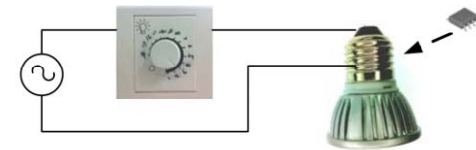




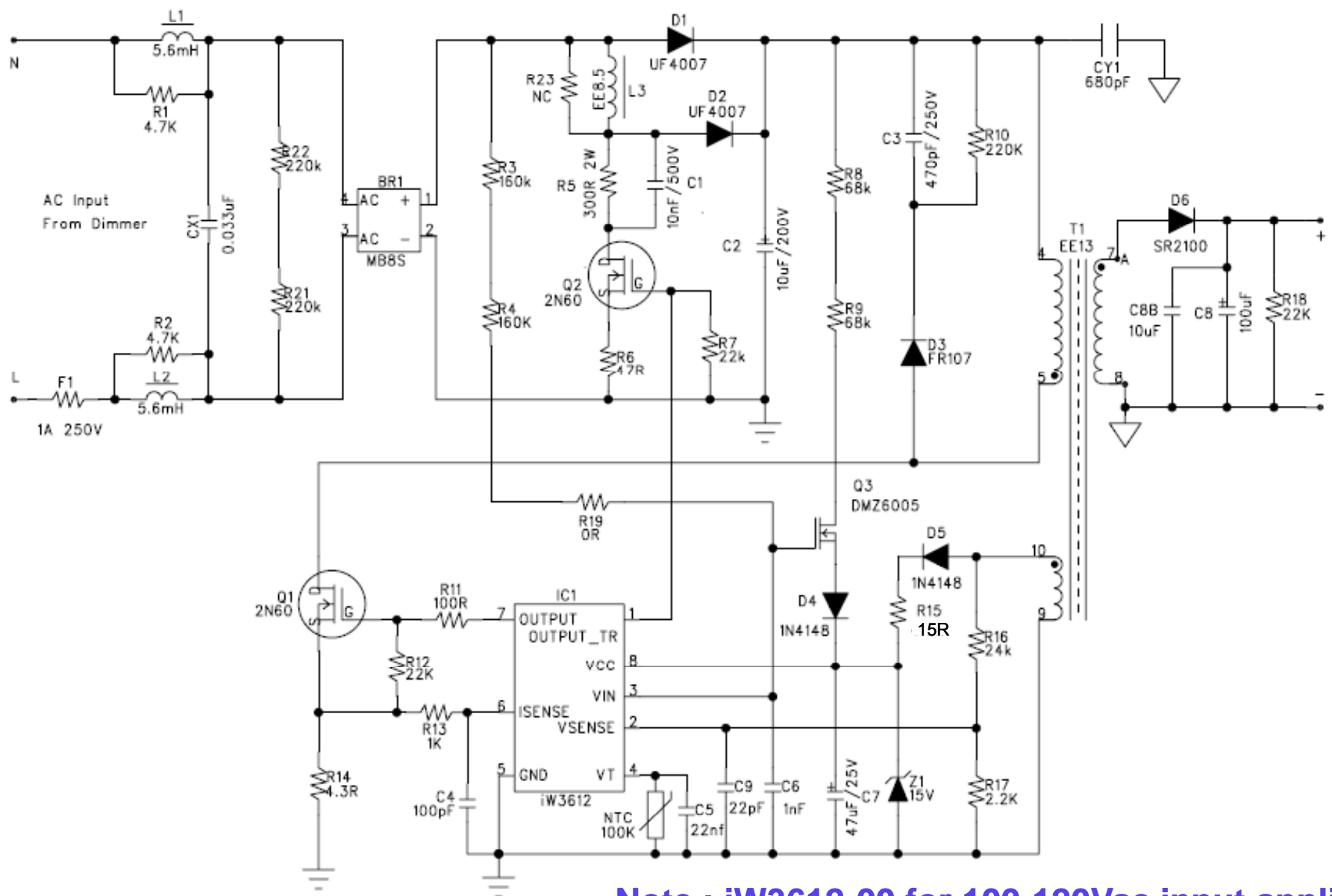
Dimmable LED Driver with iW3612
(AC input 90V~135Vac, Output 4 LEDs BXRA-W0260)

1. Design Purpose and Feature

- Isolated ac-dc offline , Input 120Vac, Output 4 LEDs 350mA _BXRA-W0260
- Intelligent wall dimmer detections
 - Leading-edge dimmer , Trailing-edge dimmer , No-dimmer
- Multiple dimming control scheme
 - Hybrid dimming scheme
 - PWM dimming scheme,900Hz
 - Amplitude dimming scheme
- Wide dimming range from 1% up to 100%
- No visible flicker
- Resonant control to achieve high efficiency
- High Power Factor, 0.7-0.9 without dimmer
- Temperature degrade control to adjust the LED
- Primary-only Sensing eliminates opto-isolator feedback and simplifies design

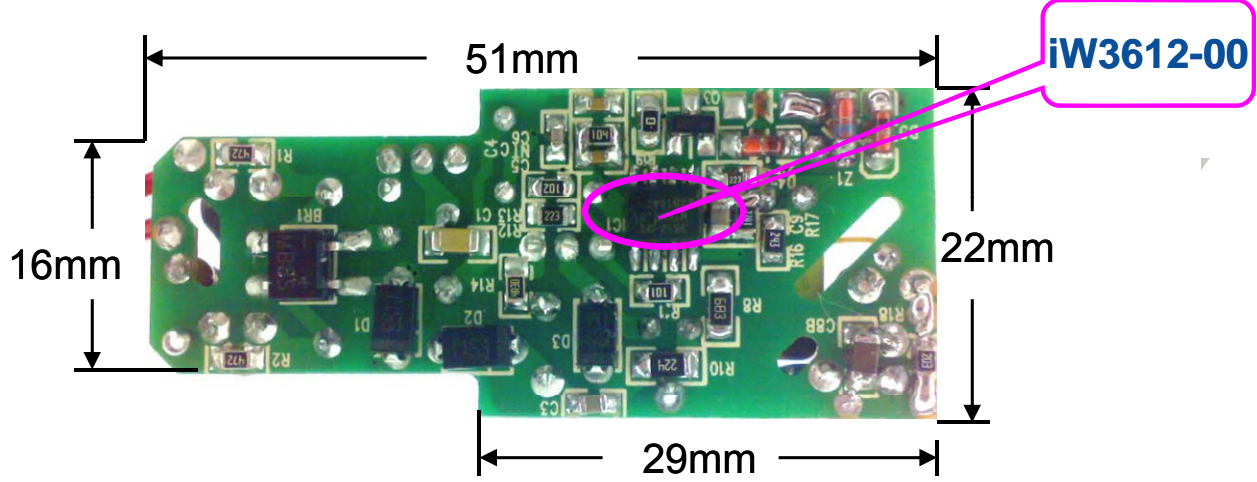
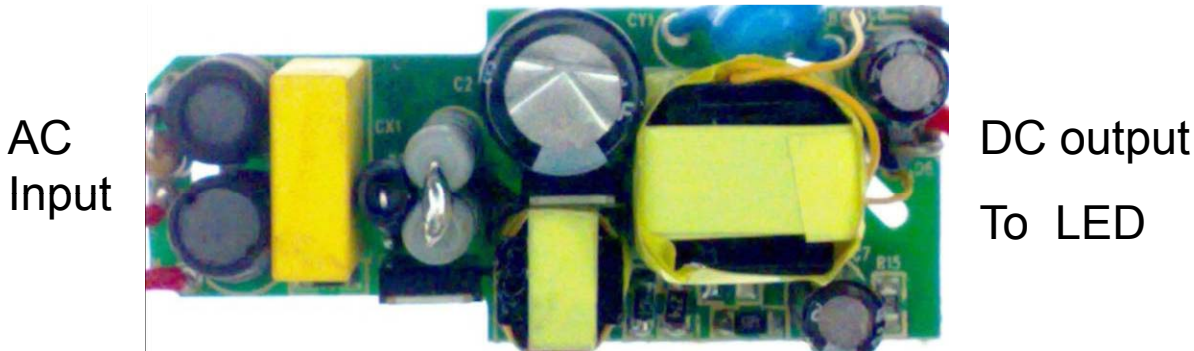


2. Schematic circuit_13V350mA_BXRA-W0260_120Vac



Note : iW3612-00 for 100-120Vac input application

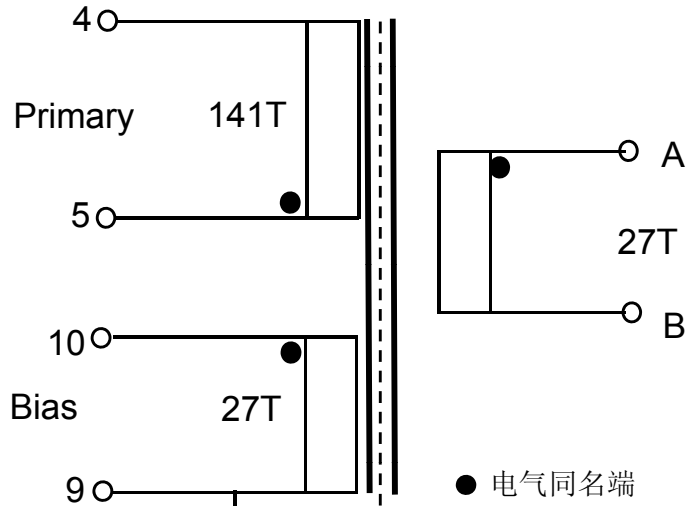
3.PCB Layout



Bridgelux
BXRA-W0260

5. Transformer Design ___ 120Vac_ 13V350mA_ BXRA-W0260

SCHEMATIC



ELECTRICAL SPECIFICATIONS:

1. Primary Inductance (L_p) = 1.7mH @10KHz
2. Primary Leakage Inductance (L_k) ≤ 100uH @10KHz

MATERIALS:

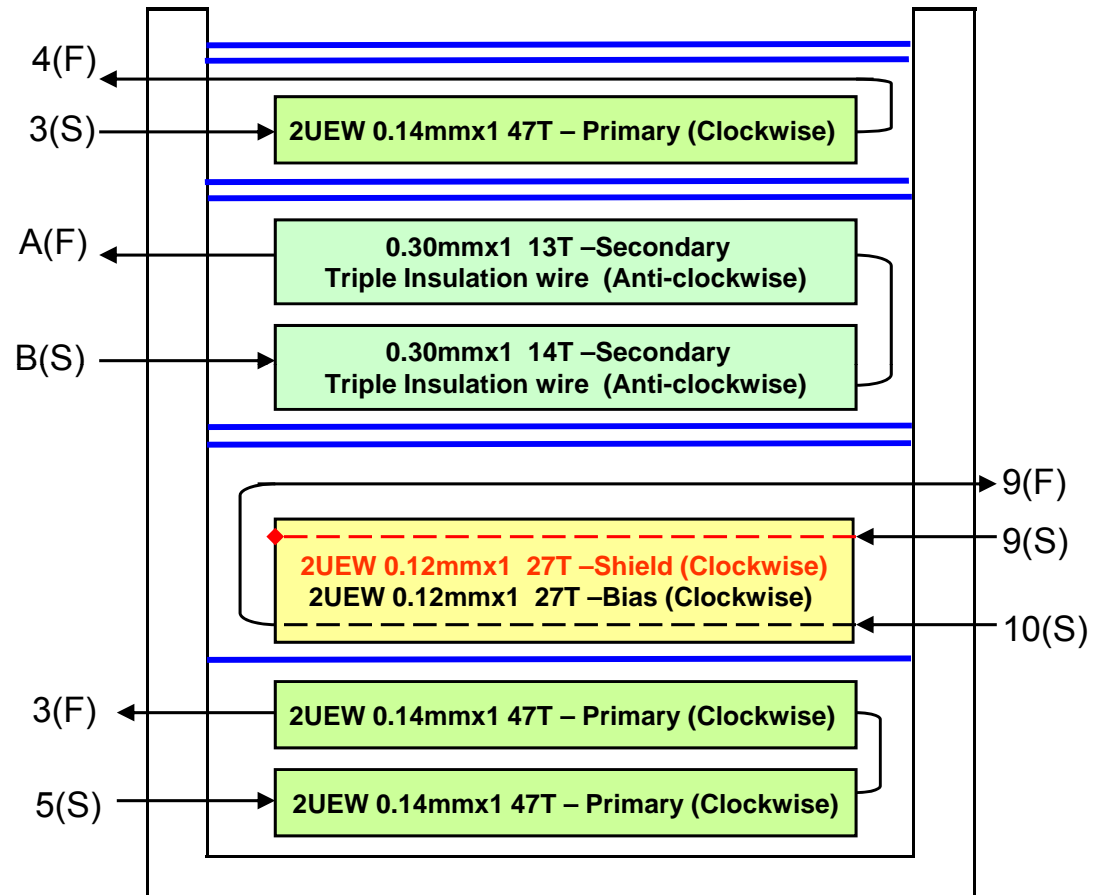
1. Core : EE13 (Ferrite Material TDK PC40 or equivalent)
2. Bobbin : EE13 Vertical
3. Magnet Wires : Type 2-UEW
4. Layer Insulation Tape : 3M1298 or equivalent.

FINISHED :

1. Cut remained of Pin1,2,3,6,7,8
2. Varnish the complete assembly
3. Core is connected to pin9(primary ground)

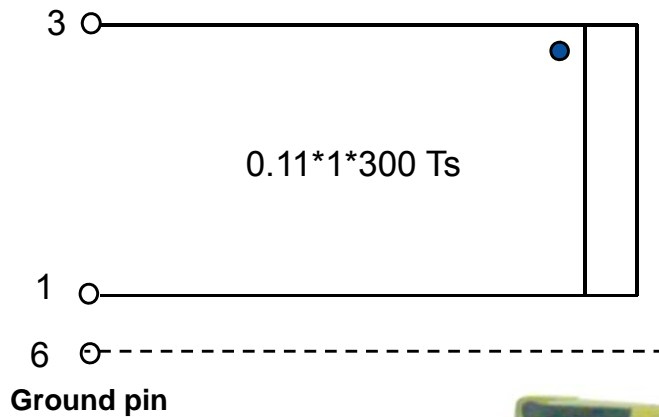
Instruction for start of first winding...

Winding Start from Pin-4 & Ended at Pin-3 in "Clockwise Direction" – looking from pin side of the Bobbin

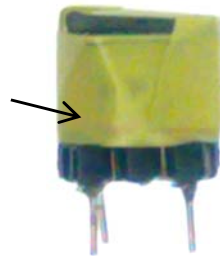


6.PFC choke and EMI Inductor__ For input 120Vac

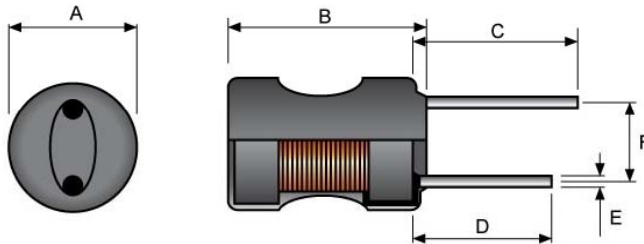
L3 SCHEMATIC



Copper shielding is connected to pin 6



EMI Inductor L1,L2

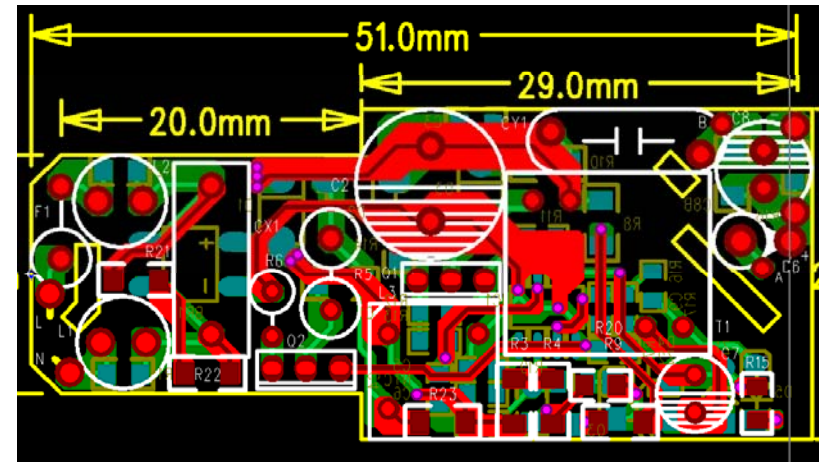


ELECTRICAL SPECIFICATIONS:

1. Inductance (L_p) = 4.5 mH @10KHz
2. Core : EE8.3 (Ferrite Material TDK PC40 or equivalent)
3. Bobbin : EE8.3 Horizontal
4. Ferrite core is connected to Pin 6 after assembling
5. Cut Pin2 4 5 after wires termination
6. Varnish the complete assembly



PCB top view



Ferrite core size : Ax B 6x8mm 0.11*450T

Inductance @10kHz, 1V: 5.6mH +/-20%

DCR: 14 OHM +/-20%

7.Constant Current and Efficiency __No Dimmer

(AC input 90~135Vac,Output 4 LEDs)

#of LEDs	Vin	Pin	Vout	Iout	Ripple	efficiency	3rd Harmonic	PF
	(V)	(W)	(V)	(A)	(mA)			
BXRA - W0260	90	6.460	13.19	0.363	59	74.09%		0.776
	100	6.286	13.17	0.362	55	75.86%		0.760
	110	6.179	13.16	0.361	55	76.89%		0.761
	120	6.186	13.15	0.361	55	76.65%		0.731
	130	6.121	13.14	0.360	56	77.25%		0.736
	135	6.091	13.12	0.360	55	77.56%		0.738

8.Constant Current and Efficiency_ with dimmer

Leading edge dimmer

_ Panasonic
_ 4 LEDs
_ BXRA-W0260



Vin	DIM Level	Pin	LED Voltage	LED current	Pout	Eff	ripple current	DIM mode
(V)		(W)	(V)	(mA)	(W)	(%)	(mA)	
90	Max.	6.99	13.12	362	4.75	68.0%		
		3.06	12.33	168	2.07	67.7%		
	Min.	0.41	10.49	5	0.05	12.7%		
120	Max.	6.24	13.12	359	4.71	75.5%		
		3.56	12.43	176	2.19	61.5%		
	Min.	0.62	10.68	9	0.10	15.4%		
135	Max.	6.45	13.09	359	4.70	72.9%		
		3.48	12.33	172	2.12	61.0%		
	Min.	0.81	10.77	15	0.16	20.0%		

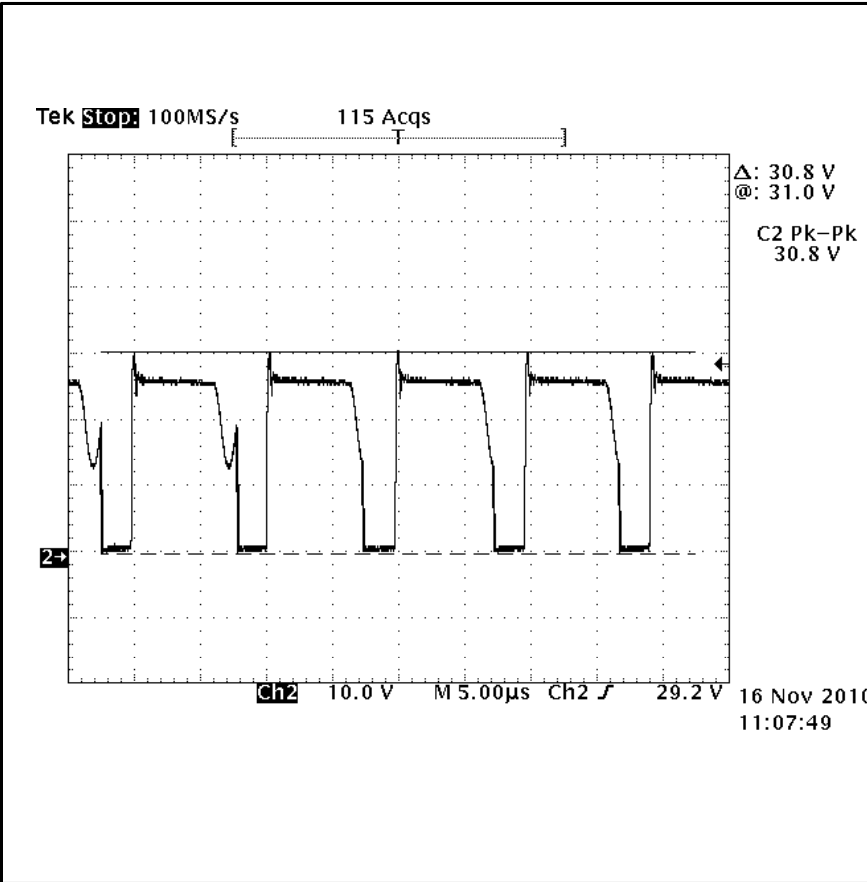
Trailing edge dimmer

_ Lutron
_ 4 LEDs
_ BXRA-W0260



Vin	DIM Level	Pin	LED Voltage	LED current	Pout	Eff	ripple current	DIM mode
(V)		(W)	(V)	(mA)	(W)	(%)	(mA)	
90	Max.	7.15	13.09	363	4.75	66.4%		
		3.35	12.30	168	2.07	61.7%		
	Min.	0.42	10.15	5.06	0.05	12.2%		
120	Max.	6.51	13.16	360	4.74	72.8%		
		3.73	12.45	184	2.29	61.4%		
	Min.	0.68	10.65	10	0.11	15.6%		
135	Max.	6.77	13.17	358	4.72	69.6%		
		3.88	12.40	187	2.32	59.8%		
	Min.	1.05	10.98	26	0.29	27.2%		

9. V_{CE} Waveform



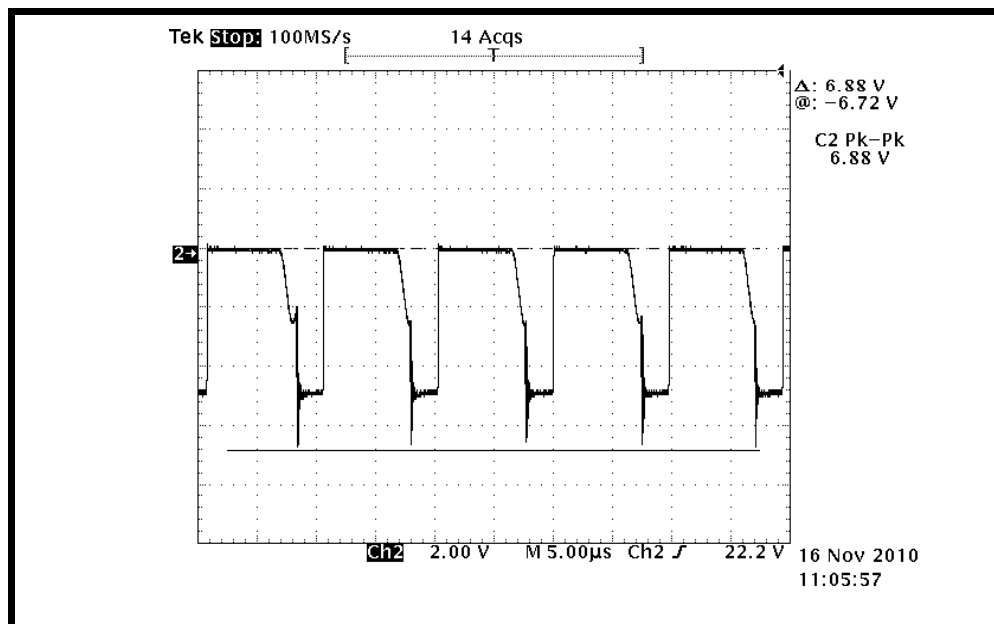
Test Condition:

V_{in}=135Vac, I_{OUT}=0.35A

Result:

$$V_{CE_MAX} = 30.8 * 10 = \underline{308V}$$

10. V_R waveform



Test Condition:

$V_{IN}=135VAC, I_{out}=350mA$

Result:

$V_R (pk-pk)=6.88*10=68.8V$

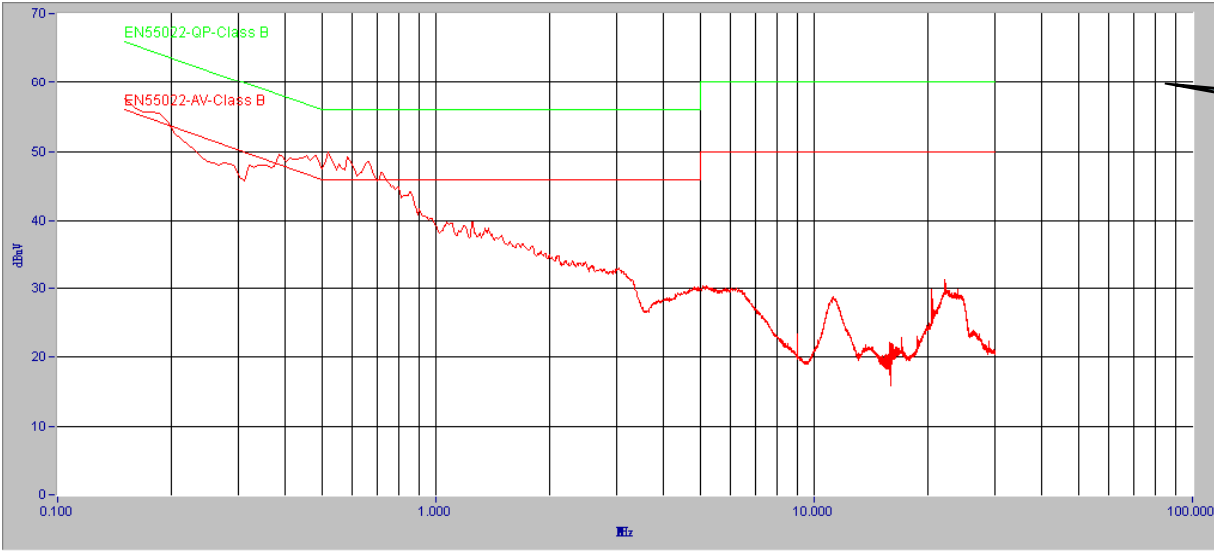
Output rectifier diode: SR2100

TYPE NUMBER	SR220	SR230	SR240	SR250	SR260	SR280	SR2100	UNITS	
Maximum Recurrent Peak Reverse Voltage	20	30	40	50	60	80	100	V	
Maximum RMS Voltage	14	21	28	35	42	56	70	V	
Maximum DC Blocking Voltage	20	30	40	50	60	80	100	V	
Maximum Average Forward Rectified Current									
See Fig. 1								2.0	A
Peak Forward Surge Current, 8.3 ms single half sine-wave superimposed on rated load (JEDEC method)								50	A
Maximum Instantaneous Forward Voltage at 2.0A	0.55		0.70		0.85			V	
Maximum DC Reverse Current $T_a=25^{\circ}C$								2.0	mA
at Rated DC Blocking Voltage $T_a=100^{\circ}C$								20	mA
Typical Junction Capacitance (Note1)								170	pF
Typical Thermal Resistance $R_{\theta JA}$ (Note 2)								35	$^{\circ}C/W$
Operating Temperature Range T_J	-65 — +125			-65 — +150				$^{\circ}C$	
Storage Temperature Range T_{STG}	-65 — +150							$^{\circ}C$	

11.iW3610 驱动板工作后, 首先检查的项目

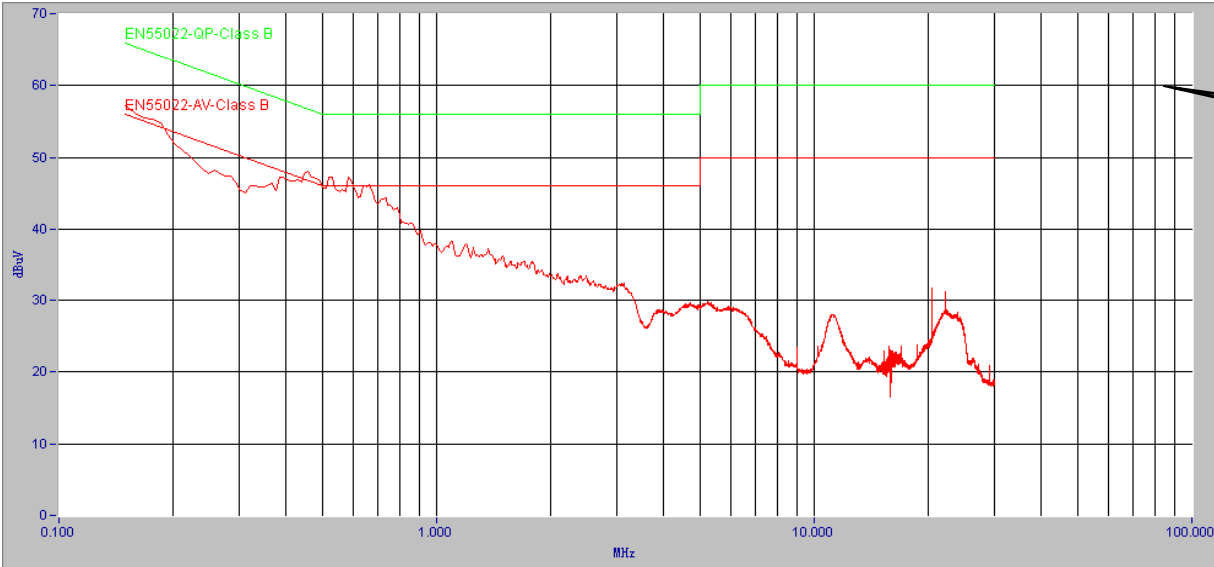
检查项目	检查内容	判断标准		结论
MOSFET	在输入电压最高的时候的 Vds 值	0.8~0.9*Vds Max.		
输出整流管	反向电压及Trr 的参数范围	低输出电压	肖特基	
		较高输出电压	HER	
		高电压小电流	超快恢复	
Vcc 整流管	反向电压及Trr的参数范围	推荐用1N4148或FR102/FR103		
Vcc 电压	调光最大位置和最小位置时的Vcc	最大亮度/最多灯数	<16V	15.4V
		最小亮度/最小灯数	>8V	9.3V
变压器	Bmax.			
Vsense	正常工作时的 Vsense电压	最高输出电压时的 Vsense (Knee) 应该低于1.4V, 以确保工作于CC mode(<1.538V)		
OVP	输出开路时 Vsense 电压	OVP 是1.7V,确认 输出开路时 MOSFET Vds是安全的, 输出整流管电压及 Vcc 的值		

12. Conducted EMI (Input 115Vac)



Peak Scan
QP Limit line

Peak scan N



Peak Scan
QP Limit line

Peak scan L