



## LED Driver Design with iW1810

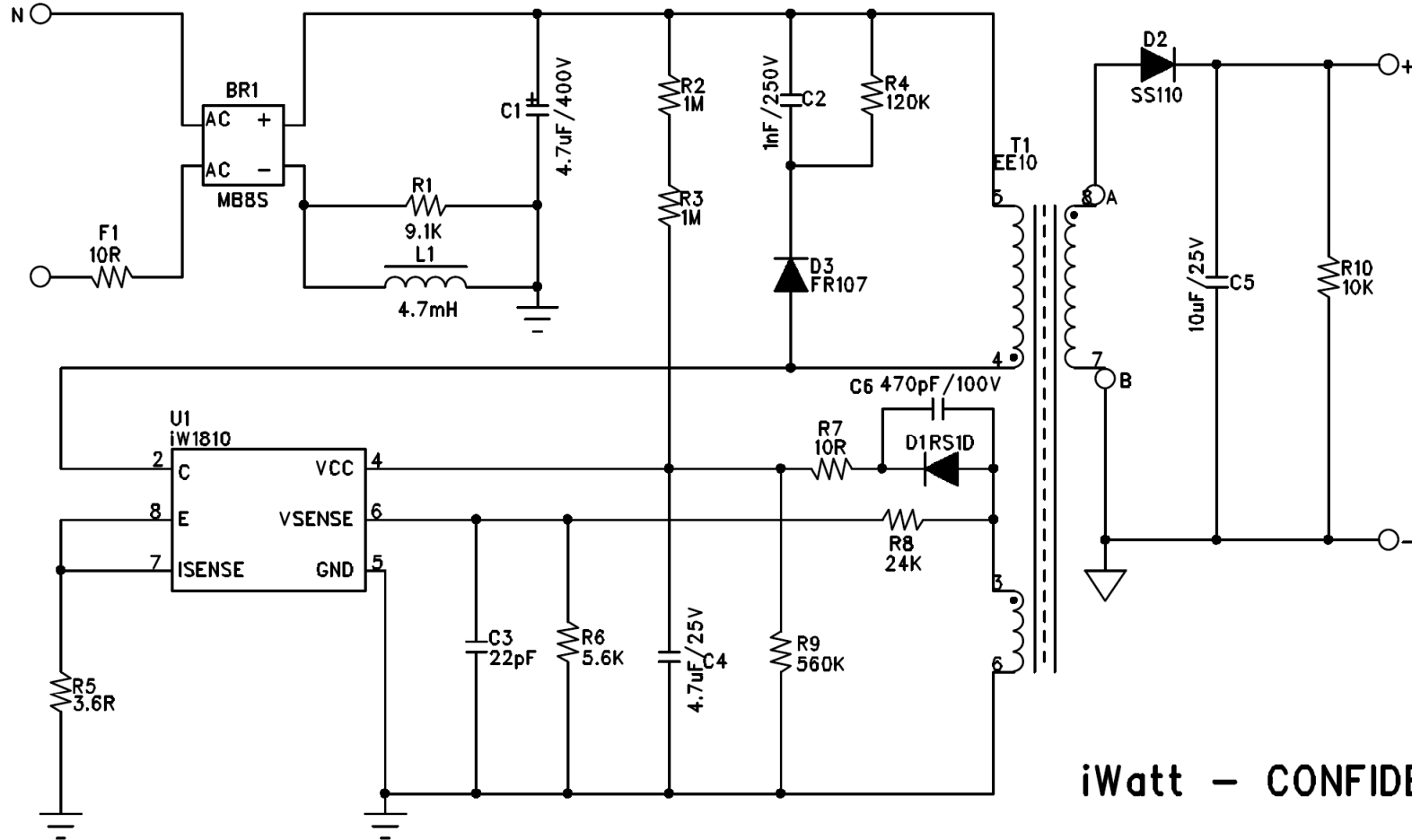
### Summary and Features :

1. LED driver, 12V, CC@0.35A ; Wide range AC input range @90-264Vac
2. For Isolated or Non-isolated Applications
3. High Efficiency and Minimum Parts count
4. Meet EMI EN55015B-QP & AV limits
5. Fully protected against AC input UV, OV, O/P Short/Open, meet single point failure test.

# 1. Specification

Description		Symbol	Min	Typ	Max	Units	Comment
Input							
Voltage		$V_{IN}$	90	100/240	264	V <sub>AC</sub>	2 Wire
Frequency		$f_{LINE}$	47	50/60	63	Hz	
Open-load Input Power (264V <sub>AC</sub> )				3.5		W	
Output							
Const Voltage	@ 0-350 m A	$V_{OUT\_CV}$		12	15	V	Measured at the PCB connector
Const Current	@ 7--12V	$I_{OUT\_CV}$	0.31	0.35	0.38	A	
Output Ripple Current						mA	Measured at the LED load
Continuous Output Power		$P_{OUT}$				W	
Output short circuit test		$I_{OUT\_MAX}$				A	Auto-restart
Efficiency		$\eta$	70			%	Measured at end of PCB @ 115Vac
Others							
Turn on Delay Time				1		Sec	At rated input voltage <u>115</u> Vac
Inrush current				10		A	At rated input voltage <u>115</u> Vac
Hi-pot test				4		kV	<u>Isolated</u> / Non-isolated
Conducted EMI			Meets EN55015B				Floating / Grounding
Surge Test							Differential mode
Operation Temperature		$T_{opr}$			50	° C	Free convection, sea level

## 2. Schematic Circuit



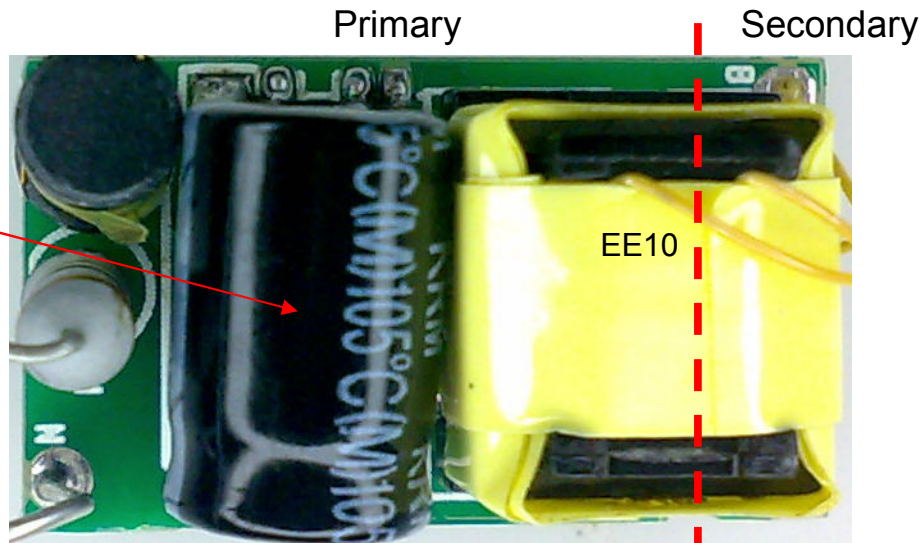
iWatt - CONFIDENTIAL

### 3. Bill of Material

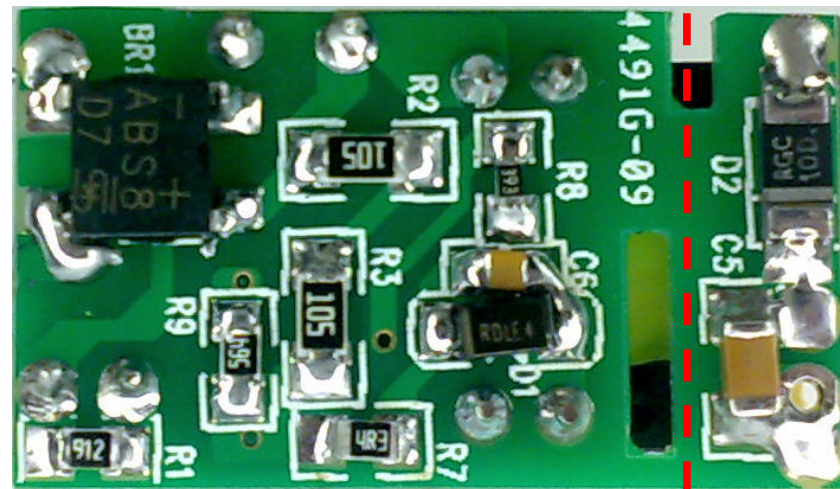
Item	Qty.	Ref.	Description	Cost (US Cent) / unit	Sub-Total (Cent)
1	1	U1	iW1810, Off-line digital PWM Controller, SOT-8		
2	1	C1	6.8uF, 400V, E-CAP, 105°C		
3	1	C2	1nF, 250V, Ceramic Capacitor, SMD-0805		
4	1	C4	4.7uF/25V, SMD-1206		
5	1	C5	10uF/25V, SMD-1206		
6		C6	470pF/100V, SMD-0603		
7	1	C3	22pF/25V, SMD-0603		
8	1	BR1	MB8S		
9	1	D1	1N4148 0.1A/100V, LL-34		
10	1	D2	SS110 ,1A/100V, SMD		
11		D3	FR107,1A/1000V		
12	1	R1	9.1KΩ±5%, SMD-0603		
13	2	R2,R3	1MΩ,±5%, SMD-1206		
14	1	R4	120KΩ ±5%, SMD-1206		
15	1	R5	3.6Ω±1%, SMD-0805		
16	1	R8	24KΩ±1%, SMD-0603		
17	1	R6	5.6KΩ±1%, SMD-0603		
18	1	R10	10KΩ ±5%, SMD-0805		
19	1	R9	560KΩ,±5%, SMD-0805		
20	1	R7	10Ω,±5%, SMD-0603		
21	1	FR1	10R,1W, FUSE Resistor		
22	1	L1	4.7mH, 0410		
23	1	T1	EE10, Transformer		

# 4.Circuit Board Photograph

iW1810(under the cap )



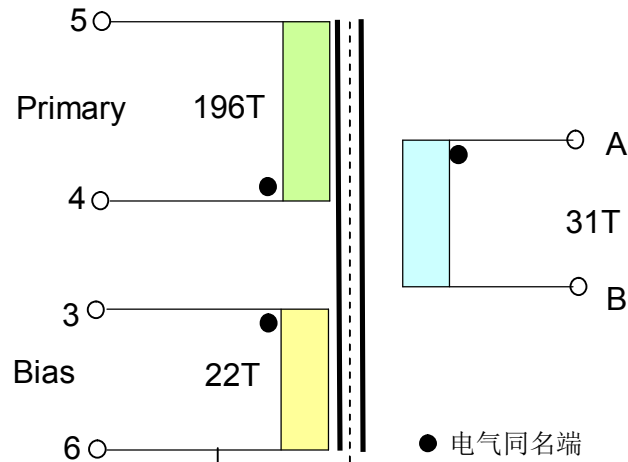
Top side



Bottom side

# 5. Transformer Design

### SCHEMATIC



### ELECTRICAL SPECIFICATIONS:

1. Primary Inductance ( $L_p$ ) = 2.2mH @10KHz
2. Primary Leakage Inductance ( $L_k$ )  $\leq$  150uH@10KHz

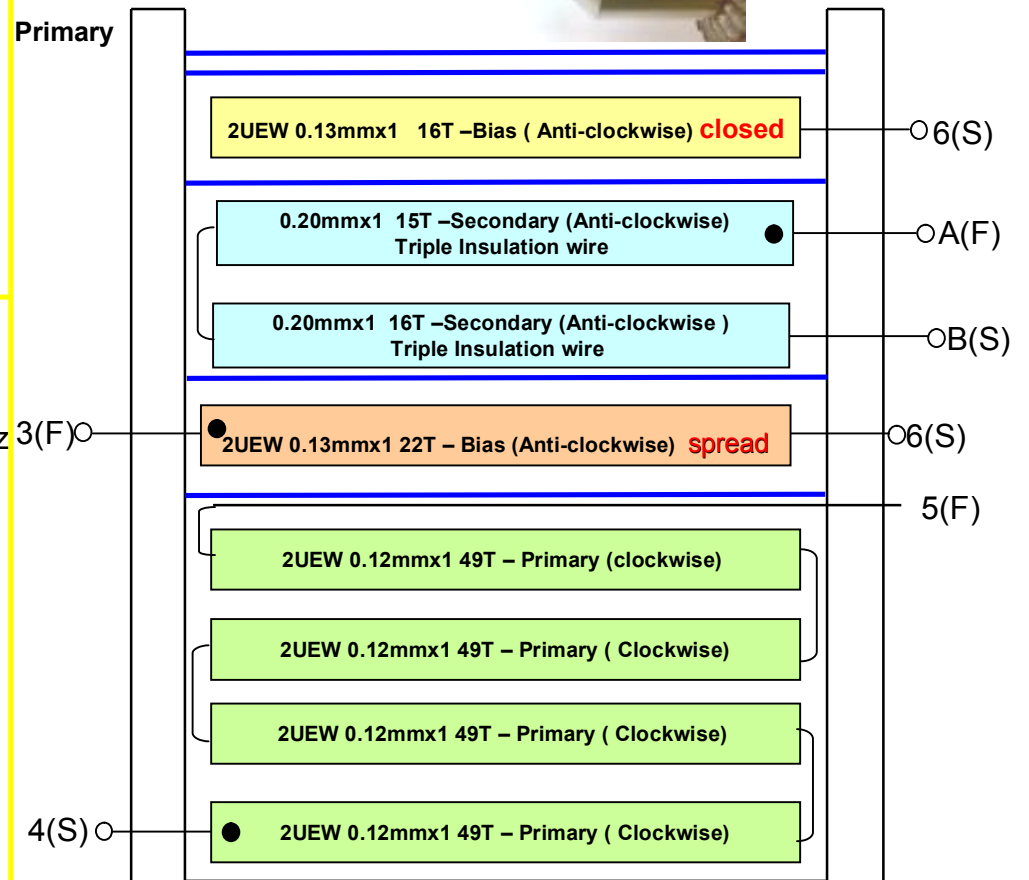
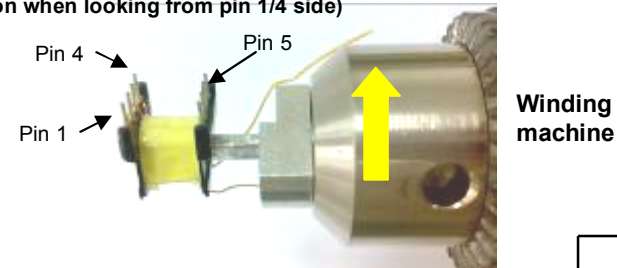
### MATERIALS:

1. Core : EE10 (Ferrite Material TDK PC40 or equivalent)
2. Bobbin : EE10 Vertical
3. Magnet Wires : Type 2-UEW
4. Layer Insulation Tape : 3M1298 or equivalent.

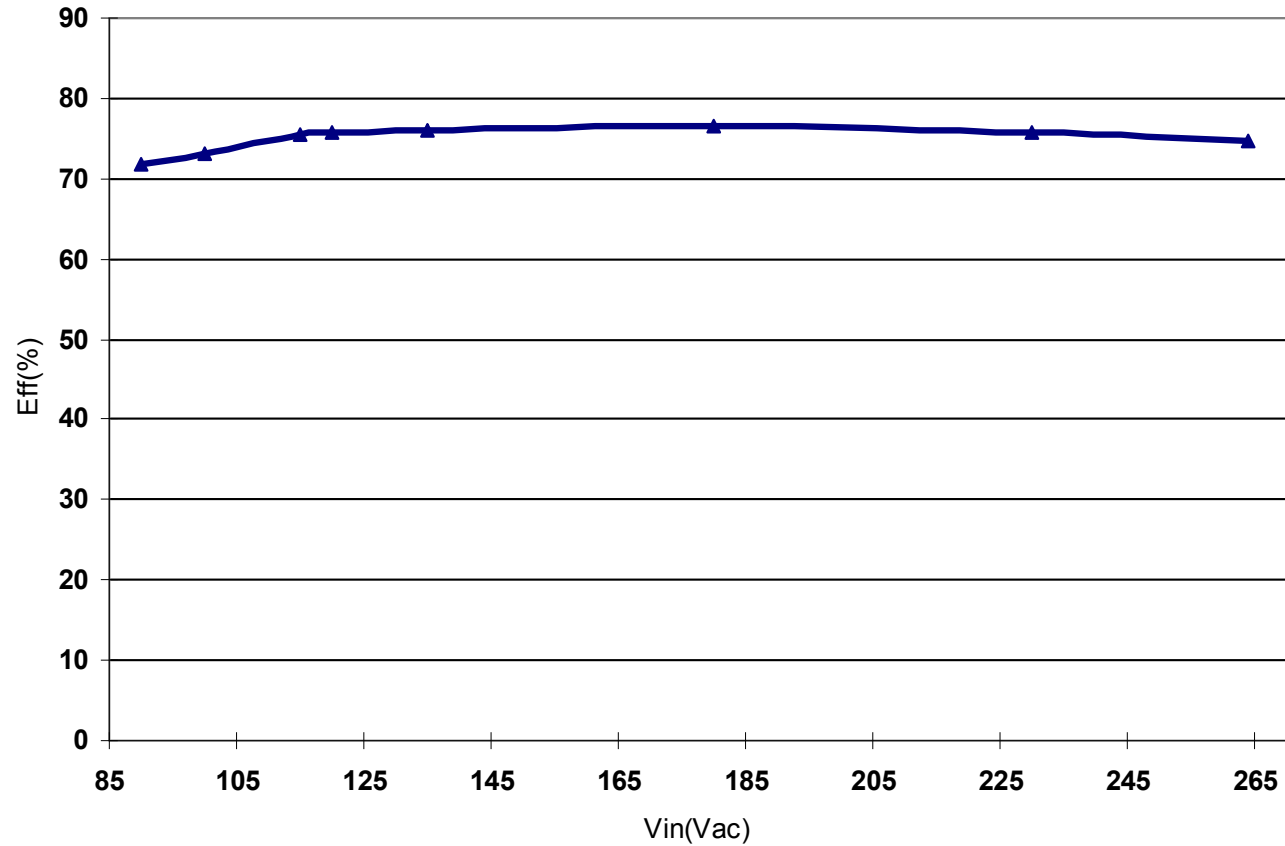
### FINISHED :

1. Varnish the complete assembly
2. Core is connected to pin5 ( primary ground )

- Bobbin to be "rotated" in Anti-clockwise direct looking from pin 1/4 side.
- (Wire to be "started" from pin-4 & "ended" at pin-3 in a Clockwise direction when looking from pin 1/4 side)



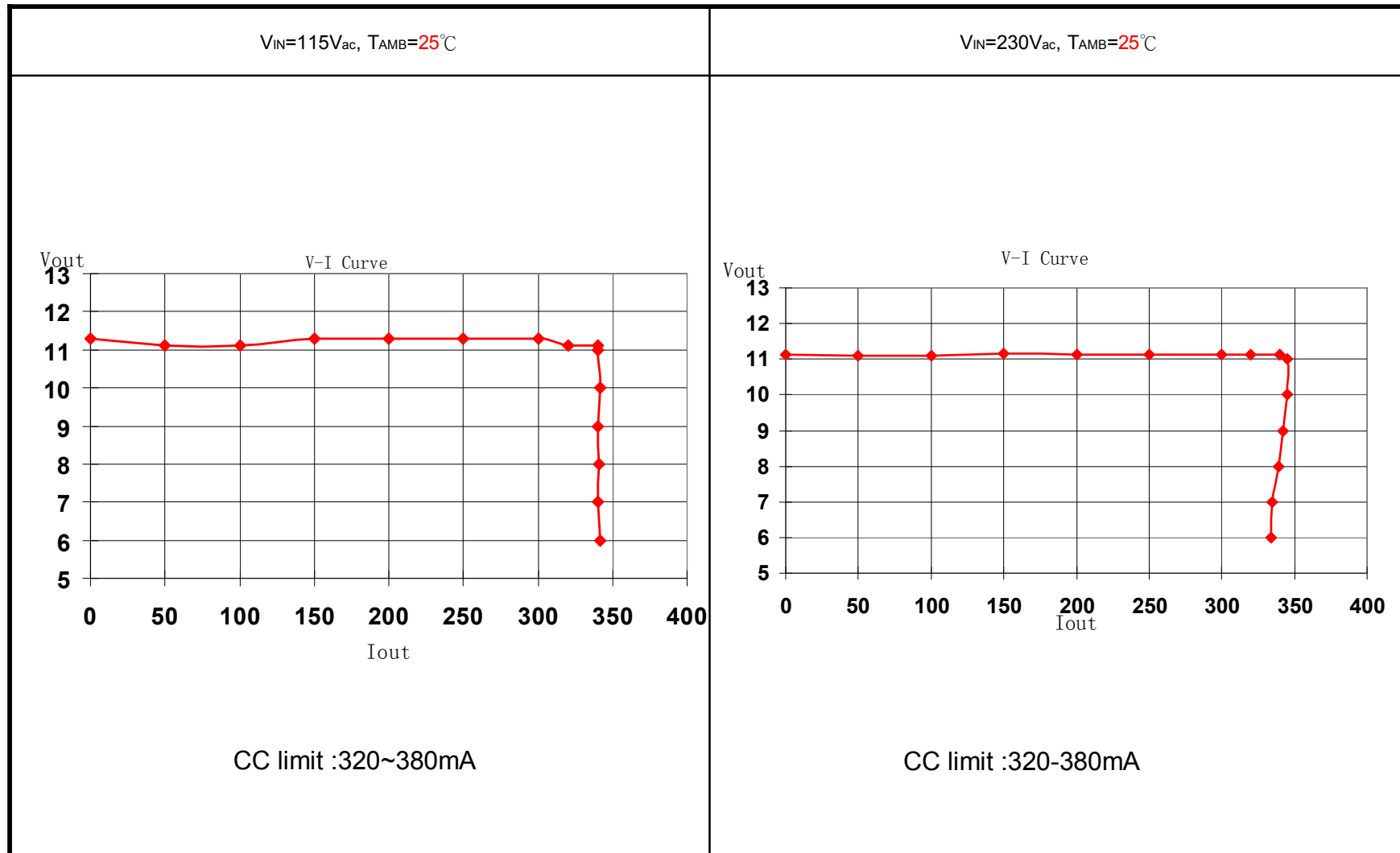
## 6. Efficiency Vs Input Voltage



**\* Note: Output voltage measured at end of PCB.**

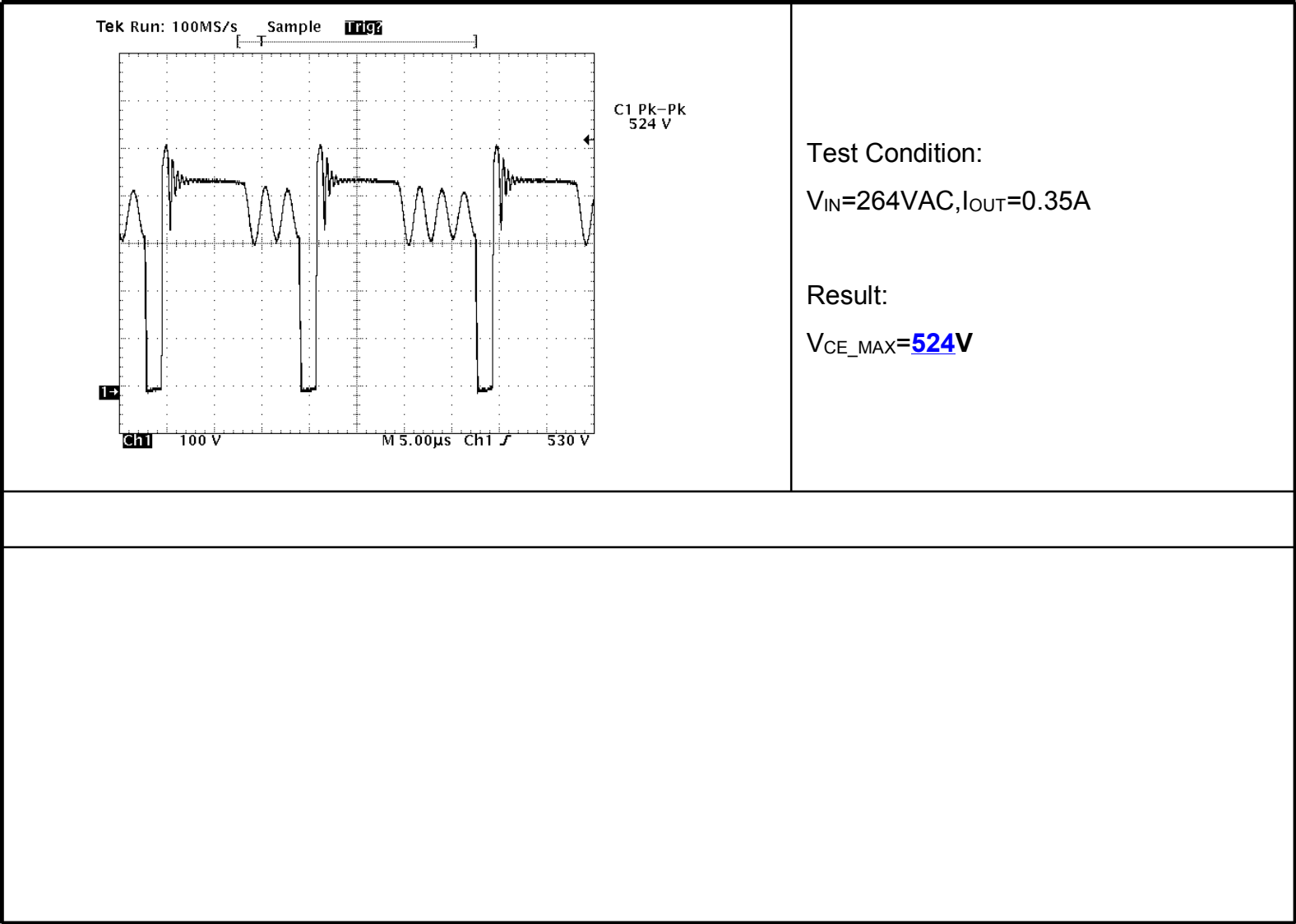
# 7. Output VI Characteristics

\* Note: Output voltage measured at PCB end,  $T_{AMB}=25\text{ }^{\circ}\text{C}$





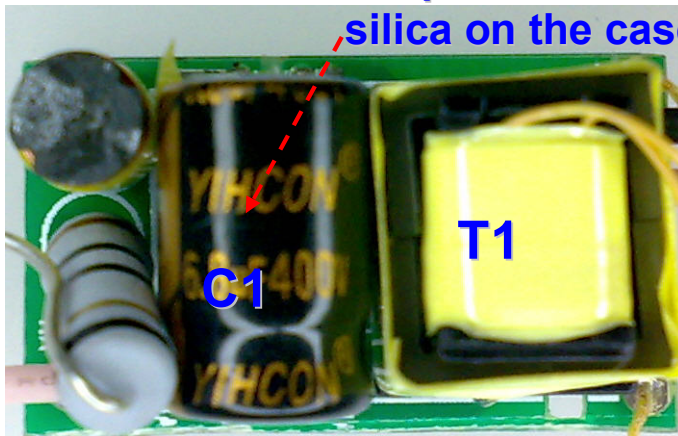
# 8. V<sub>CE</sub> Waveform



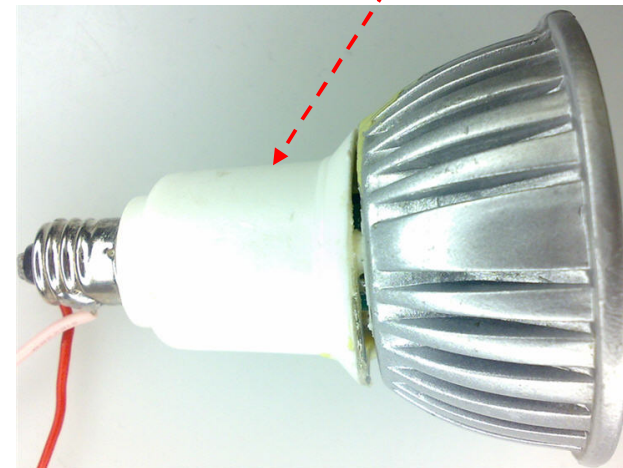
# 9. Thermal test

Component s	90Vac	264Vac
IC	87.6 ° C	85.9 ° C
C1 , 6.8uF/400V	71.7 ° C	76.6 ° C
T1	86.5 ° C	90.1 ° C
Ambient	23.1 ° C	24.2 ° C

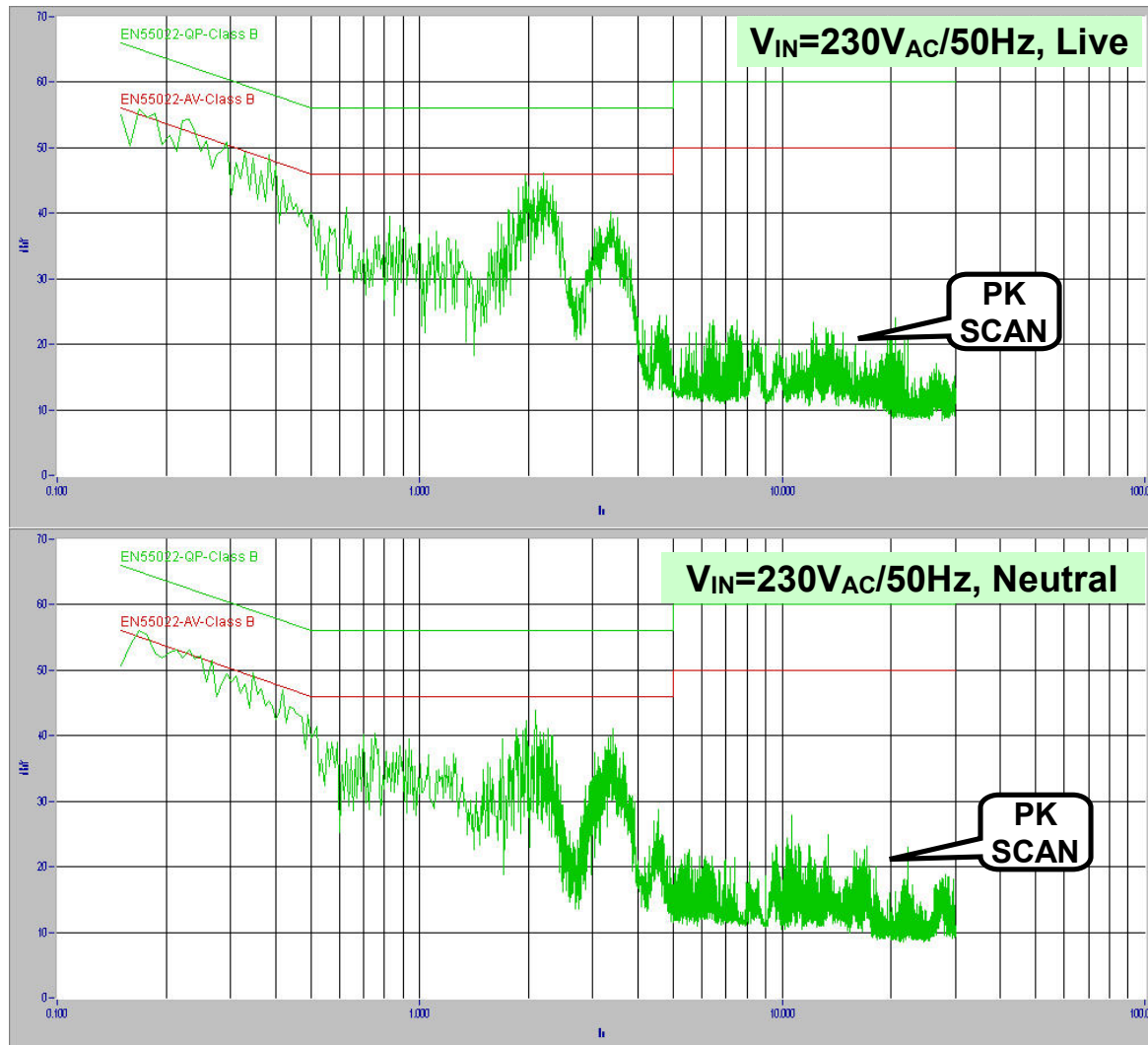
1810 is under the Ecap with thermal silica on the case



The driver is inside the case



# 10. Conducted EMI



Test Conditions : Resistive & Full load. Output ungrounded.