PN8610 12V2A 六级能效

多模式（ **QR-PWM+QR-PFM+Burst-Mode** ）

专利高压启动模块+低工作电流

超低待机功耗小于65mW

六级能效裕量充足，消除异音

零炸机风险

KCS 宽诚

Global Integrated Circuit Company

General Design Specification:

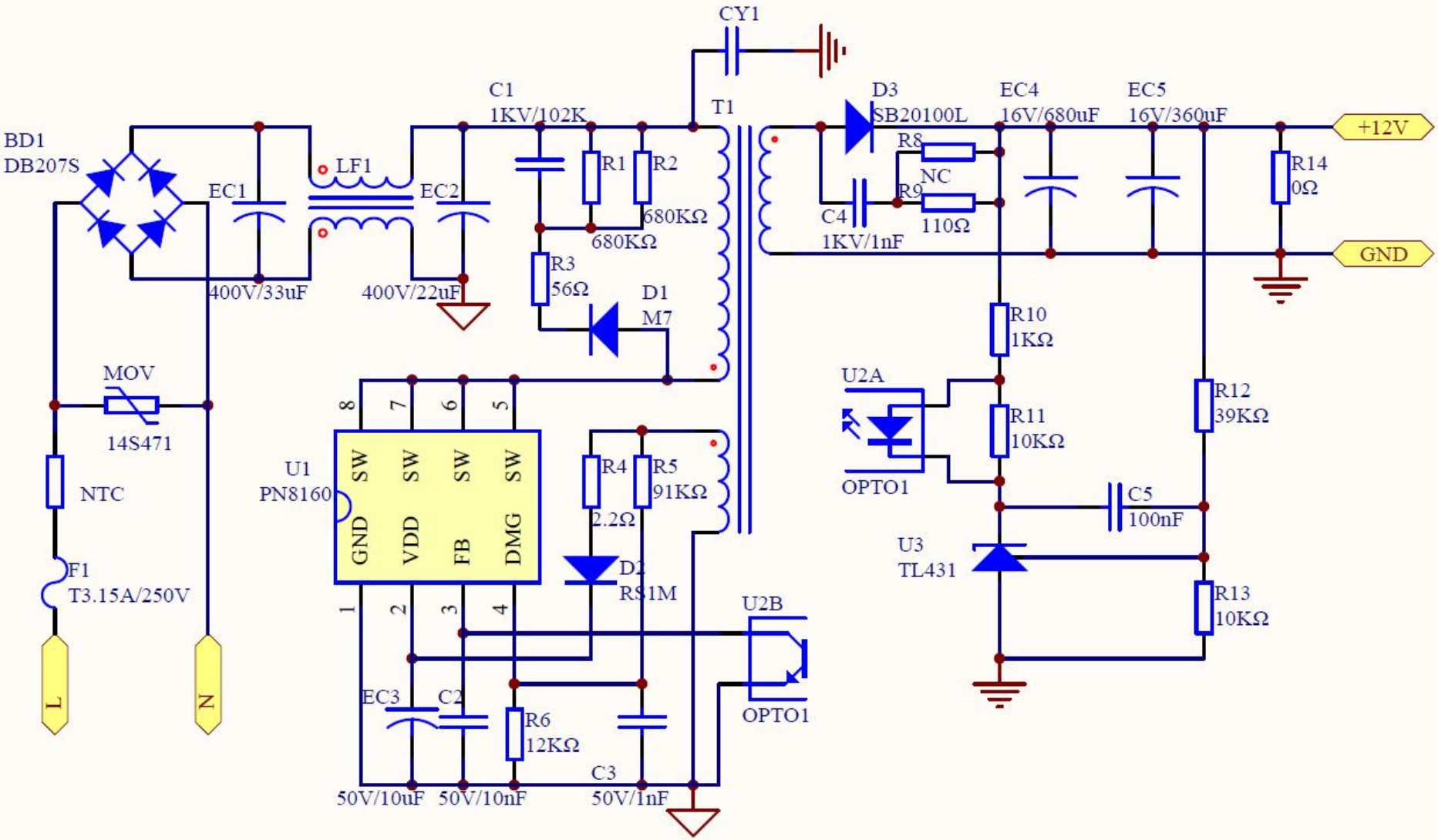
1. AC Input Range 90-264VAC
2. DC Output 12V/2A
3. Meet “75mW@12V” No-Load Standby Power Consumption Requirement
4. Meet “DOE LEVEL VI” Efficiency Requirement
5. Max Output Ripple & Noise < 100mV

1、Specificaton

Description		Symbol	Min	Typ	Max	Unit	Comment
Input							
Voltage		Vin	90		264	V	
Frequency		Fs		60		Hz	
No-Load Input Power(230V)					60	mW	
Output							
12V/2A	Output Voltage	Vout	12.21		12.24	V	
	Output Current	Iout	0		2	A	
	Over Current Protection	Iocp			2.5	A	
	Ripple & Noise	Vripple			88	mVp-p	
	Average Efficiency	η	88.81%				DOE LEVEL VI (86.2%)
Ambient Temperature		Tamb	0		40	℃	

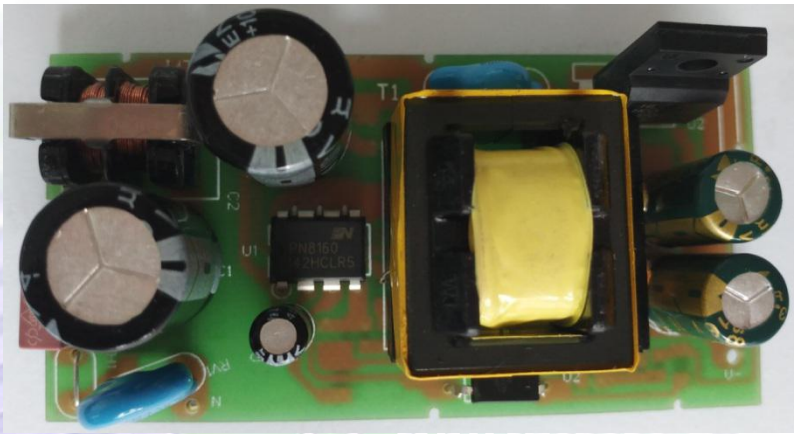
Test condition：
Test at the end of the board terminal

2、Schematic

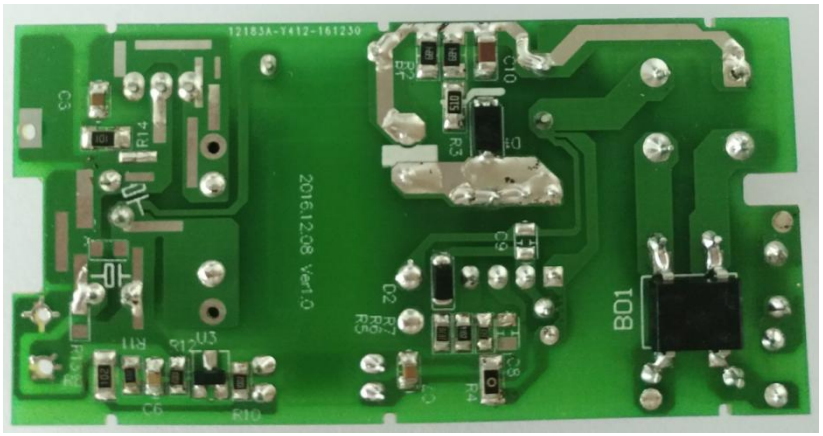

CY1
C1
1KV/102K
T1
D3
SB20100L
EC4
16V/680uF
EC5
16V/360uF
+12V
BD1
DB207S
EC1
LF1
EC2
R1
R2
680KΩ
680KΩ
R8
NC
R9
110Ω
C4
1KV/1nF
R14
0Ω
GND
400V/33uF
400V/22uF
R3
56Ω
D1
M7
R10
1KΩ
MOV
14S471
U2A
R12
39KΩ
R11
10KΩ
NTC
U1
PN8160
SW
SW
SW
SW
GND
VDD
FB
DMG
R4
2.2Ω
R5
91KΩ
OPTO1
C5
100nF
U3
TL431
F1
T3.15A/250V
D2
RS1M
U2B
R13
10KΩ
L
N
EC3
C2
R6
12KΩ
OPTO1
C3
50V/10uF
50V/10nF
50V/1nF

3、Circuit Board Photograph

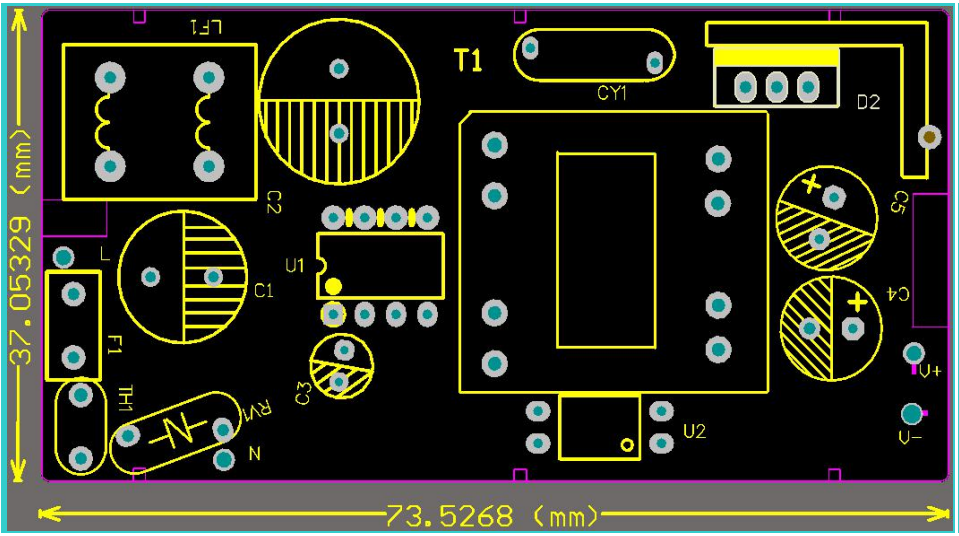
Top View



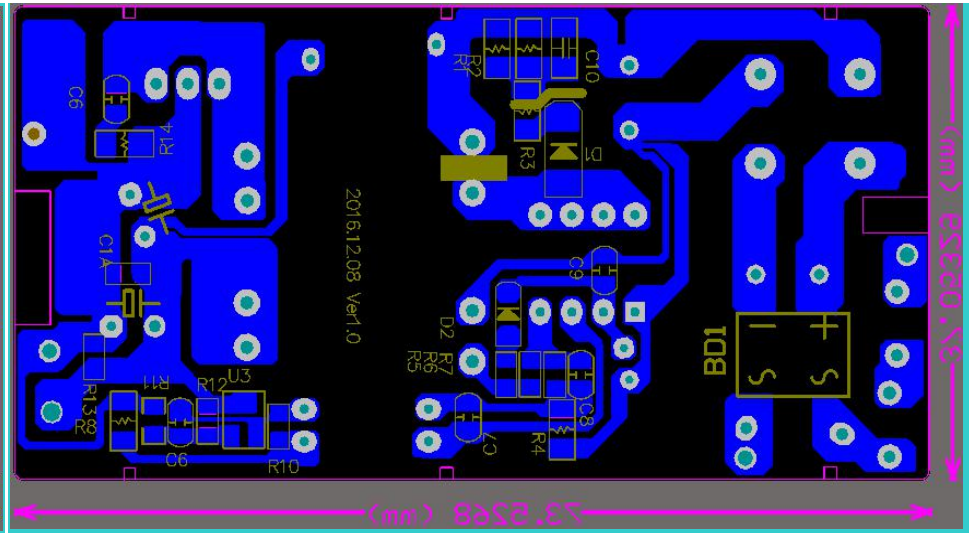
Bottom View



4、Layout



top layer



bottom layer

5.1、Bill of Material

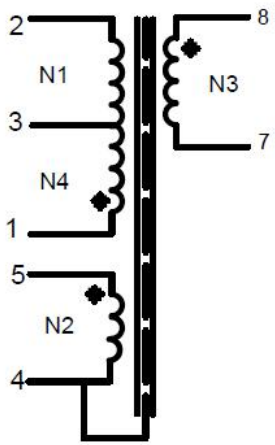
序号	元件标号	元件名称	原件型号	封装尺寸	数量	备注
1	BD1	整流桥	DB207S	SMD DB207S	1	
2	C1	陶瓷电容	1nF/1KV	SMD 1206	1	
3	C2		50V/10nF	SMD 0805	1	
4	C3		NC	SMD 0805	1	
5	C4		100V/1nF	SMD 0805	1	
6	C5		50V/100nF	SMD 0805	1	
7	CY1	Y安规电容	1KV/102M	DIP 脚距10.0mm	1	
8	D1	二极管	M7	SMD SMA	1	
9	D2		A7	SMD SOD-123FL	1	
10	D3	肖特基二极管	SB20100L	TO-220	1	
11	EC1	电解电容	400V/33uF	Φ10*16mm	1	
12	EC2		400V/22uF	Φ10*16mm	1	
13	EC3		50V/10uF	Φ5*11mm	1	
14	EC4		16V/820uF	Φ8*16mm	1	
15	EC5		16V/820uF	Φ8*16mm	1	
16	F1	保险丝	2A/250V	DIP 脚距4.0mm	1	
17	L1	电感	38mH	UU9.8	1	
18	MOV	压敏电阻	14S471	DIP 脚距7.5mm	1	
19	NTC	热敏电阻	10D-7	DIP 脚距5mm	1	
20	R1		680KΩ	SMD 0805	1	
21	R2		680KΩ	SMD 0805	1	
22	R3		56Ω	SMD1206	1	
23	R4		2.2Ω	SMD 0805	1	
24	R5		90KΩ	SMD 0805	1	

5.2、Bill of Material

序号	元件标号	元件名称	原件型号	封装尺寸	数量	备注
25	R6		12KΩ	SMD 0805	1	
26	R9		110Ω	SMD 0805	1	
27	R10		1KΩ	SMD1206	1	
28	R11		10KΩ	SMD 0805	1	
29	R12		39KΩ	SMD 0805	1	1%
30	R13		10KΩ	SMD 0805	1	1%
31	R14		NC	SMD 0805	1	
32	T1	变压器	EE22卧式加宽	EE22加宽卧式5+5	1	2.0uH
33	U1	IC	PN8160	DIP8	1	
34	U2	光耦	OPTO	DIP4	1	
35	U3	431	TL431	SOT-23-TL431	1	

6、Transformer Drawing

1.原理图



<<NOTE>>
1. N3绕组使用三层绝缘线.
2. 气隙研磨中柱.
3. 磁芯中柱要点黑胶固定
4. 磁芯接地

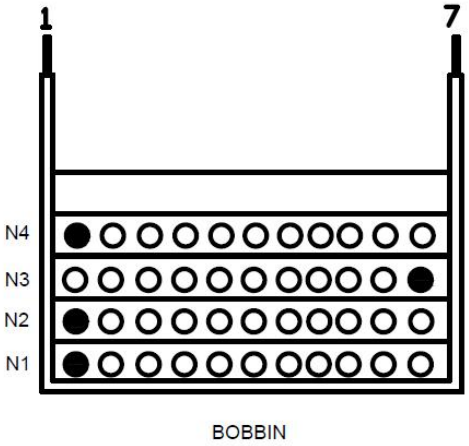
3.电气特性：

1.1 电感量:PIN 2- 1　2.0mH　+/-5%；　测试条件：1KHz　0.25V
1.2 漏感量:PIN 2- 1　200uH　Max　测试条件: 10KHz　0.25V；PIN 8-7 5-4 短路.
1.3 高压测试：
　1.3.1 初级-次级　3750VAC　5mA 60S
　1.3.2 初、次级-磁芯　1500VAC　5mA 60S
1.4 绝缘电阻: 100Mohm Min; 测试条件：500VDC

2.绕线结构

绕组	起末端	漆包线	圈数(TS)	胶带圈数(TS)	绕线方式	备　注
N1	2 -- 3	UEW　Ø 0.3mm X 1P	72	2	平整密绕	三层
N2	5 -- 4	UEW　Ø 0.17mm X 3P	14	2	平整密绕	一层
N3	8 -- 7	TEX-1　Ø 0.7mm X 1P	10	2	平整密绕	一层
N4	3 -- 1	UEW　Ø 0.3mm X1P	24	2	平整密绕	一层

4. 绕线剖面示意图



EE22加宽卧式 Ae=50mm² 5+4pin　PC40

7、 Regulation, Ripple and Efficiency

Vin (V)	Pin (W)	Iout (A)	Vout (V)	η (%)	Avg η (%)	OCP (A)	Vripple MAX (mV)	Doe Level VI Requirement
115Vac /60Hz	0.04	0	12.24			2.6	78	86.20%
	2.86	0.2	12.24	85.59%				
	6.88	0.5	12.24	88.95%	88.37%			
	13.69	1	12.23	89.34%				
	20.86	1.5	12.22	87.87%				
	27.97	2	12.21	87.31%				
230Vac /50Hz	0.06	0	12.24			2.57	88	
	2.92	0.2	12.24	83.84%				
	6.94	0.5	12.24	88.18%	89.24%			
	13.66	1	12.23	89.53%				
	20.41	1.5	12.22	89.81%				
	27.31	2	12.21	89.42%				

Test condition：
Test at the end of the board terminal

Thank you

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