

LED Driver Design with iW1692

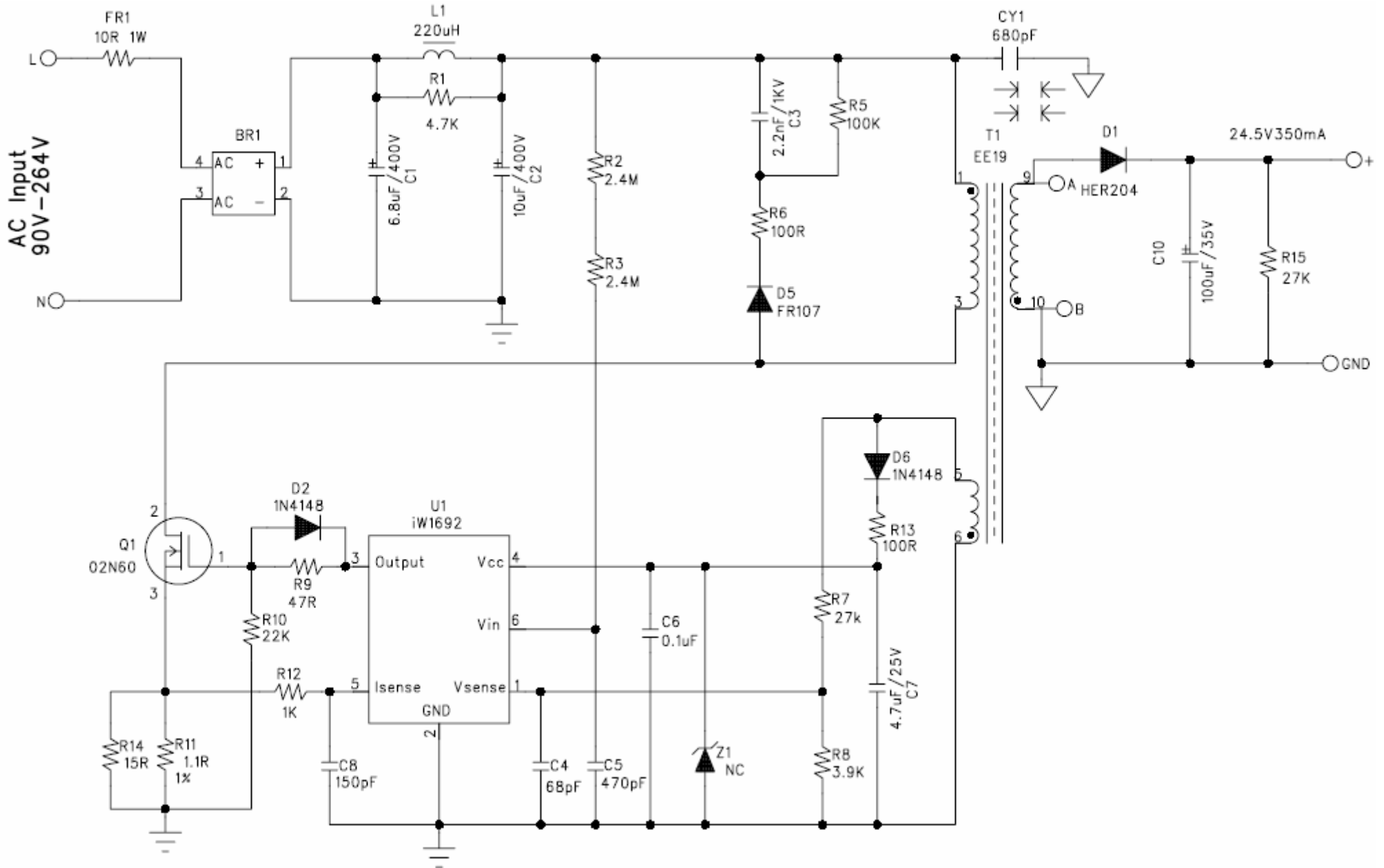
Summary and Features :

1. **7W LED driver, 24.5V, CC@0.35A ; Wide AC input range 90Vac-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.**

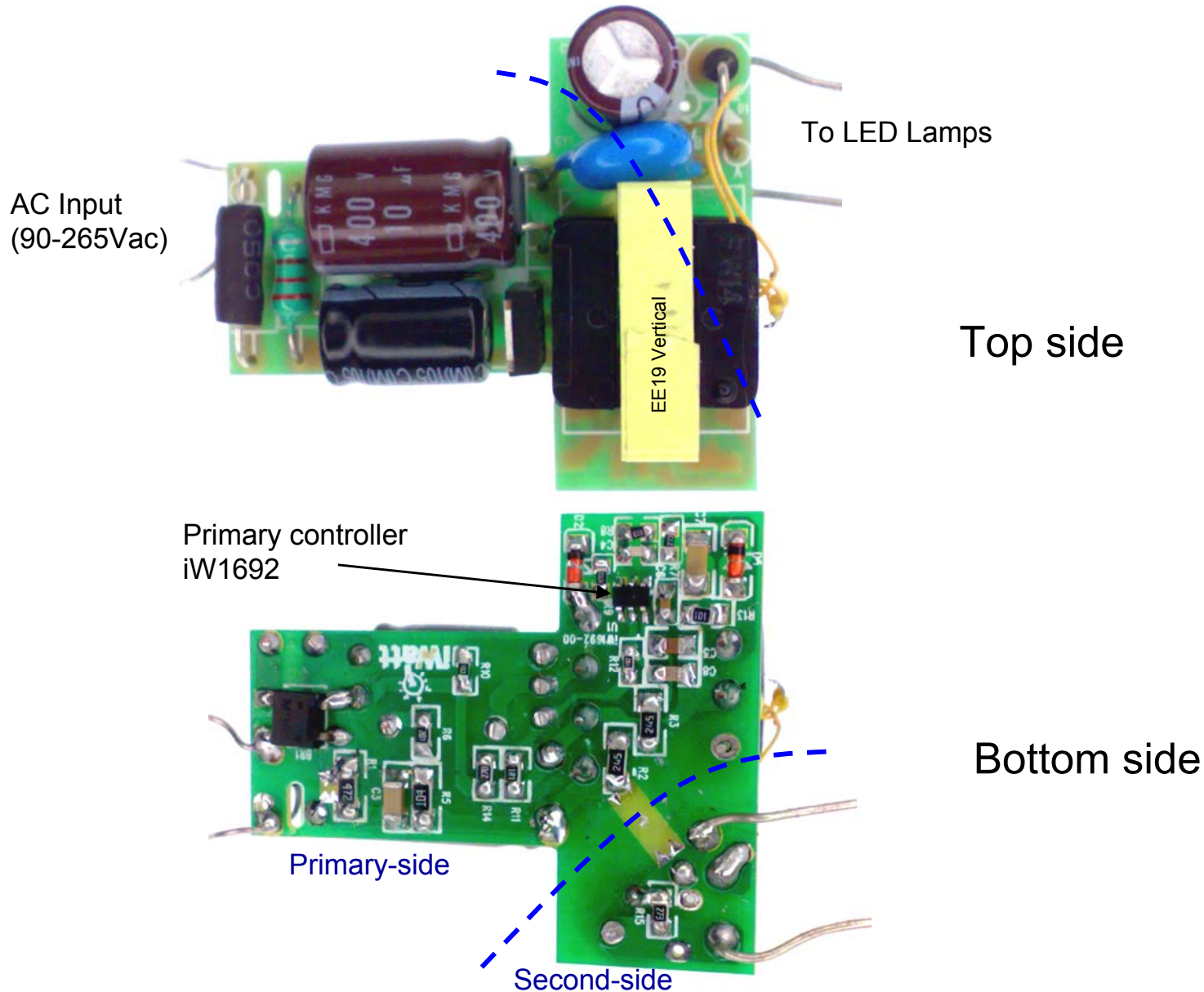
1. Specification

Description		Symbol	Min	Typ	Max	Units	Comment	
Input								
Voltage		V_{IN}	90		264	V _{AC}	2 Wire	
Frequency		f_{LINE}	47	50/60	63	Hz		
Open-load Input Power (264V _{AC})						W		
Output								
Const Voltage	Output Voltage	V_{OUT_CV}		24.5		V	Measured at the PCB connector	
	Output Current	I_{OUT_CV}		0.35		A		
Const Current	Output Voltage	V_{OUT_CV}				V	Min Vout is depend on Vcc	
	Output Current	I_{OUT_CV}		0.35		A		
Total Output Power								
Continuous Output Power		P_{OUT}				W		
Over Current Protection		I_{OUT_MAX}			0.4	A	Auto-restart	
Efficiency		η	80			%	Measured at end of PCB, (T _A = 25 °C)	
Environmental								
Conducted EMI			Meets EN55015B					
Safety								
Operation Temperature		T_{opr}			50	° C	Free convection, sea level	

2. Schematic circuit



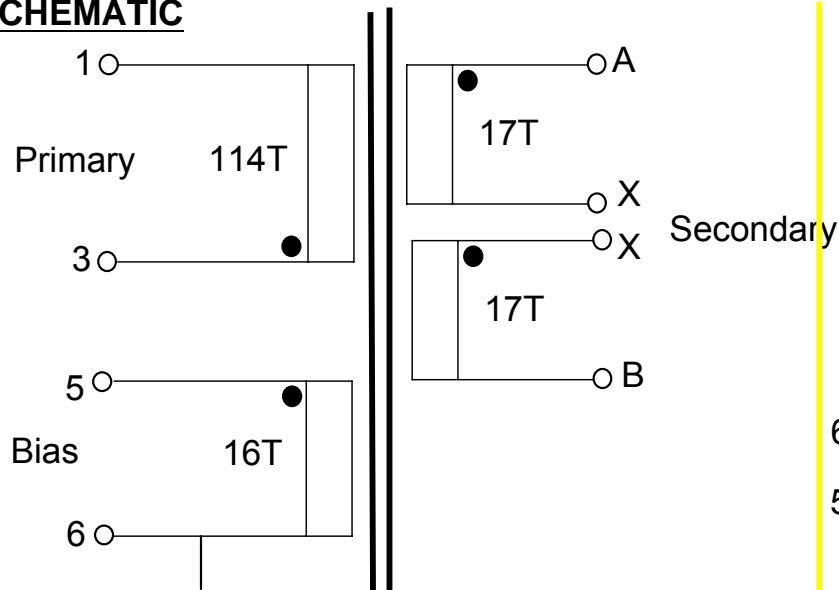
3. Circuit Board Photograph



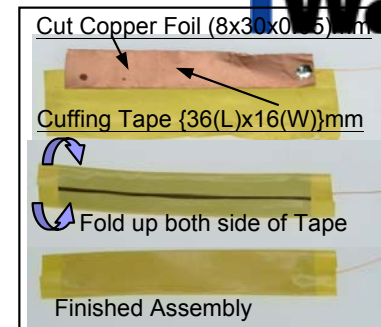
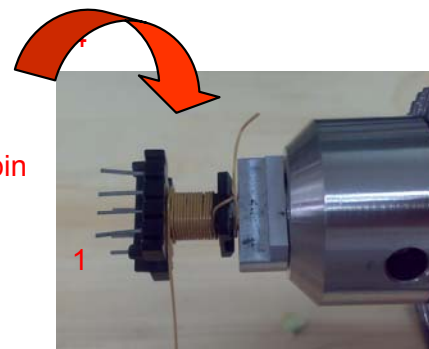


4. Transformer Design

SCHMATIC



Clockwise looking at pin 1-5 side



Small solder joint with fine wire

Top

ELECTRICAL SPECIFICATIONS:

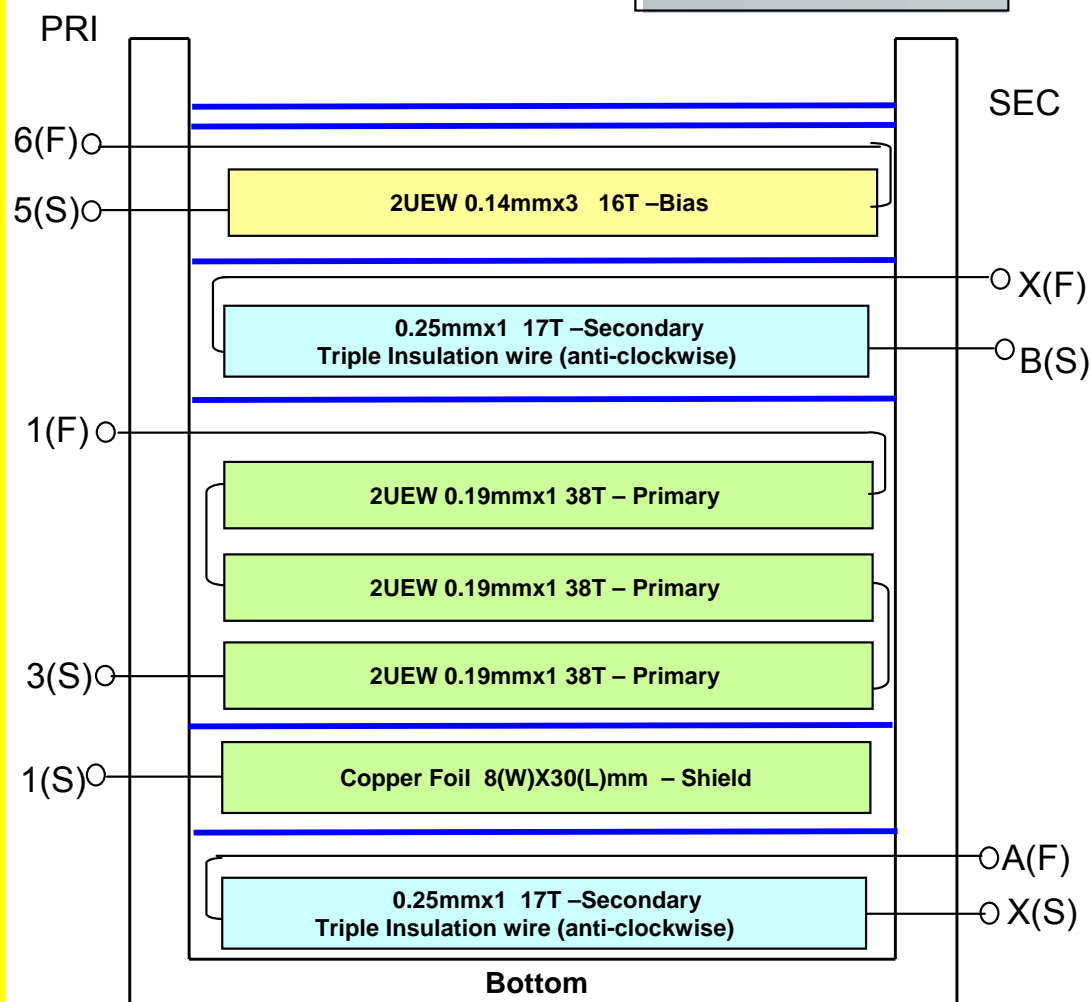
1. Primary Inductance (L_p) = 0.9mH @10KHz
2. Primary Leakage Inductance (L_k) \leq 30uH@10KHz

MATERIALS:

1. Core : EE19 (Ferrite Material TDK PC40 or equivalent)
2. Bobbin : EE19 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 primary ground (Pin6)

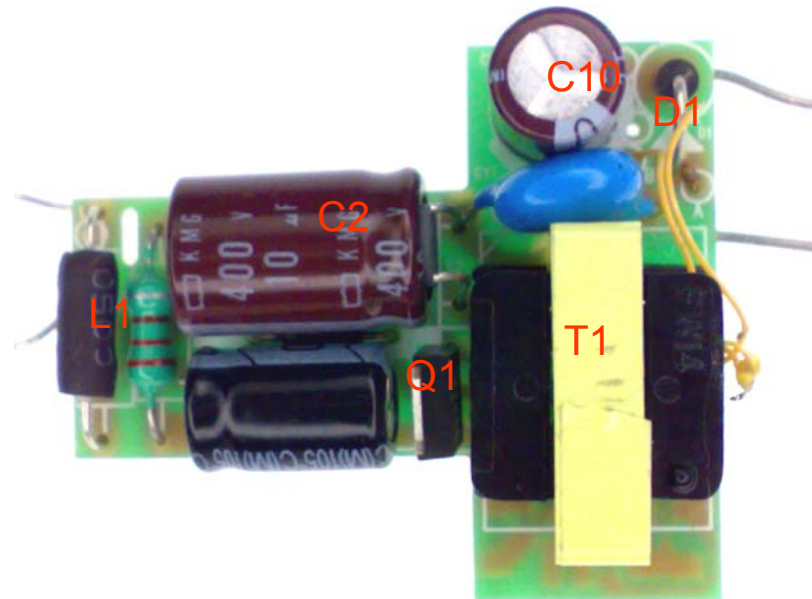


5. Bill of Material

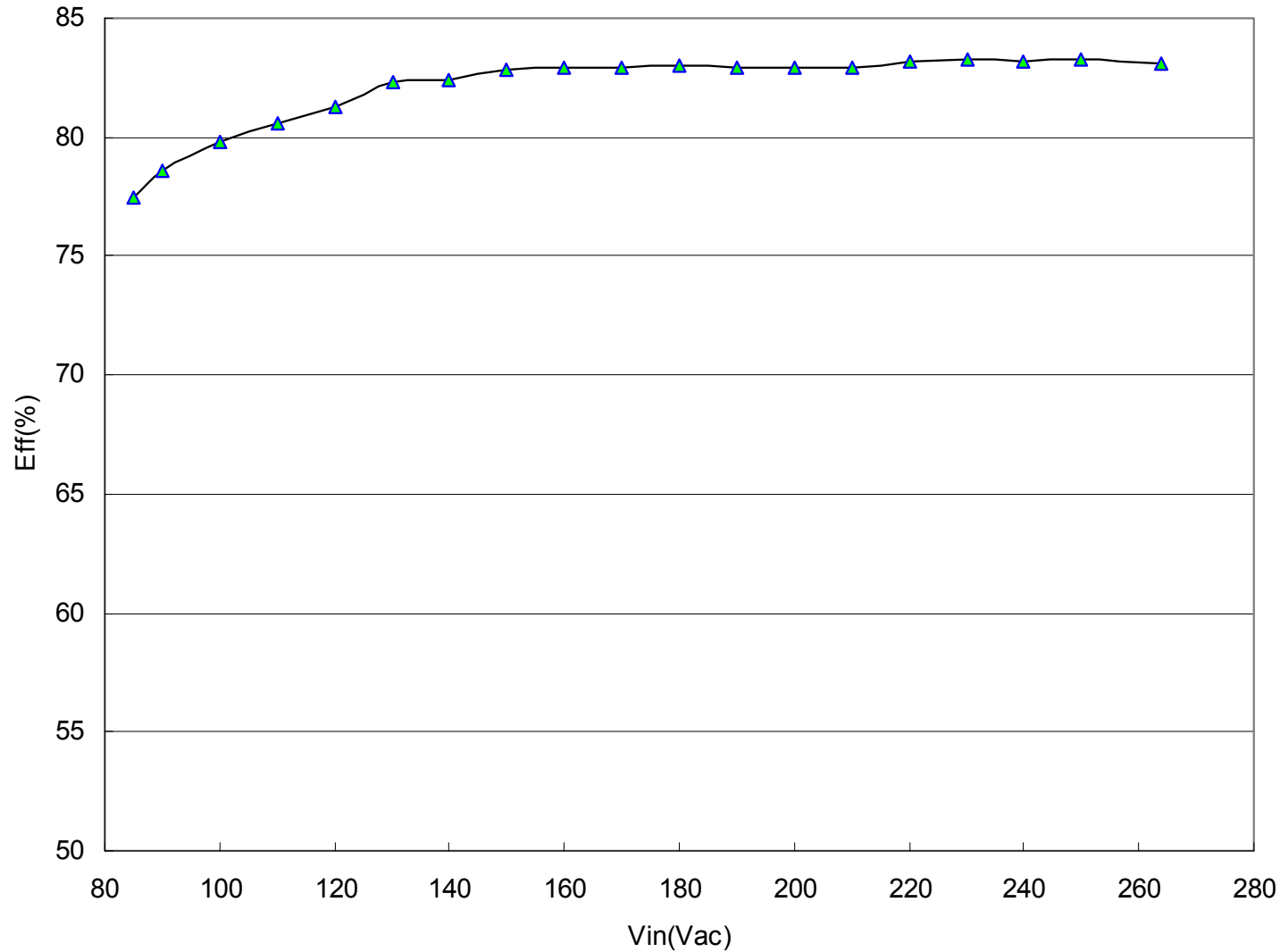
Item	Qty.	Ref.	Description	Cost (US Cent) / unit	Sub-Total (Cent)
1	1	U1	iW1692, Off-line digital PWM Controller, SOT-6		
2	1	C1	4.7uF, 400V, E-CAP, 105'C		
3	1	C2	10uF, 400V, E-CAP, 105'C		
4	1	C3	2.2nF, 1KV, Ceramic Capacitor,SMD-1206		
5	1	C4	68pF, 50V, NPO, SMD-0603		
6	1	C5	470pF, 50V, NPO, SMD-0805		
7	1	C6	0.1uF, 50V, NPO, SMD-0603		
8	1	C7	4.7uF, 50V, E-CAP, Low ESR		
9	1	C8	150pF, 50V, SMD-0805		
10	1	C10	100uF, 35V, Low ESR E-CAP,		
11	1	R1	4.7kΩ ±5 %, SMD-0805		
12	2	R2,R3	2.4MΩ,±1 %, SMD-1206		
13	1	R5	100kΩ,±5 %, SMD-1206		
14	1	R6	100Ω,±5 %, SMD-0805		
15	2	R7,R10	27kΩ,±5 %, SMD-0805		
16	1	R8	3.9kΩ,±5 %, SMD-0603		
17	1	R9	47Ω ±5 %, SMD-0805		
18	1	R11	1.1Ω ±1 %, SMD-0805		
19	1	R12	1kΩ ±5 %, SMD-0603		
20	1	R13	100Ω ±5 %, SMD-0805		
21	1	R14	Trim, SMD-0805		
22	1	R15	27k±5 %, SMD-0805		
23	1	D1	HER204, Rectifier Diode,		
24	1	D5	FR107, Rectifier Diode, DO-41		
25	2	D2,D6	1N4148 0.1A/100V, LL-34		
26	1	BR1	Rectifier Bridge MB8S		
27	1	FR1	10R 1W Fusible resistor		
28	1	L1	220uH, Filter Inductor,0510		
29	1	Q1	02N6G, TO-251		
30	1	Z1	15V,0.5W		
31	1	CY1	680pF,Y1		
32	1	T1	EE19 Transformer		
			Total BOM (Based on 100K/M volume)		

6. Temperature Rise Test

Item	90Vac		264Vac	
	T(°C)	Tr(°C)	T(°C)	Tr(°C)
Input Inductance(L1)	96	28	61.8	2.8
Input Bulk-Cap(C2)	79	11	67	8
Power Transistor(Q1 02N6G)	88.8	20.8	79.6	20.6
Transformer(T1)	83.1	15.1	77.2	18.2
Output Diode(D1)	79.4	11.4	75	16
Output E-Cap(C10)	77.3	9.3	72.5	13.5
Ambient Temperature	65		59	



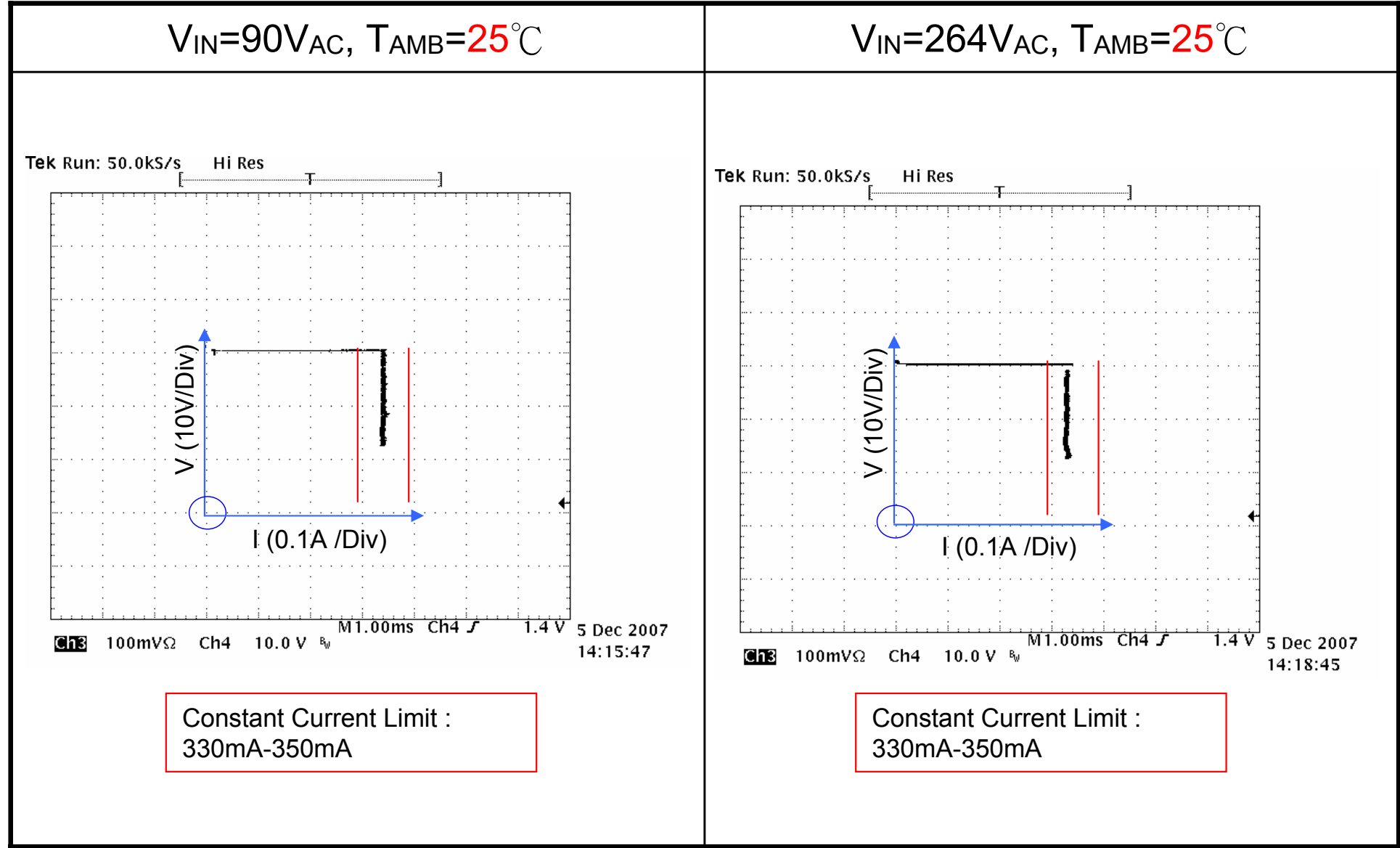
7. Efficiency Measurement



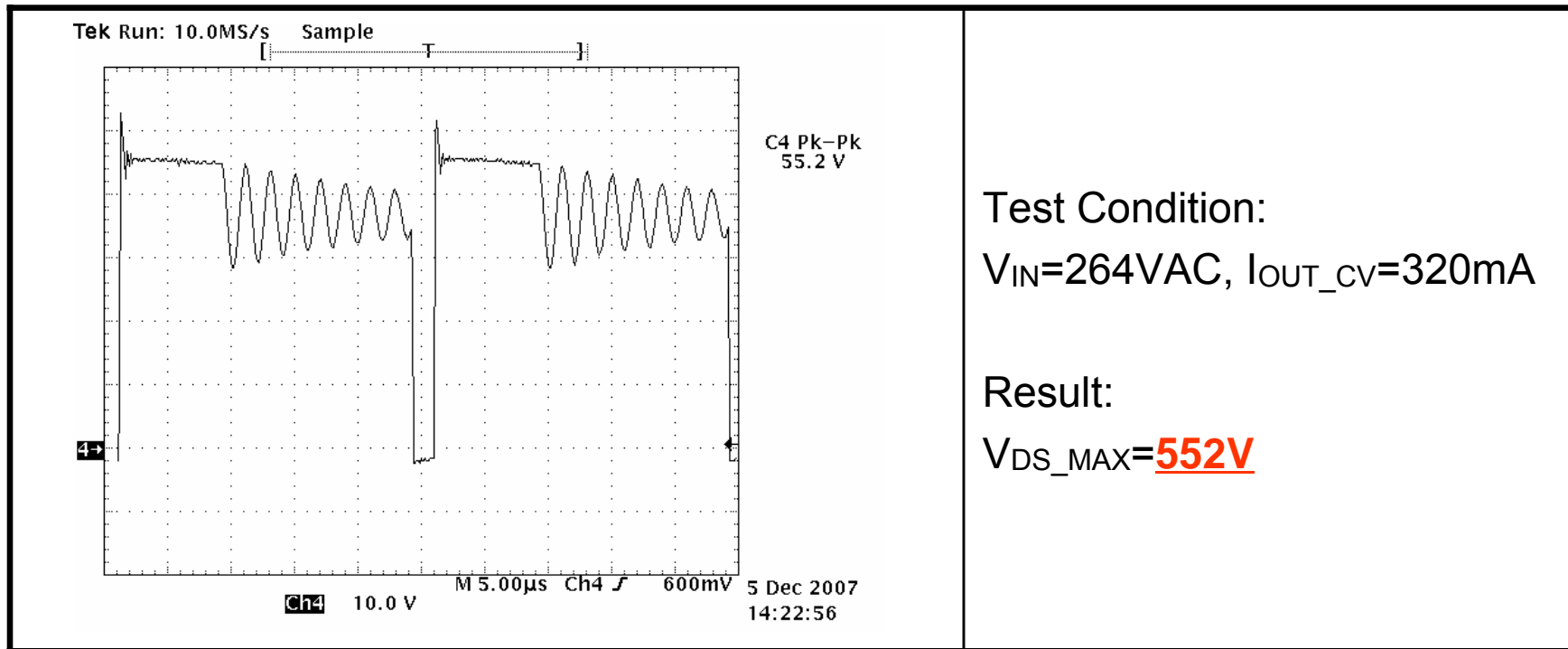
*** Note: Output voltage measured at PCB end.**

8. Output VI Characteristics

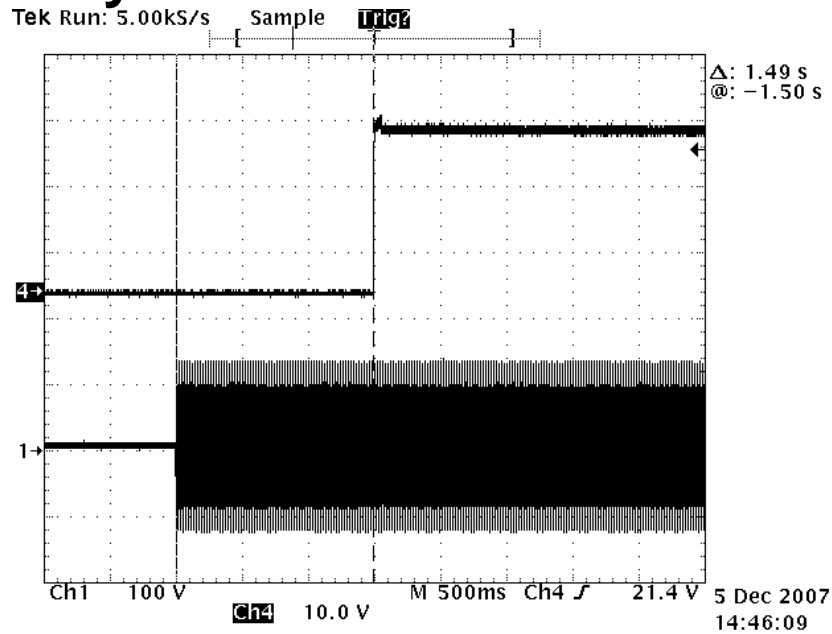
* Note: Output voltage measured at PCB end, $T_{AMB}=25^{\circ}\text{C}$



9. V_{DS} waveform

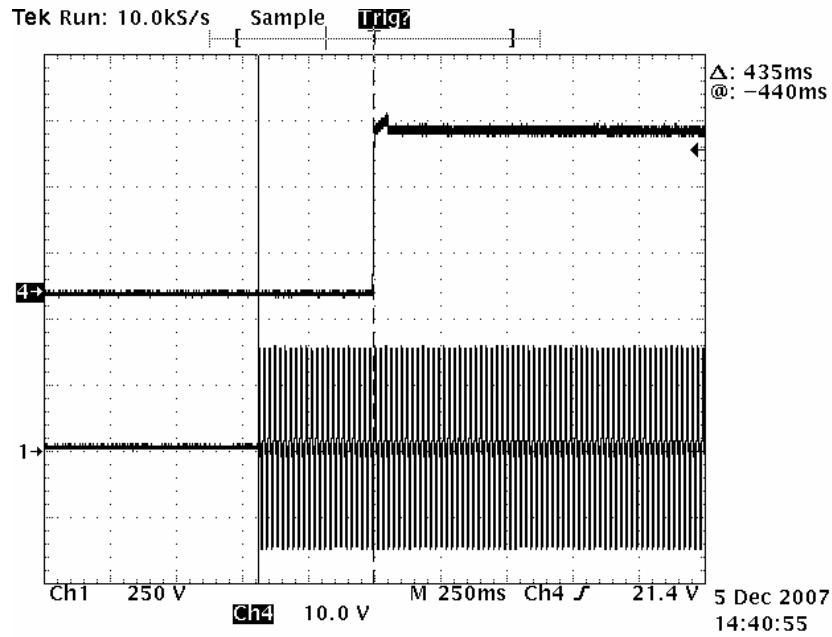


10. Turn On Delay Time



90V_{AC}, Full Load

$T_{ST_DELAY} = 1.49\text{S}$

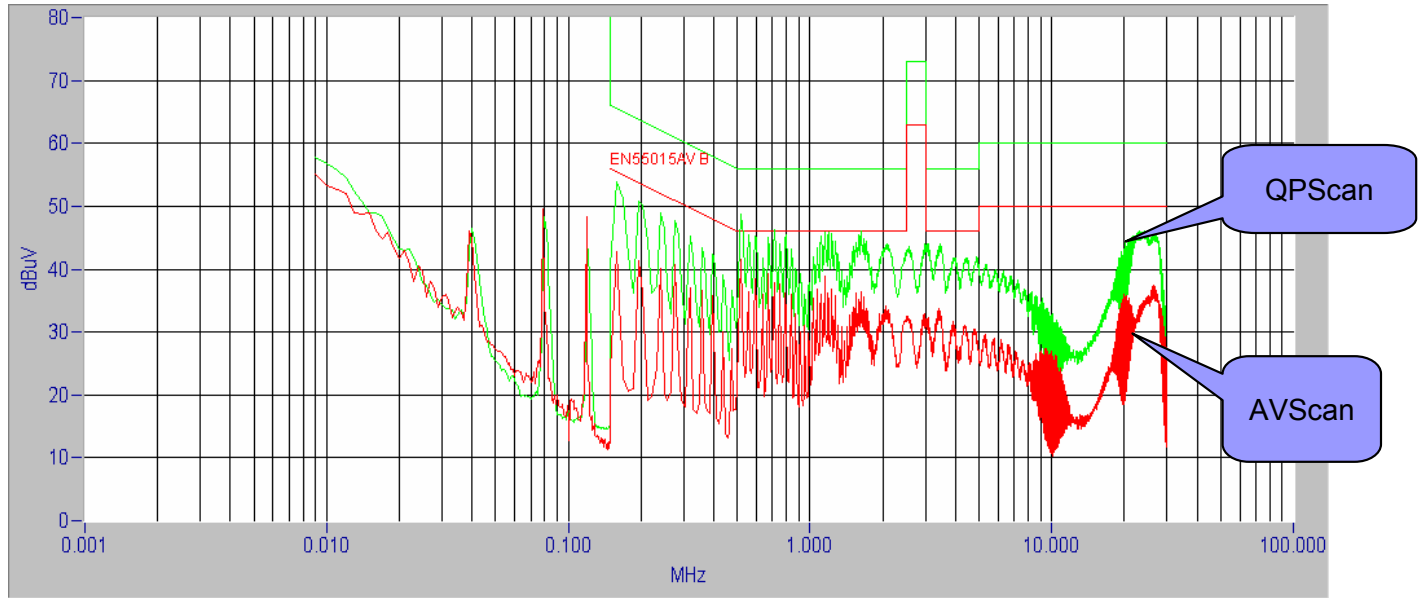


264V_{AC}, Full Load

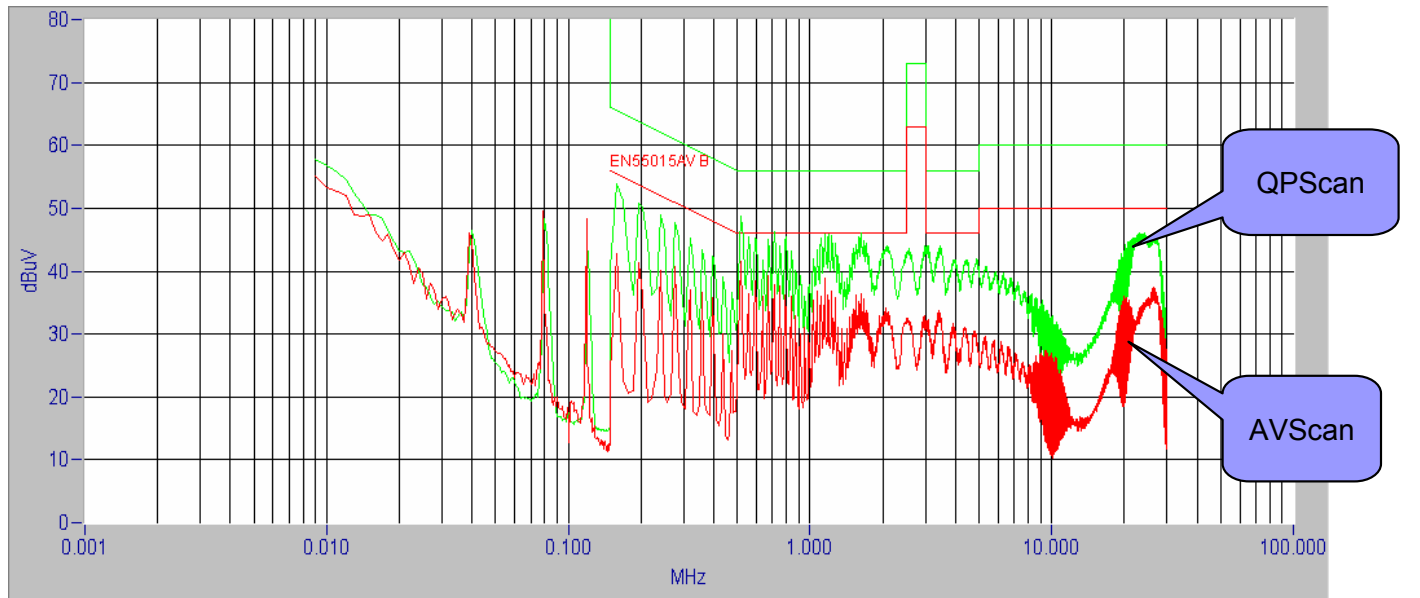
$T_{ST_DELAY} = 435\text{mS}$

11. Conducted EMI

230V_{AC}/50Hz, Live



230V_{AC}/50Hz, Neutral



Test Conditions : LED Full load. Output Ungrounded.