

iW1900 for 5.4W Single Output SMPS Design

General Design Specification:

- 1.AC Input Range: 90-264V_{AC}
- 2.DC Output: 12V/0.45A
- 3.Meet “**80mW@230Vac**” No-Load standby
Power Consumption Requirement
- 4.Max Ripple@12V/0.45A <150mV_{P-P}



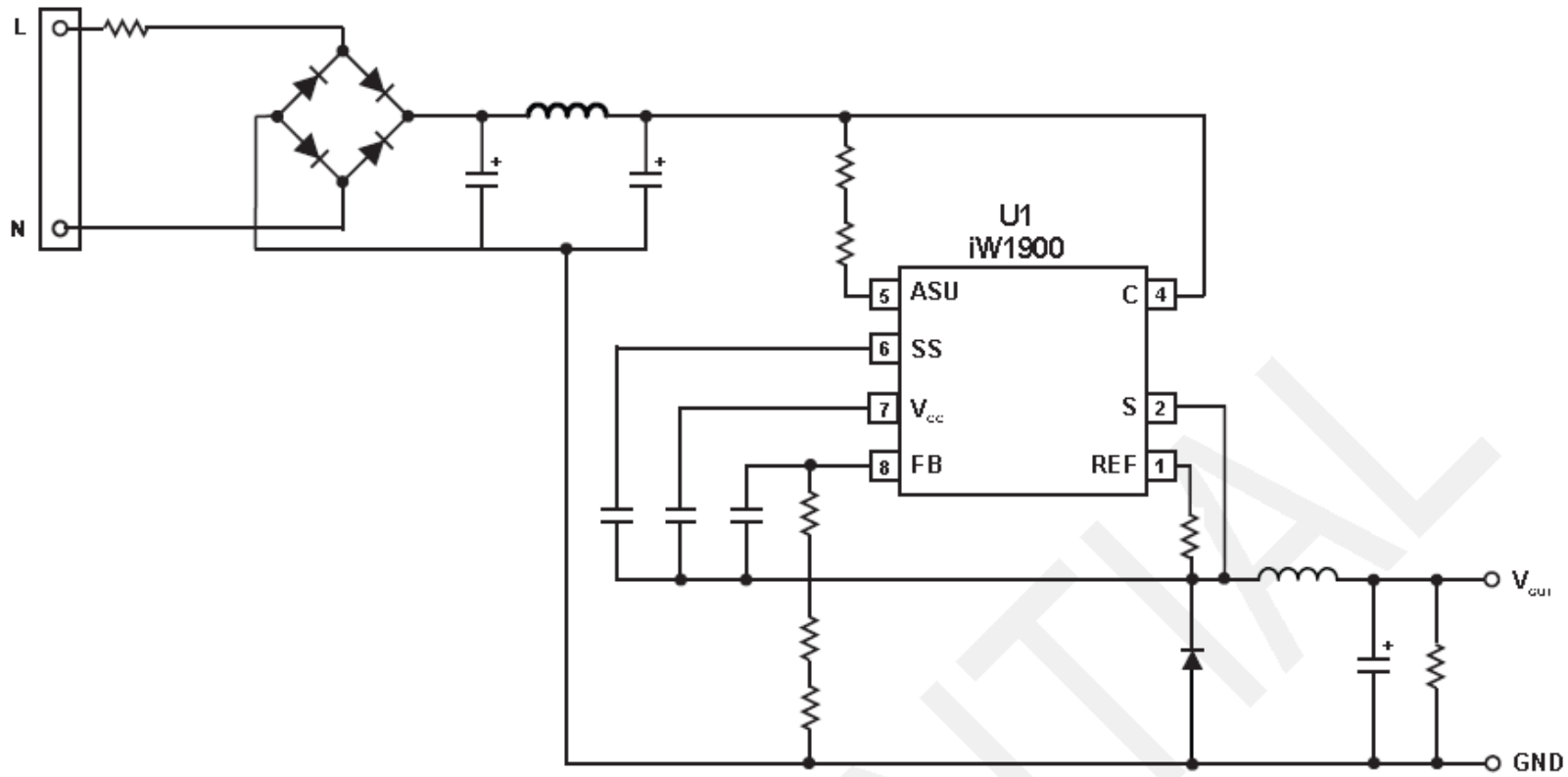
...personal
...portable
...connected

1. Specification

Description	Symbol	Min	Typ	Max	Units	Comment
Input						
Voltage	V_{IN}	90		264	V _{AC}	2 Wire
Frequency	f_{LINE}	47	50/60	63	Hz	
No-load Input Power (230V _{AC})				80	mW	
Output						
Output Voltage	V_{OUT}	11.4	12	12.6	V	Measured at the end of PCB
Output Current	I_{OUT}	0		0.45	A	
Output Ripple Voltage	V_{RIPPLE}			150	mV _{P-P}	Connected with 10uF E-Cap and 100nF C-Cap $I_{OUT}=0.35A @ T_A = 25\text{ }^\circ\text{C}$ 20 MHz Bandwidth
Total Output						
Continuous Output Power	P_{OUT}		5.4		W	
Over Current Protection	OCP			0.5	A	Shut down
Environmental						
Safety	Designed to meet IEC60065, IEC60950, UL1950 Class II					
Ambient Temperature	T_{AMB}	0		40	° C	Free convection, sea level



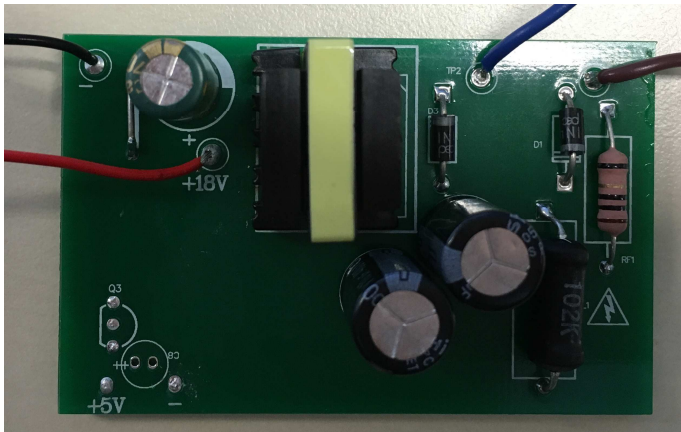
2. Schematic



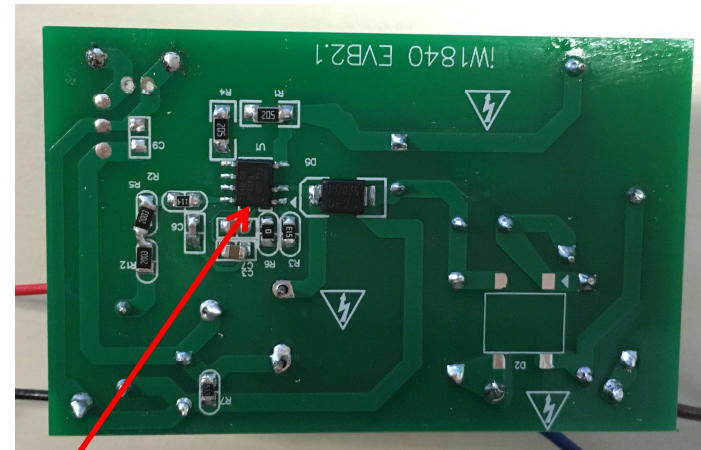
3. Circuit Board Photograph



Top View



Bottom View



iW1900

4. Bill of Material



item	Qty.	Reference	Part Description	Package	Manufacture	Part number
1	2	C1,C2	Cap, ALUM 10uF 400V 20%	Radial (10mm)	Capxon	KM100M400G150
2	1	C3	Cap, CER 4.7uF 50V 10% X5R	C1206	Yageo	CC0805KRX7R8475
3	1	C4	Cap, ALUM 470uF 25V 20%	Radial(8mm)	Capxon	GF471M025E110
4	1	C6	Cap, CER 10pF, 50V NPO	C0805	Yageo	CC0805JRNPO9100
5	1	C7	Cap, CER 560nF, 50V 10% X7R	C0805	Yageo	CC0805KRX7R9564
6	2	D1,D3	Diode, Rec 1000V 1A	DO41	PANJIT	1N4007
7	1	D5	Diode U_Fast Rec 600V 2A	SMB	PANJIT	UF2J
8	1	RF1	Fusible RES, 10 ohm 1W 5%	Axial	Bourns	FW10A10R0JA
9	1	L1	IND, 1mH 200mA 2.3Ω	Axial	Bourns	5800-102-RC
10	1	L2	EE19 1mH	Radial		
11	2	R1,R4	Chip RES, 2M 5% 1/8W	R0805	Yageo	RC0805J-07205
12	2	R2,R5	Chip RES, 200K 1% 1/8W	R0805	Yageo	RC0805F-07204
13	1	R3	Chip RES, 56K 1% 1/8W	R0805	Yageo	RC0805F-07563
14	1	R7	Chip RES, 36K 1% 1/8W	R0805	Yageo	RC0805F-07363
15	1	R6	Chip RES, 3K 1% 1/8W	R0805	Yageo	RC0805F-07302
16	1	R12	Chip RES, 13K 1% 1/8W	R0805	Yageo	RC0805F-07133
17	1	U1	IC, Off-line Switcher	SOIC8	Diaglog	lw1900-00



5. Regulation, Ripple and Efficiency



AC_voltage (V)	Power (W)	output voltage (V)	loading current (A)	loading power (W)	Efficiency (%)	Average efficiency (%)
110	0.033	12.064	0	0	0.00	83.85
	2.123	12.001	0.15	1.80015	84.79	
	3.524	11.953	0.25	2.98825	84.80	
	4.972	11.899	0.35	4.16465	83.76	
	6.488	11.831	0.45	5.32395	82.06	
230	0.063	12.082	0	0	0.00	82.46
	2.203	12.033	0.15	1.80495	81.93	
	3.633	11.992	0.25	2.998	82.52	
	5.045	11.946	0.35	4.1811	82.88	
	6.509	11.933	0.45	5.36985	82.50	

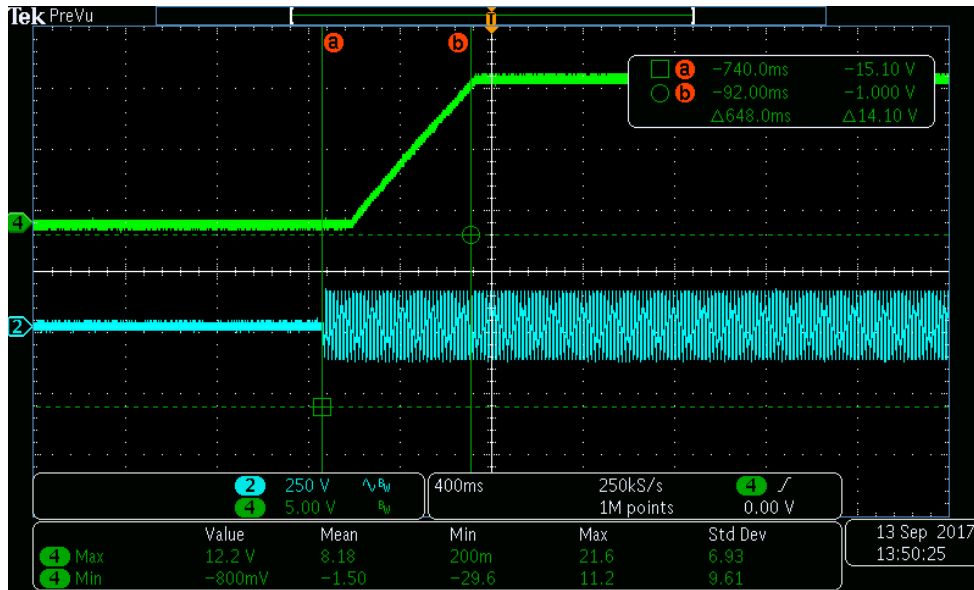
* Note: Output voltage measured at end of PCB



6. Turn-on Delay Time

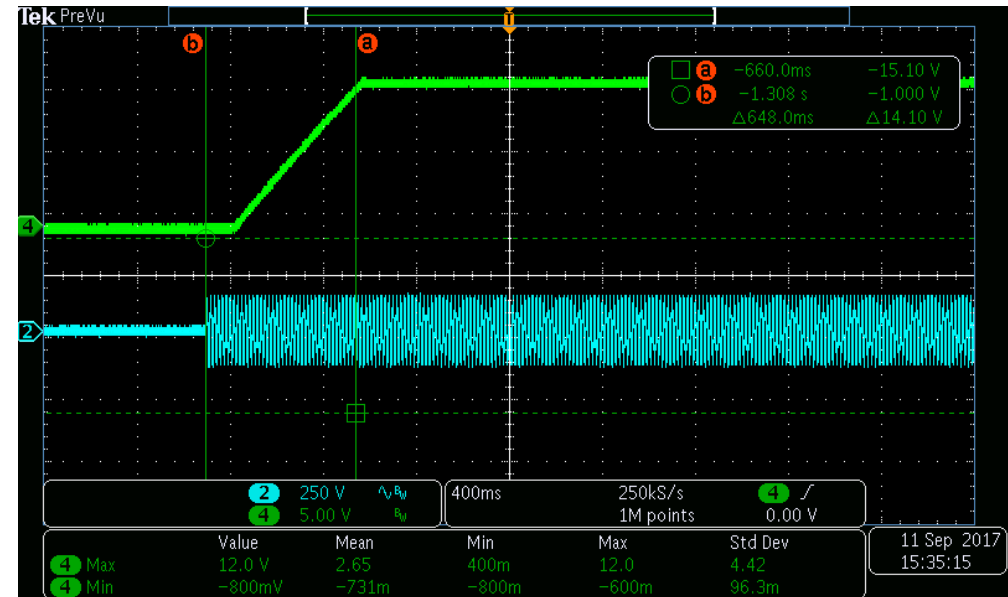
90V_{AC} Input With No Load

T_{ST_DELAY}=0.648S



90V_{AC} Input With Full Load

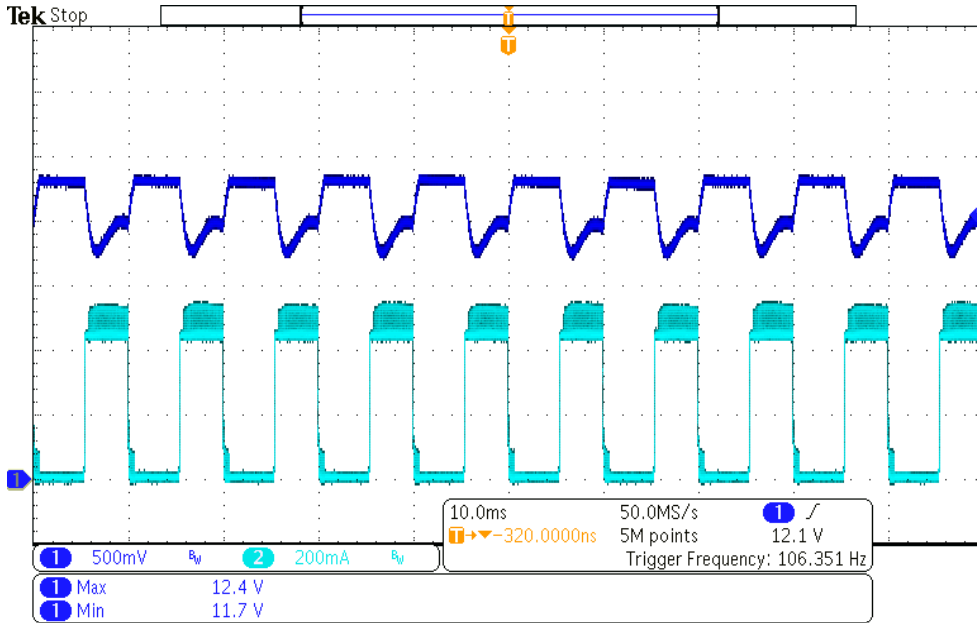
T_{ST_DELAY}=0.648S



CH2: Input CH4:V_{OUT}



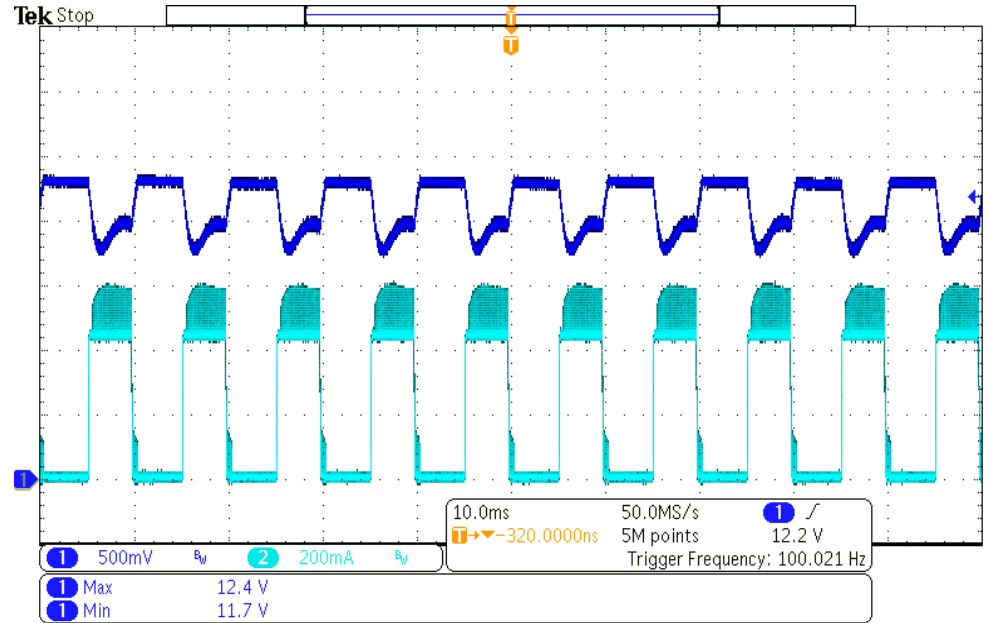
7. Dynamic Load Response



Vin=110Vac/60Hz

V_{OUT_MAX}=12.4V V_{OUT_MIN}=11.7V

F=100Hz



Vin=220Vac/60Hz

V_{OUT_MAX}=12.4V V_{OUT_MIN}=11.7V

F=100Hz

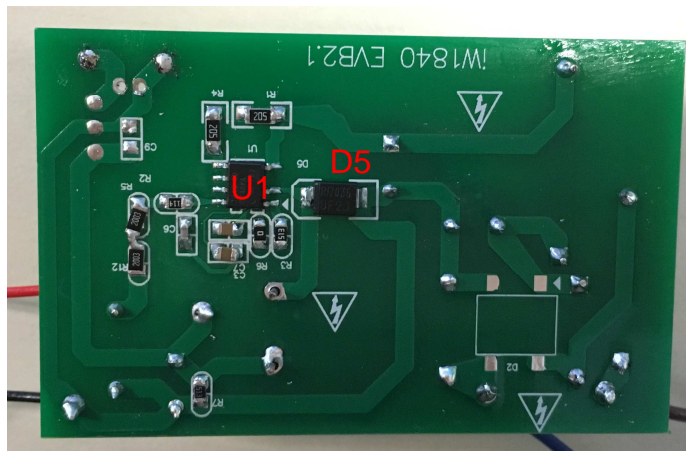
V_{OUT} is monitored at end of PCB Board.

Duty-Cycle: 50% , Slew-Rate: 0.05A/us, I_{out}: 0A-0.45A-0A



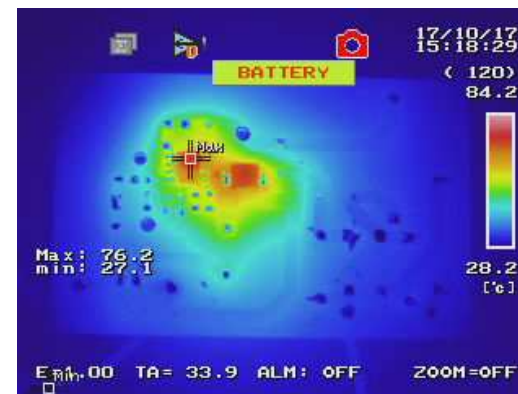
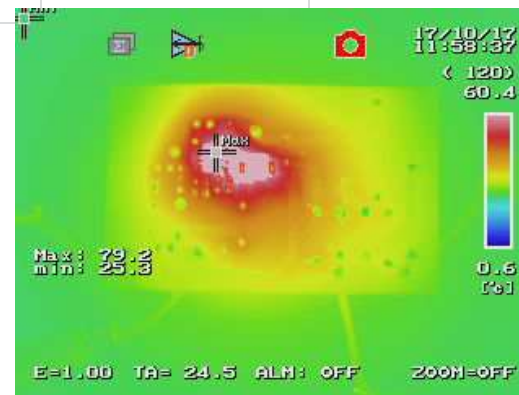
8. Thermal Test for Critical Component

Item	$V_{IN}=90V_{AC}$, $V_{out}=12V$ $I_{OUT}=0.45A$		$V_{IN}=264V_{AC}$, $V_{out}=12V$ $I_{OUT}=0.45A$	
	Temp.(°C)	Rising Temp. (°C)	Temp.(°C)	Rising Temp. (°C)
PWM IC (U1, iW1900)	79.2	54.2	76.2	51.2
Rectifier(D5, UF2J 600V 2A)	79.0	54.0	76.0	51.0
Ambient (Chamber) Temp.	25		25	



90V/
60Hz

264V/
50Hz



The power to be...



...personal
...portable
...connected

