

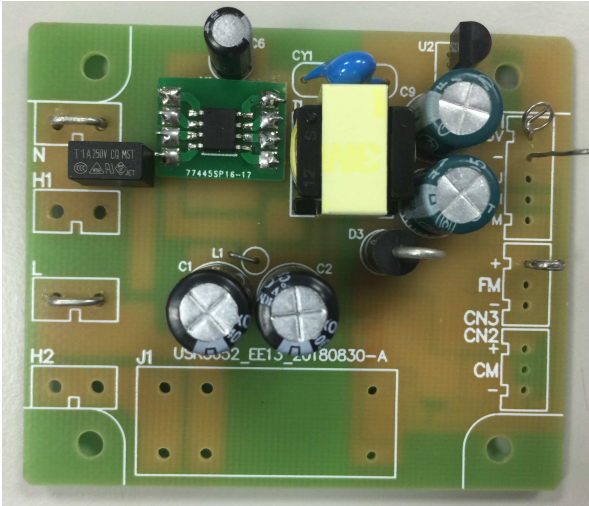


UNISONIC TECHNOLOGIES CO., LTD

12W Adapter Module Using USR3652

Subject

USR3652 12W / 12V_ 1A Demo Board Manual



Key features:

- AC Input Full Range 90Vac~264Vac
- DC Output 12Vdc 1A
- Average Efficiency >79.741%
- No load Power <151mW @230Vac
- OCP/OVP/OLP/SCP Protection

Revision History

Revise Date	Version	Reason/Issue
2018/10/1	A	Original



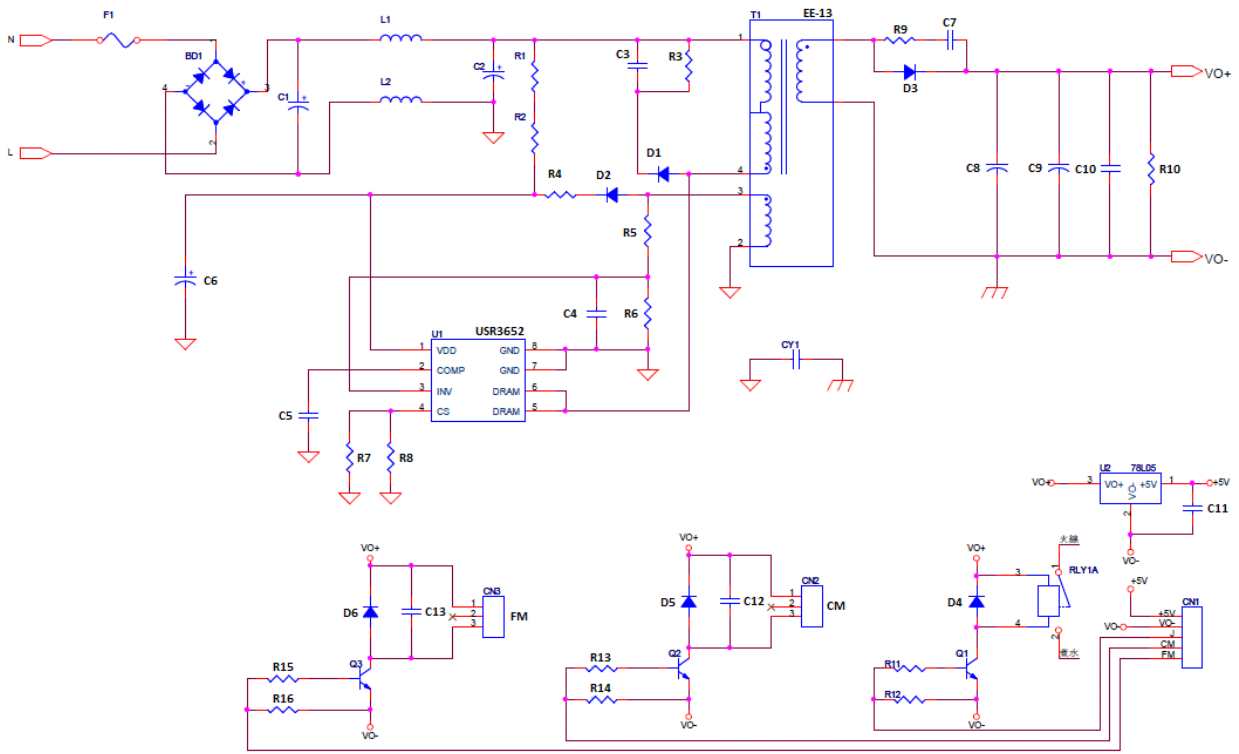
UNISONIC TECHNOLOGIES CO., LTD

www.unisonic.com.tw

12W Adapter Module Using USR3652

2. Open Frame Module Information

2.1. Schematic



2.2. BOM

1	BD1	B6S, 0.8A, 600V	1
2	C1, C2	Capacitor, aluminum electrolytic, 15uF/400V, 105°C, ±20%	2
3	C2	Capacitor, aluminum electrolytic, 33uF/400V, 105°C, ±20%	1
4	C3	Capacitor, ceramic, 1nF/1kV, X7R, SMD1206	1
5	C4	Capacitor, ceramic, 100pF/50V, X7R, SMD0805	1
6	C5	Capacitor, ceramic, 100nF/50V, X7R, SMD0805	1
7	C6	Capacitor, aluminum electrolytic, 10uF/50V, 105°C, ±20%	1
8	C7	Capacitor, ceramic, 1nF/200V, X7R, SMD1206	1
9	C8, C9	Capacitor, aluminum electrolytic, 470uF/16V, 105°C, ±20%	2
10	CY1	Capacitor, Y1, 1000pF/250V, 105°C, ±20%	1
11	D1	Diode, fast recovery, 1N4007, 1.0A/1000V SMA	1
12	D2	Diode, fast recovery, BAV20WG, 0.25A/200V, SOD-123	1
13	D3	Diode, Schottky, SB5100, 5A/100V, DO-41	1
14	R1, R2	Resistor, chip, 1.5M, SMD1206	2
15	R3	Resistor, chip, 100k, SMD1206	1
16	R5	Resistor, chip, 18k, SMD0805	1
17	R6	Resistor, chip, 2.6k, SMD0805	2
18	R7, R8	Resistor, chip, 3.0R, SMD1206	2



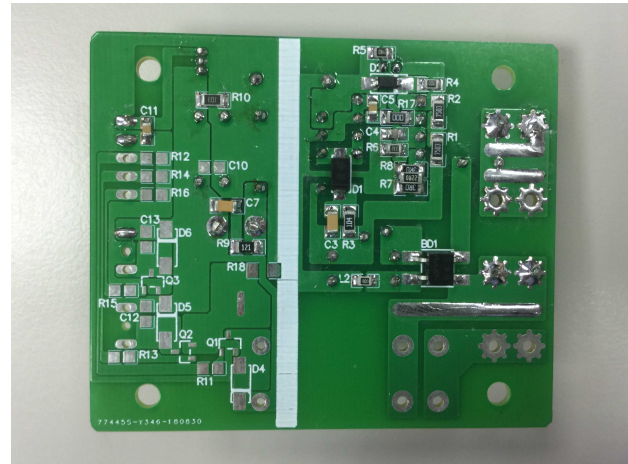
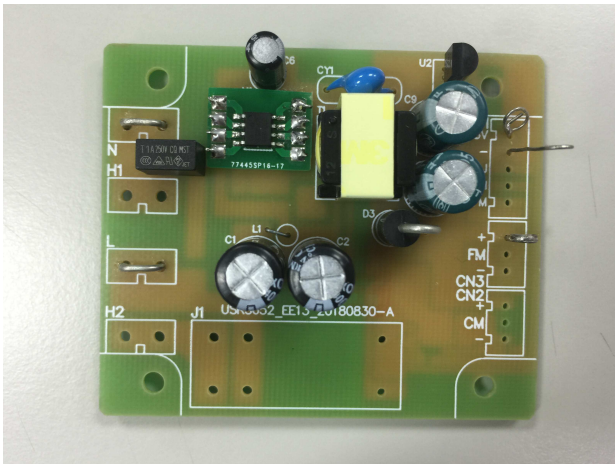
UNISONIC TECHNOLOGIES CO., LTD

www.unisonic.com.tw

12W Adapter Module Using USR3652

19	R9	Resistor, chip, 120R, SMD1206	1
20	R10	Resistor, chip, 10k, SMD1206	1
21	L2, R4	Resistor, chip, 0R, SMD0805	2
22	R17, R18	Resistor, chip, 0R, SMD1206	2
23	L1	Short	1
24	U1	IC, PWM controller, UTC USR3652, SOP-8	1
25	U2	IC, Linear Regulator, UTC 78L05, TO-92	1
26	No Component	C10	1

2.3. Open frame Module Snapshot



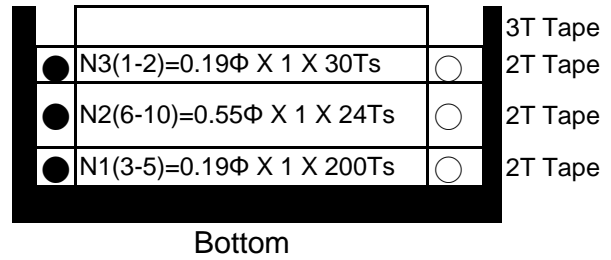
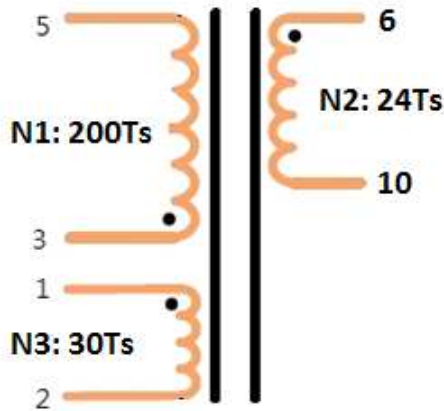
12W Adapter Module Using USR3652

2.4. Transformer Design

2.4.1. Transformer Specification

- 1) Bobbin: EE-13
- 2) Core material: PC-40 or equivalent.
- 3) Lm 3-5: 1.7mH, $\pm 10\%$ (65kHz / 1V)

2.4.2. Transformer Diagram



Transformer Winding Data

Layer No.	Winding	Material	Start	Turns	Finish
1	N1	0.19ΦX1 2 UEW	3	200	5
2	Tape	Tape		2	
3	N2	0.55ΦX1 2 UEW	6	24	10
4	Tape	Tape		2	
5	N3	0.19ΦX1 2 UEW	1	30	2
6	Tape	Tape		3	



UNISONIC TECHNOLOGIES CO., LTD

www.unisonic.com.tw

12W Adapter Module Using USR3652

3. Performance Evaluation

This document presented here is to describe the open frame Module performance.

The Summarized Result :

Item	Test result
1. Input Characteristics	
Standby Power at No Load (230Vac/50Hz)	151mw
Averaged Efficiency (@115/230Vac, 25%~100% Load ,On PCB End)	79.741% 79.79%
2. Output characteristics	
Output Tolerance	<5%
Line Regulation	± 0%
Ripple & Nnoise	<120mV
Overshoot	≤ 3%
Ripple of DynamicTest	≤ 300mVp-p
3. Protection	
Short Circuit Protection	Shut Down and Auto Recovery
Over Voltage Protection	Shut Down and Auto Recovery
Over Load Protection	Shut Down and Auto Recovery

Test Equipment:

Item	Vendor	Model No:
1.AC Source	Chroma	61602
2.Digital Power meter	Chroma	66202
3.Electronic Load	Chroma	63102
4.Digital Oscilloscope	Tektronics	DPO3014
5.Multi-meter	Keithley	2000
6.Thermal meter	Opex	PT-3S



UNISONIC TECHNOLOGIES CO., LTD

www.unisonic.com.tw

12W Adapter Module Using USR3652

3.1. Input Characteristics

3.1.1 Efficiency:

B.VO : PCB side measured 12V output. B.Eff :PCB side measured Efficiency.

Table 1 Efficiency(Test On PCB END) :

Input Voltage	25%(0.25A)			50%(0.5A)		
	Pi(W)	B.Vo(V)	B.Eff(%)	Pi(W)	B.Vo(V)	B.Eff(%)
115Vac/60Hz	3.7701	11.9487	79.360	7.5301	12.0241	79.840
230Vac/50Hz	3.843	11.9413	77.806	7.5351	12.0177	79.745
Input Voltage	75%(0.75A)			100%(1A)		
	Pi(W)	B.Vo(V)	B.Eff(%)	Pi(W)	B.Vo(V)	B.Eff(%)
115Vac/60Hz	11.372	12.0986	79.835	15.175	12.1293	79.929
230Vac/50Hz	11.241	12.0913	80.716	14.987	12.1235	80.893

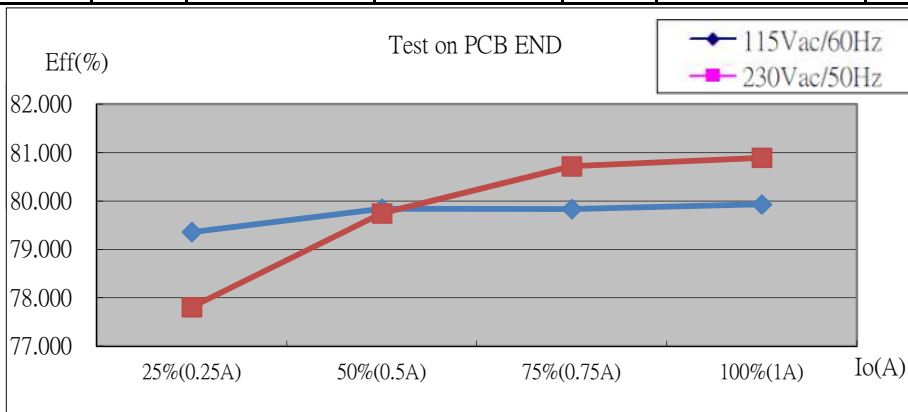


Fig.1 Efficiency VS Load

Table 2 Average Efficiency(PCB End):

Input Voltage	Average
	B.Aver. Eff.(%)
115Vac/60Hz	79.741
230Vac/60Hz	79.790



12W Adapter Module Using USR3652

3.1.2 Standby power

Table 3 Standby Power Test Data

Input	Pin(mW)
115Vac/60Hz	105.60
230Vac/50Hz	151.00

