise specified

Symbol	Parameter		Limit Value	Unit
I_D	Continuous drain current @T_C=25°C		18	A
	Continuous drain current @T_C=100°C		11.5	A
I_{DM}	Pulsed drain current @T_C=25°C (pulse width: 10us)		80	A
	Pulsed drain current @T_C=150°C (pulse width: 10us)		58	A
V_{DSS}	Drain to source voltage (T_J = -55°C to 150°C)		650	V
V_{TDSS}	Transient drain to source voltage [a]		800	V
V_{GSS}	Gate to source voltage		±20	V
P_D	Maximum power dissipation @T_C=25°C		67.5	W
T_C	Operating temperature	Case	-55 to 150	°C
T_J		Junction	-55 to 150	°C
T_S	Storage temperature		-55 to 150	°C
T_{CSOLD}	Soldering peak temperature		260	°C

650V GaN Power Transistor (FET)

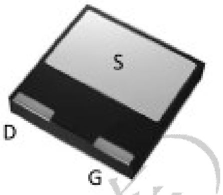
Features

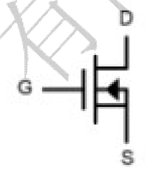
- Easy to use, compatible with standard gate drivers
- Excellent Q_G x $R_{DS(on)}$ figure of merit (FOM)
- Low Q_{RR}, no free-wheeling diode required
- Low switching loss
- RoHS compliant and Halogen-free

Product Summary		
V_{DSS}	650	V
$R_{DS(on), typ}$	240	mΩ
$Q_{G, typ}$	21.5	nC
$Q_{RR, typ}$	39	nC

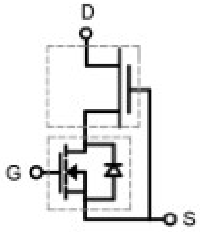
Applications

- High efficiency power supplies
- High efficiency USB PD adapters
- Other consumer electronics





Schematic Symbol



Cascode
Device Structure

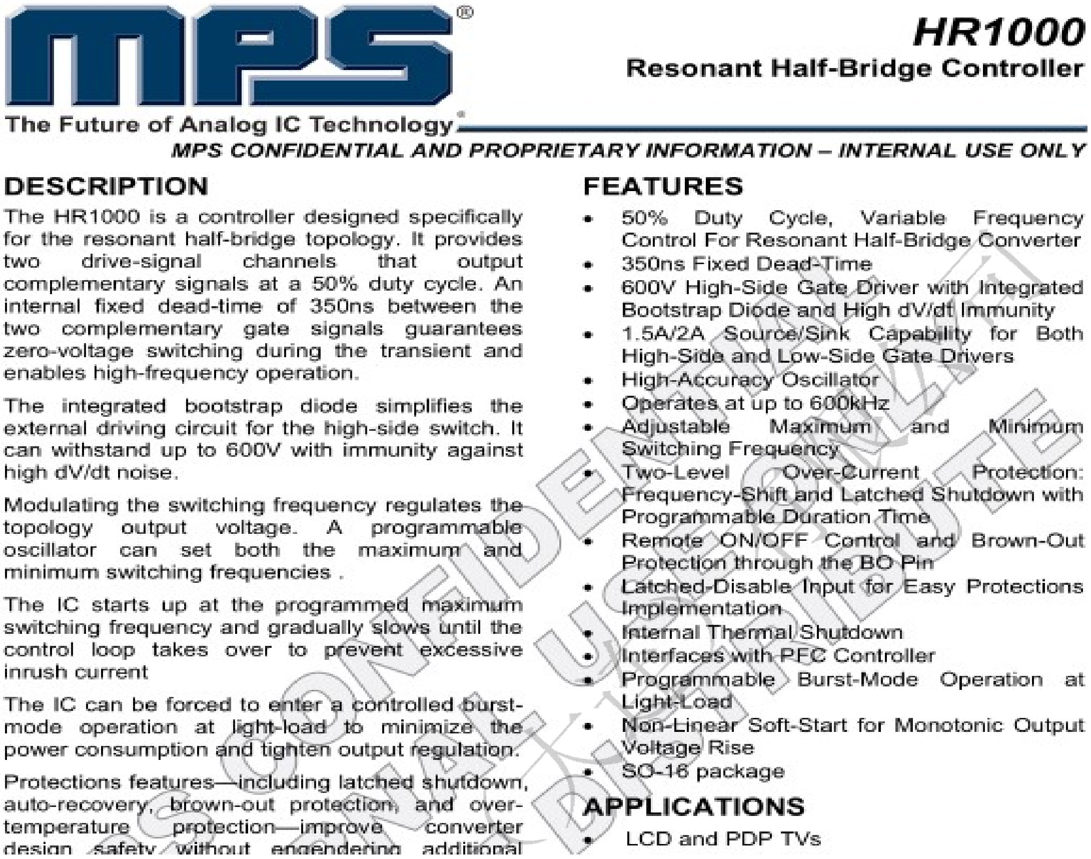
Packaging

Part Number	Package	Packaging	Base QTY
RX65T300HS2A	DFN 8 x 8	Tape and Reel	2500

Maximum ratings, at T_C=25 °C, unless otherwise specified

Symbol	Parameter		Limit Value	Unit
I_D	Continuous drain current @T_C=25°C		9	A
	Continuous drain current @T_C=100°C		6	A
I_{DM}	Pulsed drain current @T_C=25°C (pulse width: 10us)		31	A
	Pulsed drain current @T_C=150°C (pulse width: 10us)		23	A
V_{DSS}	Drain to source voltage (T_J = -55°C to 150°C)		650	V
V_{TDSS}	Transient drain to source voltage [a]		800	V
V_{GSS}	Gate to source voltage		±20	V
P_D	Maximum power dissipation @T_C=25°C		38	W
T_C	Operating temperature	Case	-55 to 150	°C
T_J		Junction	-55 to 150	°C
T_S	Storage temperature		-55 to 150	°C
T_{CSOLD}	Soldering peak temperature		260	°C

5.2 PWM 控制芯片



HR1000

Resonant Half-Bridge Controller

The Future of Analog IC Technology

MPS CONFIDENTIAL AND PROPRIETARY INFORMATION – INTERNAL USE ONLY

DESCRIPTION

The HR1000 is a controller designed specifically for the resonant half-bridge topology. It provides two drive-signal channels that output complementary signals at a 50% duty cycle. An internal fixed dead-time of 350ns between the two complementary gate signals guarantees zero-voltage switching during the transient and enables high-frequency operation.

The integrated bootstrap diode simplifies the external driving circuit for the high-side switch. It can withstand up to 600V with immunity against high dV/dt noise.

Modulating the switching frequency regulates the topology output voltage. A programmable oscillator can set both the maximum and minimum switching frequencies .

The IC starts up at the programmed maximum switching frequency and gradually slows until the control loop takes over to prevent excessive inrush current

The IC can be forced to enter a controlled burst-mode operation at light-load to minimize the power consumption and tighten output regulation.

Protections features—including latched shutdown, auto-recovery, brown-out protection, and over-temperature protection—improve converter design safety without engendering additional

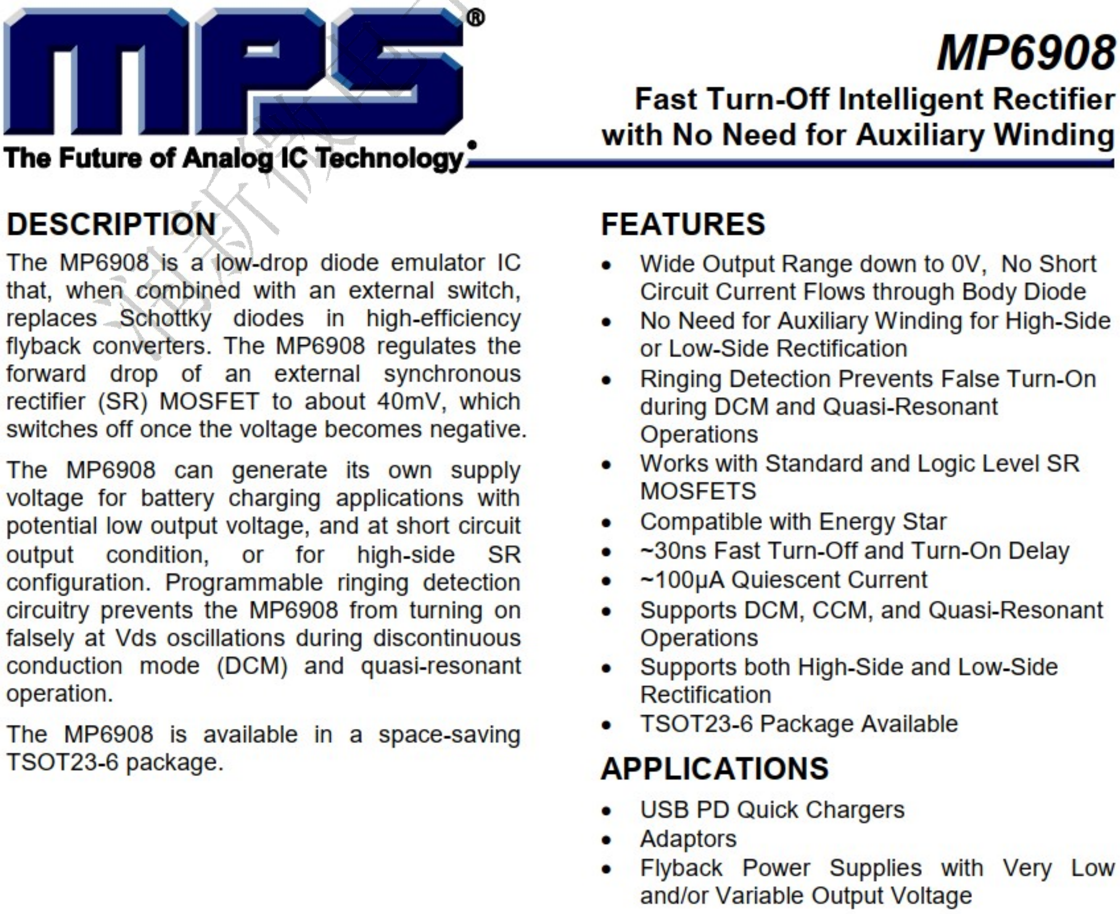
FEATURES

- 50% Duty Cycle, Variable Frequency Control For Resonant Half-Bridge Converter
- 350ns Fixed Dead-Time
- 600V High-Side Gate Driver with Integrated Bootstrap Diode and High dV/dt Immunity
- 1.5A/2A Source/Sink Capability for Both High-Side and Low-Side Gate Drivers
- High-Accuracy Oscillator
- Operates at up to 600kHz
- Adjustable Maximum and Minimum Switching Frequency
- Two-Level Over-Current Protection: Frequency-Shift and Latched Shutdown with Programmable Duration Time
- Remote ON/OFF Control and Brown-Out Protection through the BO Pin
- Latched-Disable Input for Easy Protections Implementation
- Internal Thermal Shutdown
- Interfaces with PFC Controller
- Programmable Burst-Mode Operation at Light-Load
- Non-Linear Soft-Start for Monotonic Output Voltage Rise
- SO-16 package

APPLICATIONS

- LCD and PDP TVs

5.3 SR 制芯片



MP6908

Fast Turn-Off Intelligent Rectifier with No Need for Auxiliary Winding

The Future of Analog IC Technology

DESCRIPTION

The MP6908 is a low-drop diode emulator IC that, when combined with an external switch, replaces Schottky diodes in high-efficiency flyback converters. The MP6908 regulates the forward drop of an external synchronous rectifier (SR) MOSFET to about 40mV, which switches off once the voltage becomes negative.

The MP6908 can generate its own supply voltage for battery charging applications with potential low output voltage, and at short circuit output condition, or for high-side SR configuration. Programmable ringing detection circuitry prevents the MP6908 from turning on falsely at Vds oscillations during discontinuous conduction mode (DCM) and quasi-resonant operation.

The MP6908 is available in a space-saving TSOT23-6 package.

FEATURES

- Wide Output Range down to 0V, No Short Circuit Current Flows through Body Diode
- No Need for Auxiliary Winding for High-Side or Low-Side Rectification
- Ringing Detection Prevents False Turn-On during DCM and Quasi-Resonant Operations
- Works with Standard and Logic Level SR MOSFETS
- Compatible with Energy Star
- ~30ns Fast Turn-Off and Turn-On Delay
- ~100µA Quiescent Current
- Supports DCM, CCM, and Quasi-Resonant Operations
- Supports both High-Side and Low-Side Rectification
- TSOT23-6 Package Available

APPLICATIONS

- USB PD Quick Chargers
- Adaptors
- Flyback Power Supplies with Very Low and/or Variable Output Voltage