

# ***LED Driver with ZA8756H***

*(AC input 90-264Vac, Output 56V 200mA)*

*Mode: ZP56U20L706CBNEA*

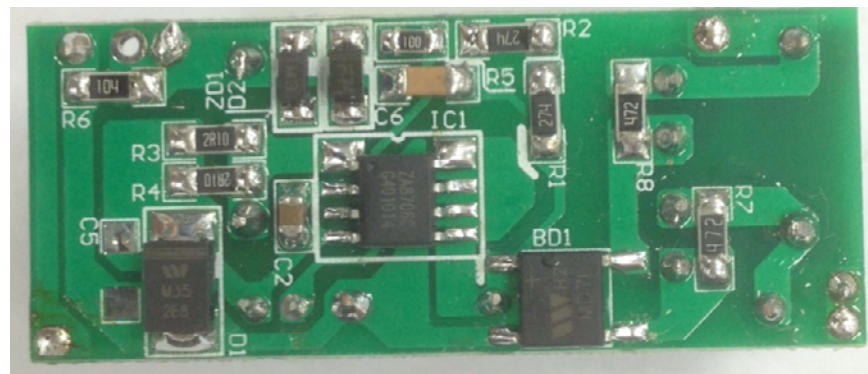
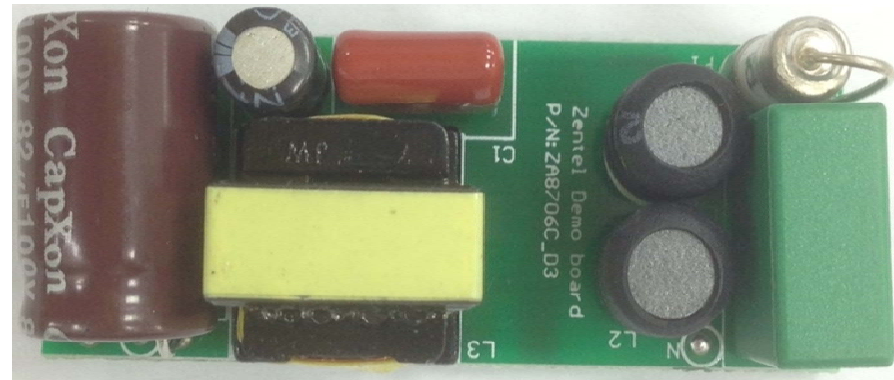
**Zentel**

## ***General Design Specification:***

- 1. AC Input Range 90Vac~264Vac***
- 2. DC Output 56V(17LED's),200mA***
- 3. Non-isolated & EMI***
- 4. High Efficiency***
- 5. High Power factor***

# Outline

- *Test Equipments*
- *Basic electrical properties*
- *Line regulation*
- *Efficiency*
- *Power Factor*
- *LED open protection*
- *LED short circuit protection*
- *Start up test*
- *Inductor waveform*
- *MOSFET waveform*
- *Diode waveform*
- *Schematic*
- *BOM List*
- *PCB Layout*



# *Test Equipments*

Name	Mark
AC Source	Chroma 6120
Oscilloscope	Tektronix WR6050
Power Meter	Chroma 66202
Electronic Load	Chroma 6301+63010
Current Amplifier	Tektronix AM503+TM502A
Multimeter	Fluke 45

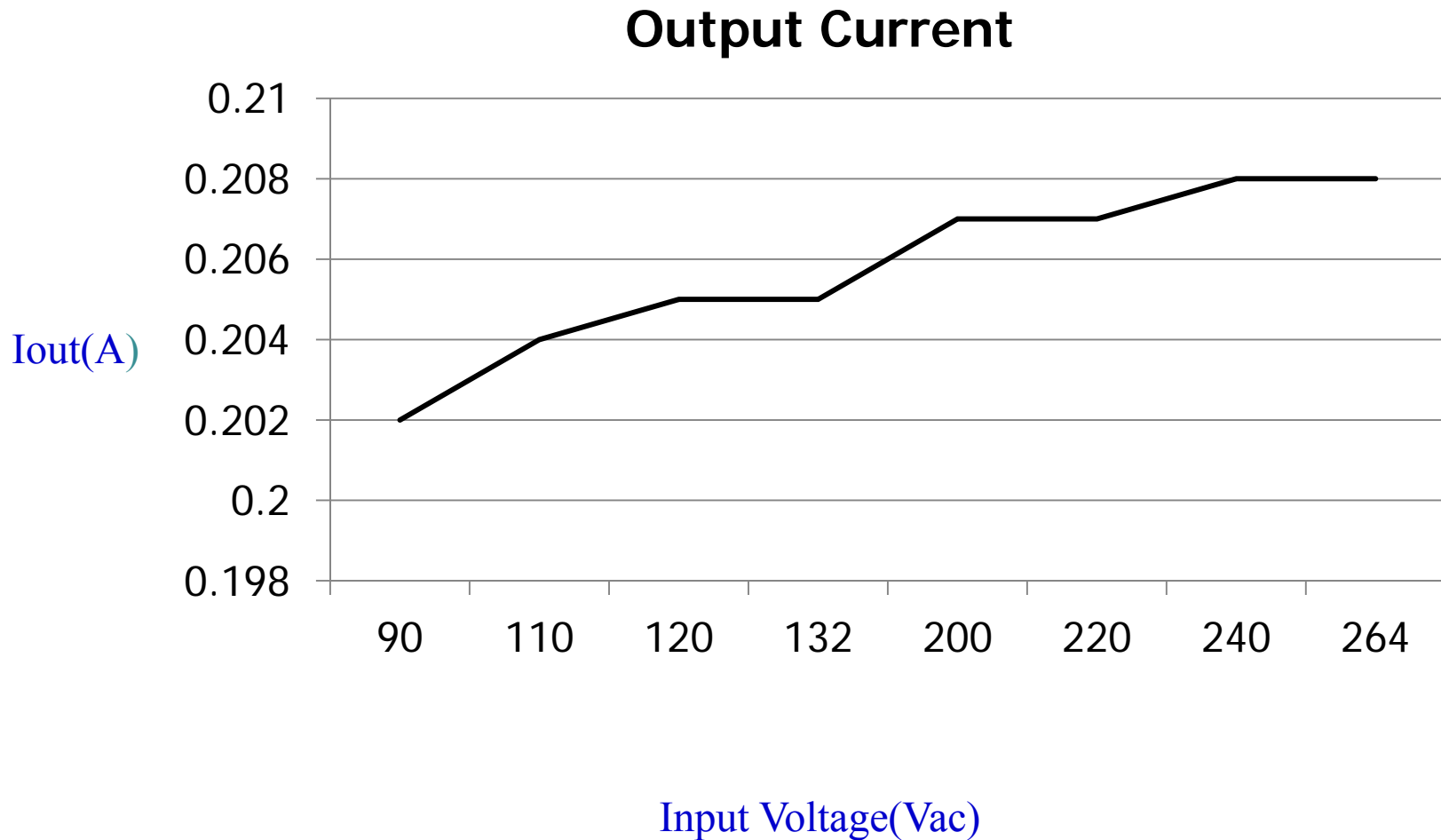
Electronic Characteristics Test Items List

All test conditions are base on ambient temperature 25°C;

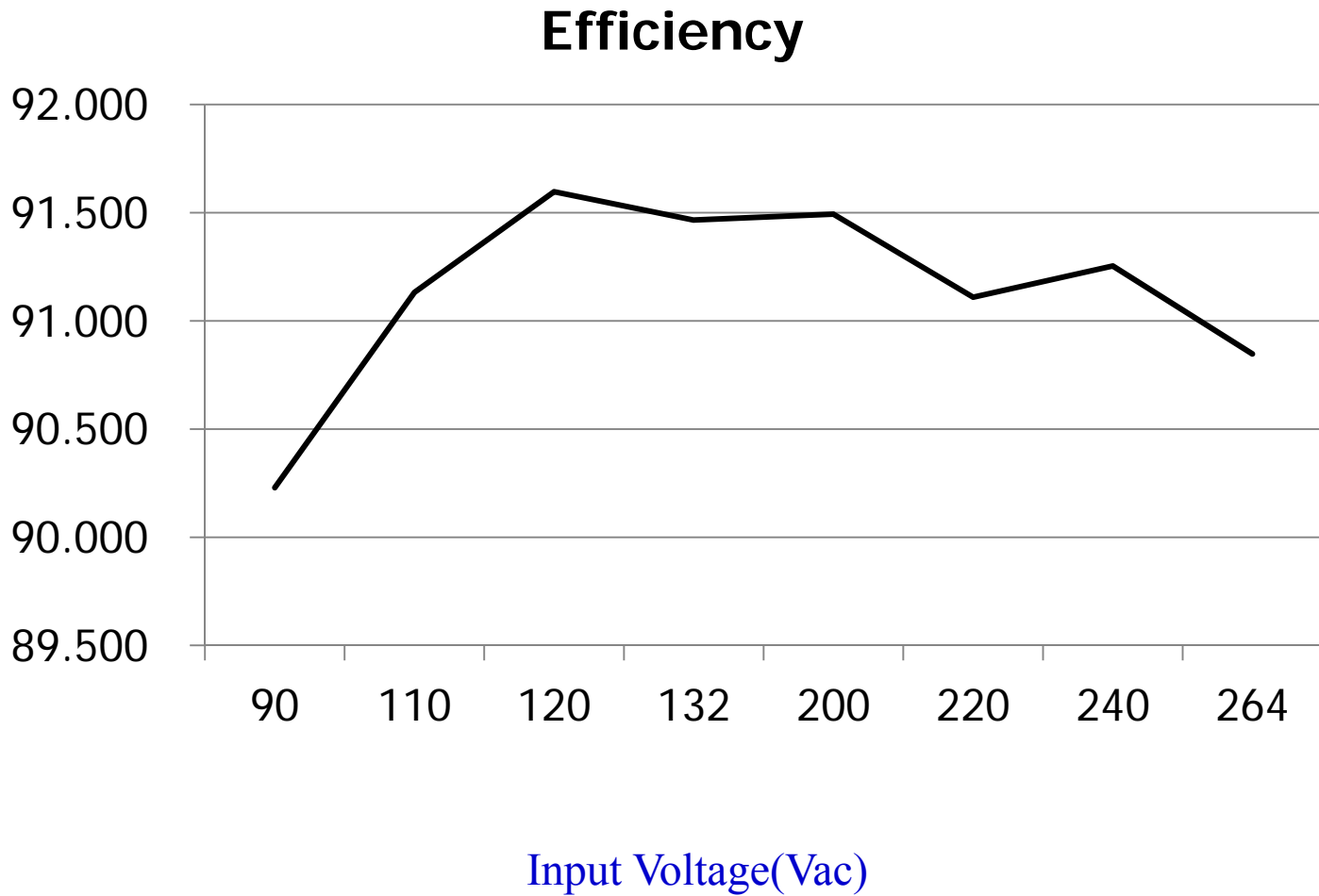
# *Basic electrical properties*

Vin	V-output	I-output	Output Watt	Input Watt	Efficiency(%)	PF	THDi(%)
90	56.21	0.202	11.354	12.584	90.229	0.9684	25.481
110	56.18	0.204	11.461	12.576	91.132	0.9756	21.611
120	56.16	0.205	11.513	12.569	91.597	0.9764	20.424
132	56.12	0.205	11.505	12.578	91.466	0.9761	20.015
200	56.16	0.207	11.625	12.706	91.493	0.9545	21.881
220	56.14	0.207	11.621	12.755	91.109	0.9435	22.298
240	56.13	0.208	11.675	12.794	91.254	0.9298	22.586
264	56.12	0.208	11.673	12.849	90.847	0.9137	22.762

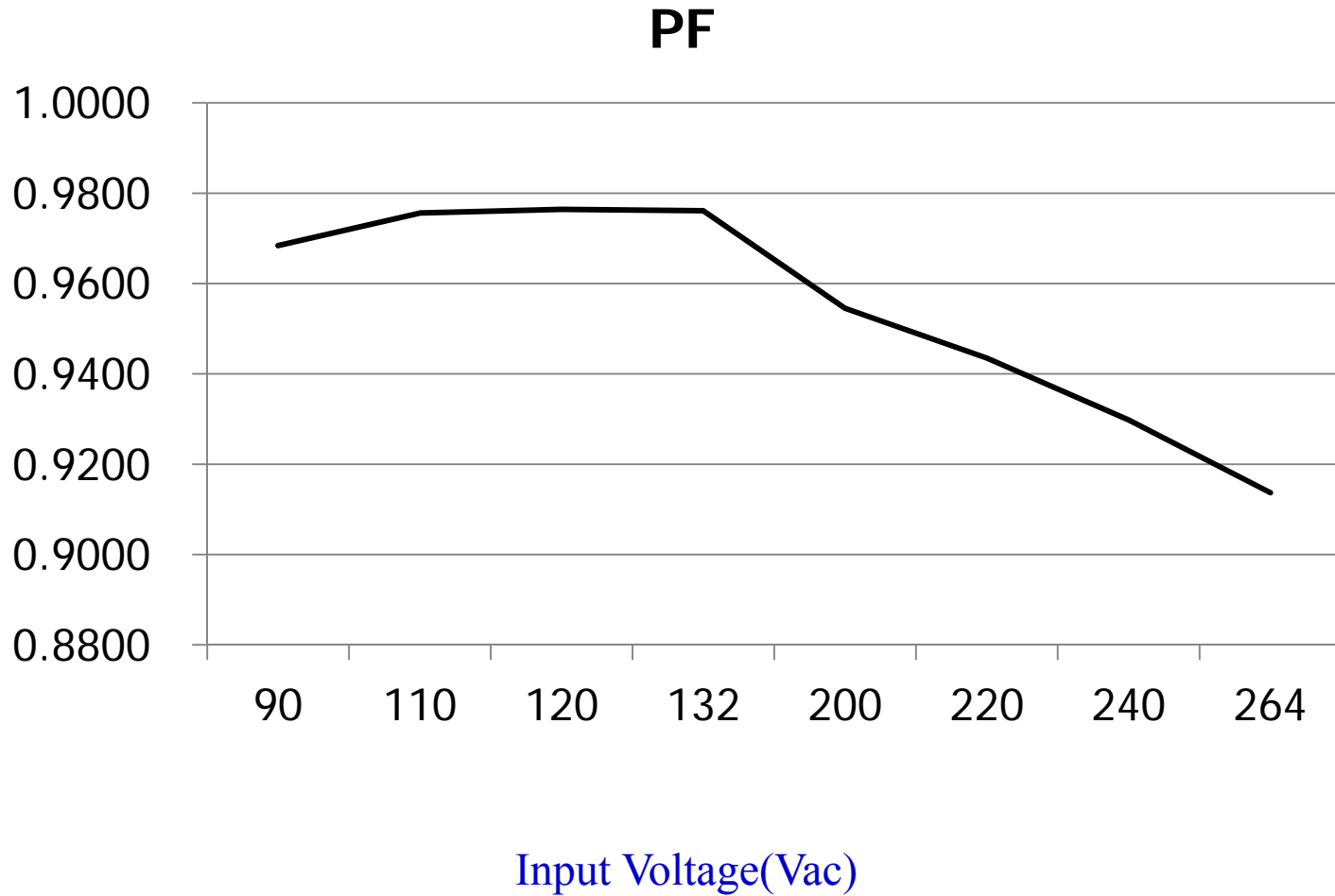
# Output Current Line Regulation



# Efficiency



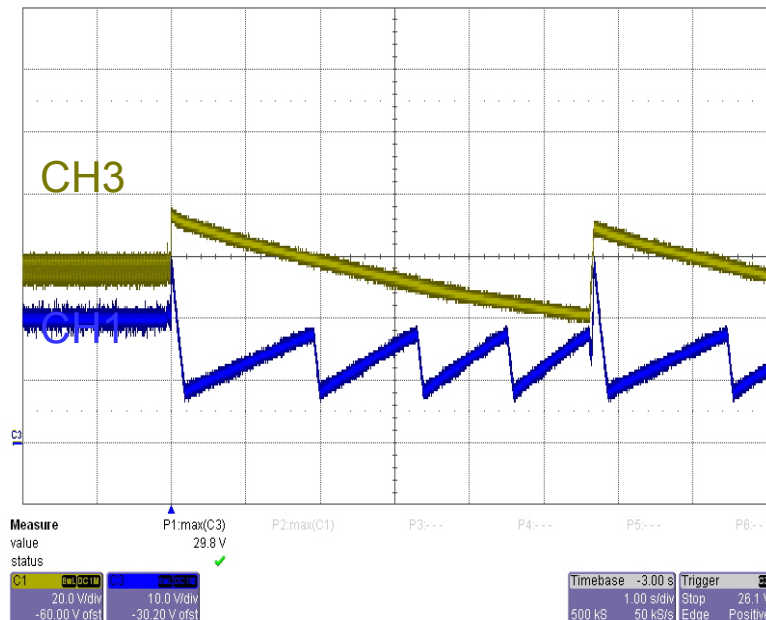
# Power Factor



# LED Open Protection

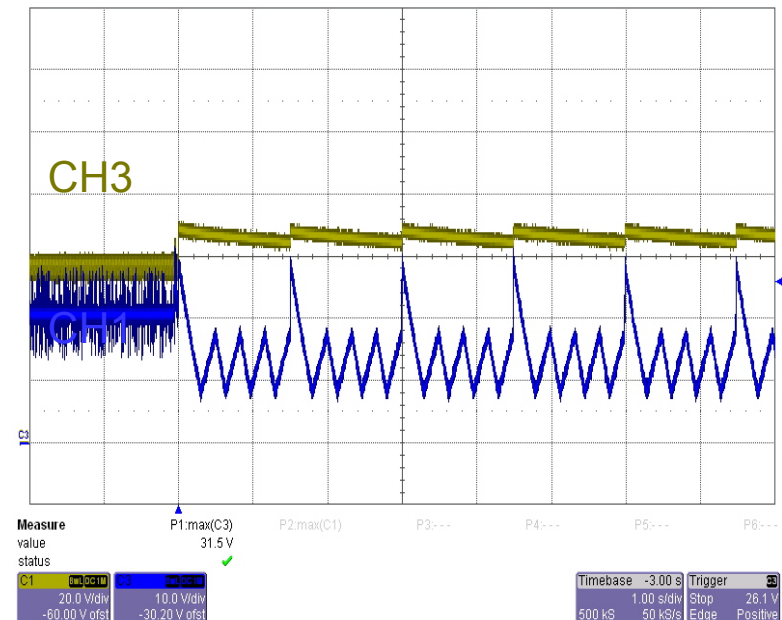
CH1: Vcc; CH3: output Voltage

90Vac



90Vac output =open  
 Input Watt=0.012W  
 Vcc OVP=30V, Vo=75V

264Vac



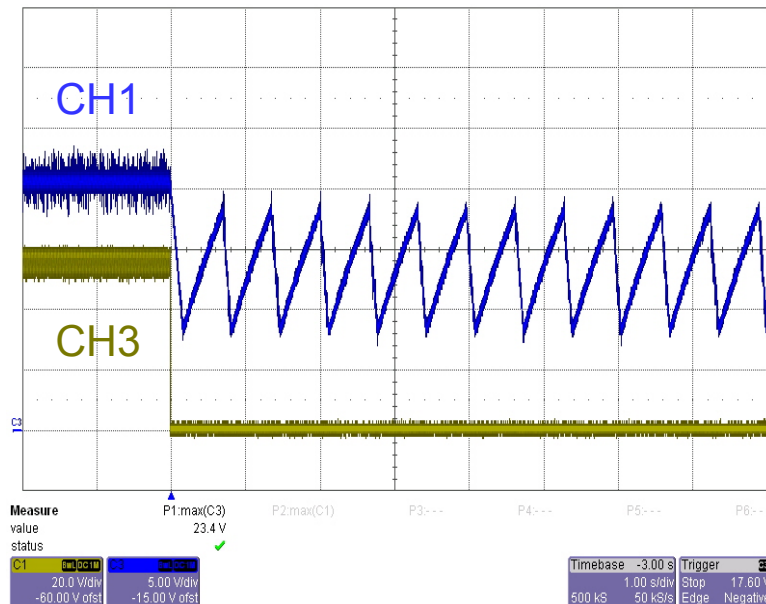
90Vac output =open  
 Input Watt=0.195W  
 Vcc OVP=30V, Vo=70V



# LED Short Circuit Protection

CH1: output Voltage ; CH3: Vcc

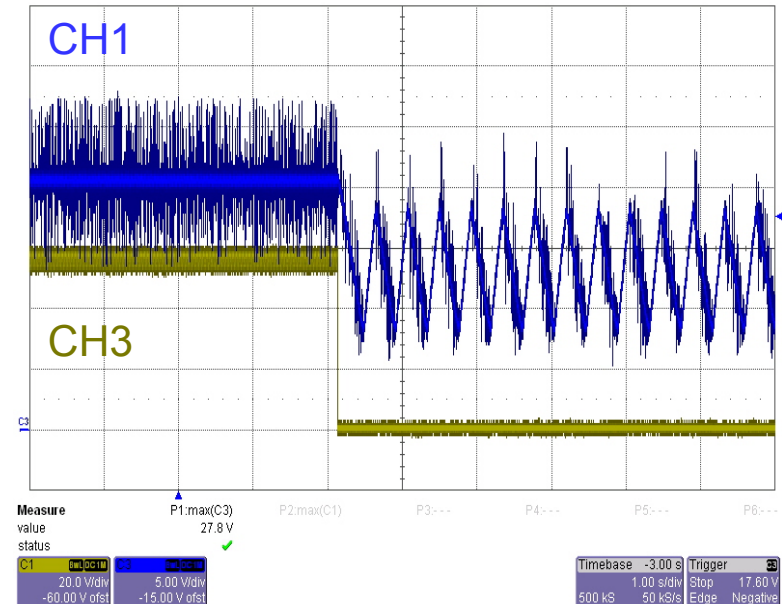
90Vac



90Vac output =short circuit

Input Watt=0.1099W

264Vac



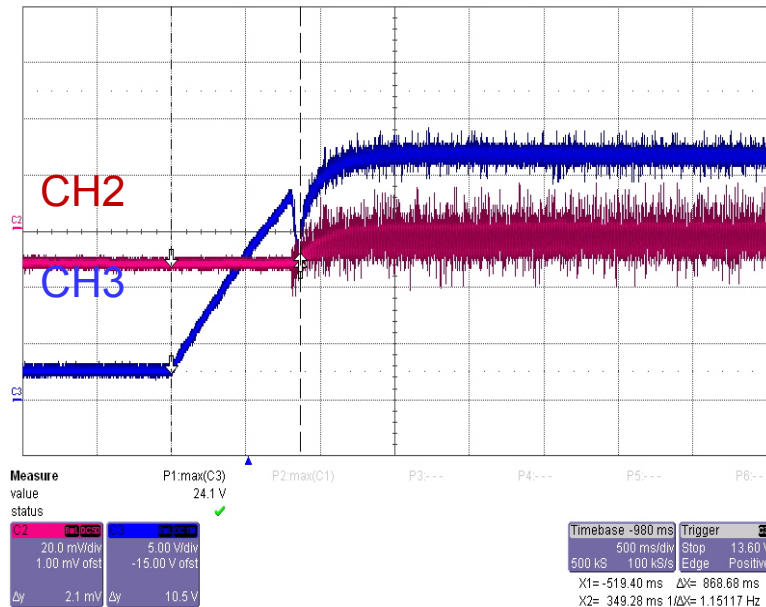
264Vac output =short circuit

Input Watt=0.3821W

# Start up test

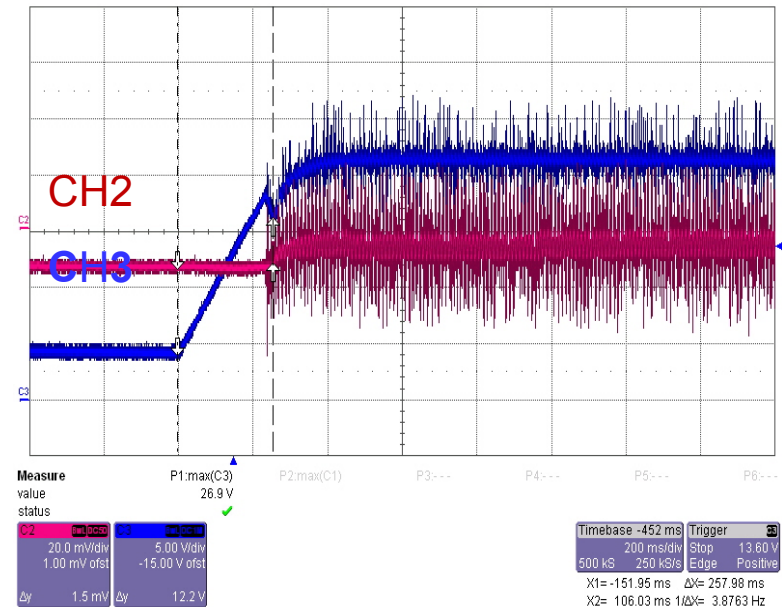
CH2: Output Current, CH3: VCC

90Vac



90Vac Start up time=0.868 Sec

264Vac

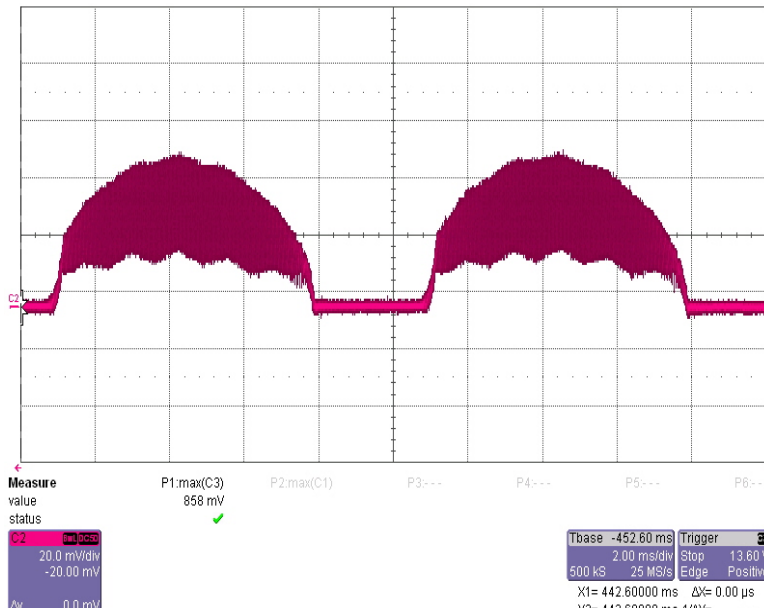


264Vac Start up time=0.258 Sec

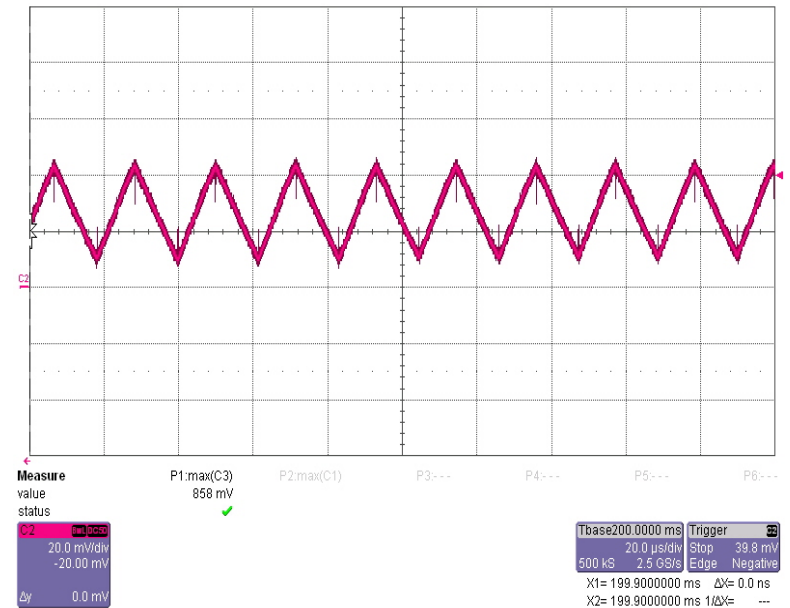
# Inductor Current waveform

CH2: Inductor Current

90Vac



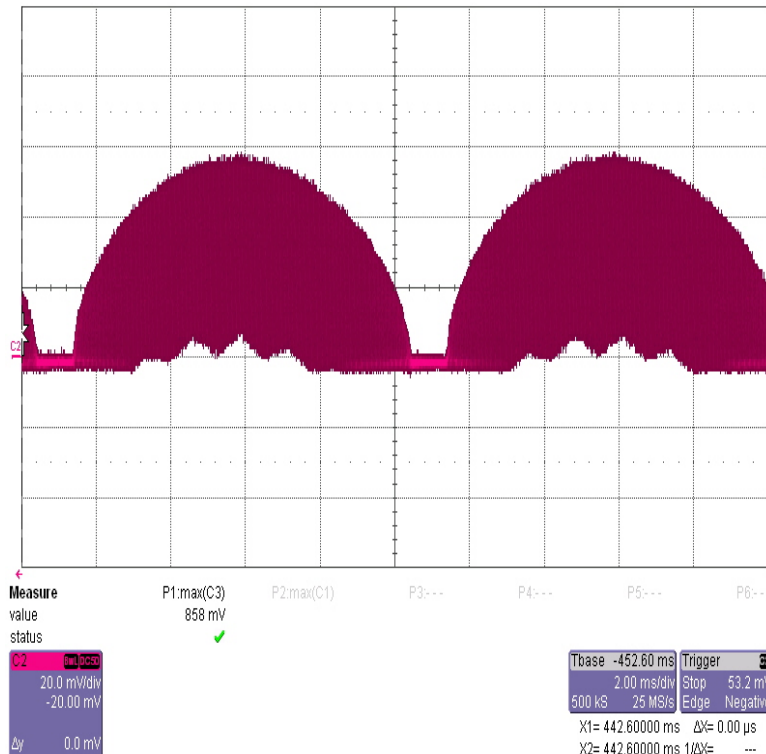
90Vac



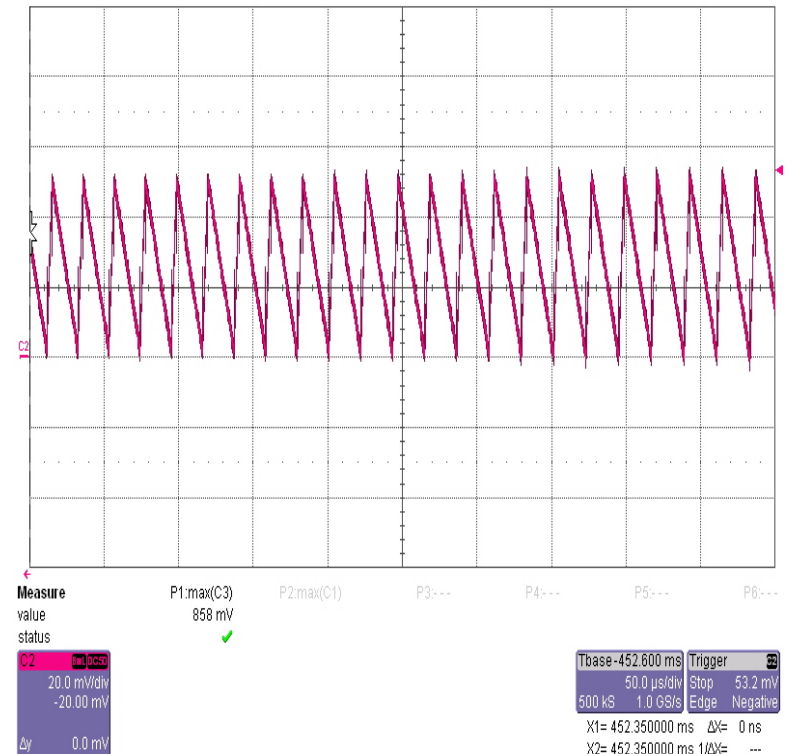
# Inductor Current waveform

## CH3: Inductor Current

264Vac



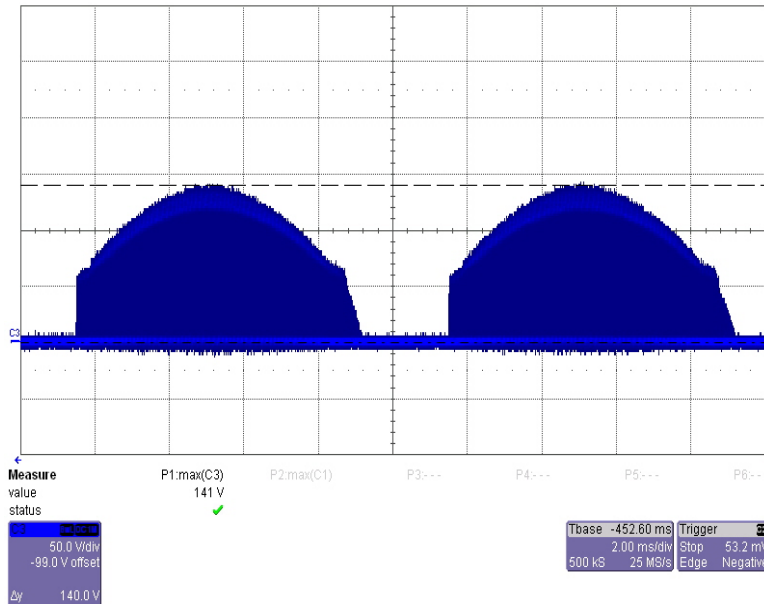
264Vac



# MOSFET Vds waveform

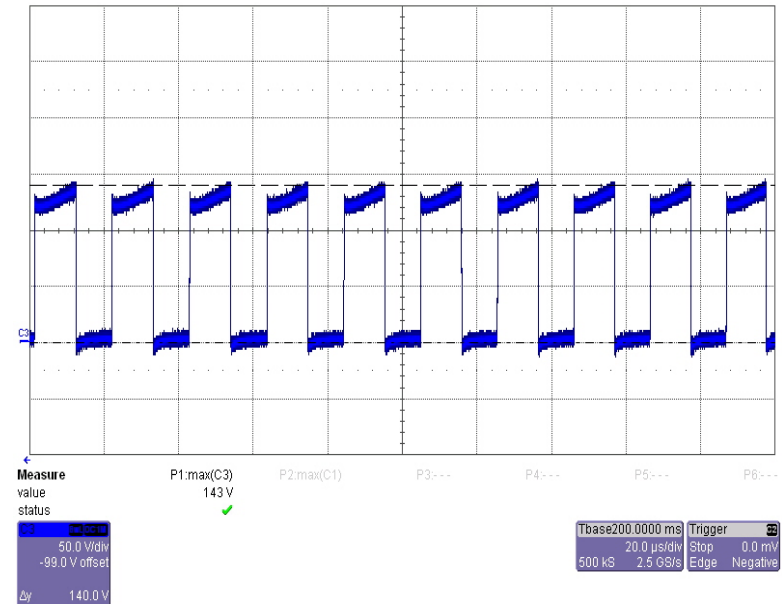
CH2: MOSFET Vds

90Vac



Vds=141V

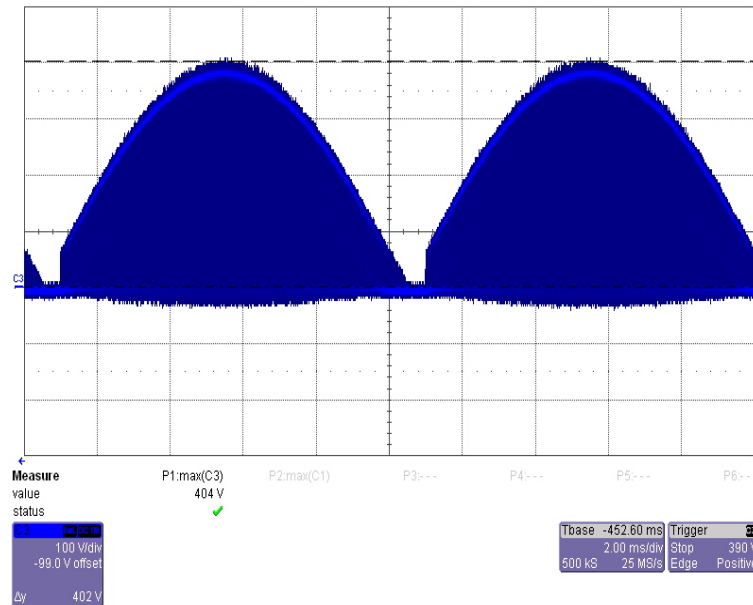
90Vac



# MOSFET Vds waveform

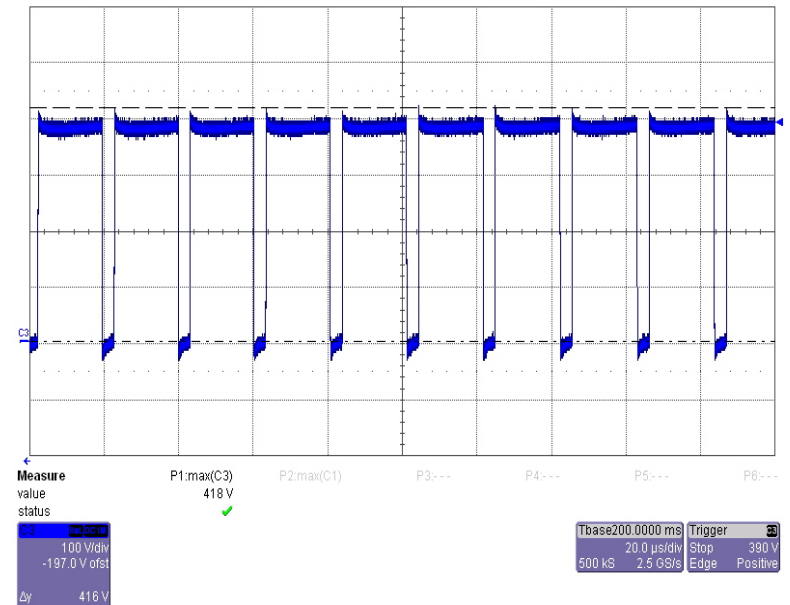
CH2: MOSFET Vds

264Vac



Vds=416V

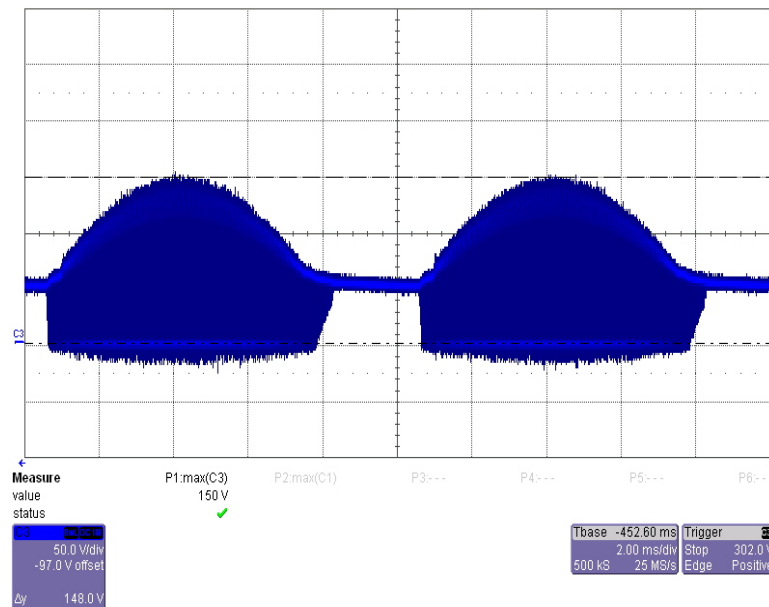
264Vac



# Diode waveform

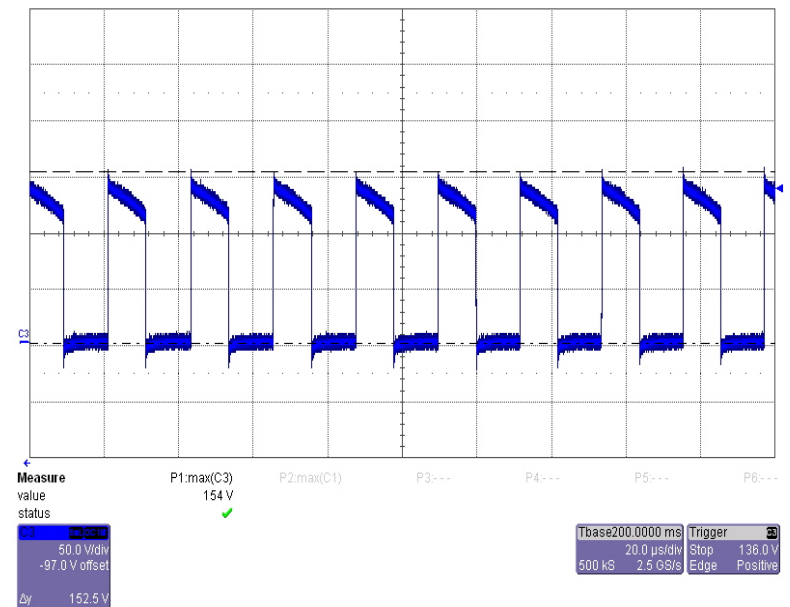
CH2: Diode Voltage

90Vac



Vdiode=154V

90Vac

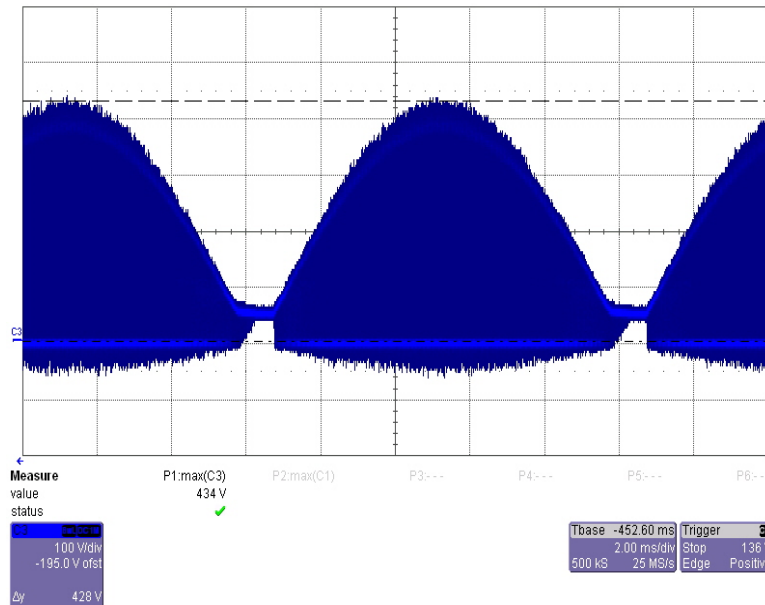




# Diode waveform

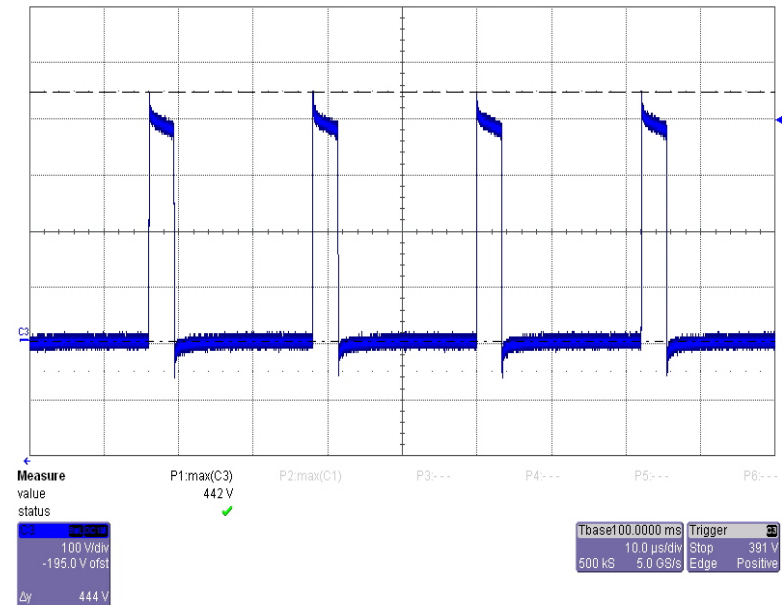
CH2: Diode Voltage

264Vac



Vdiode=442V

264Vac



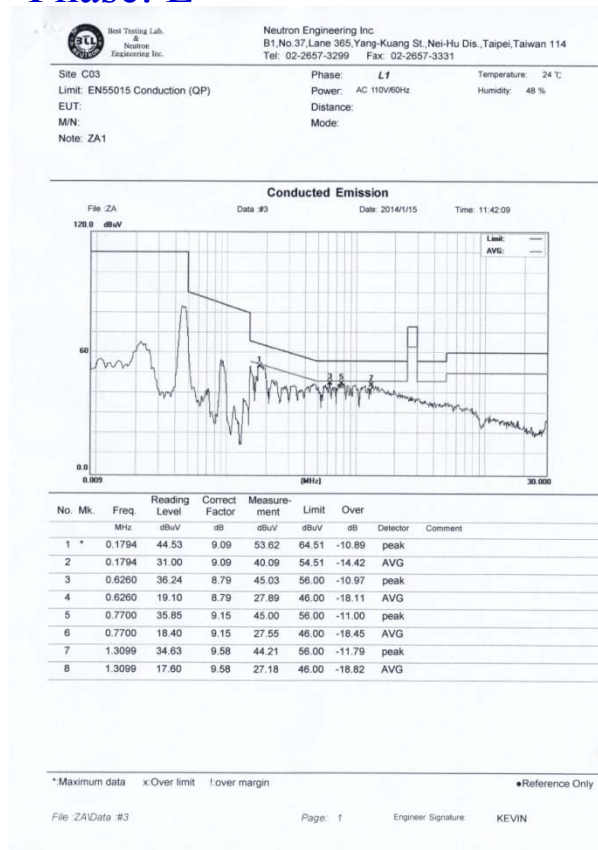


# EMI-Conduction

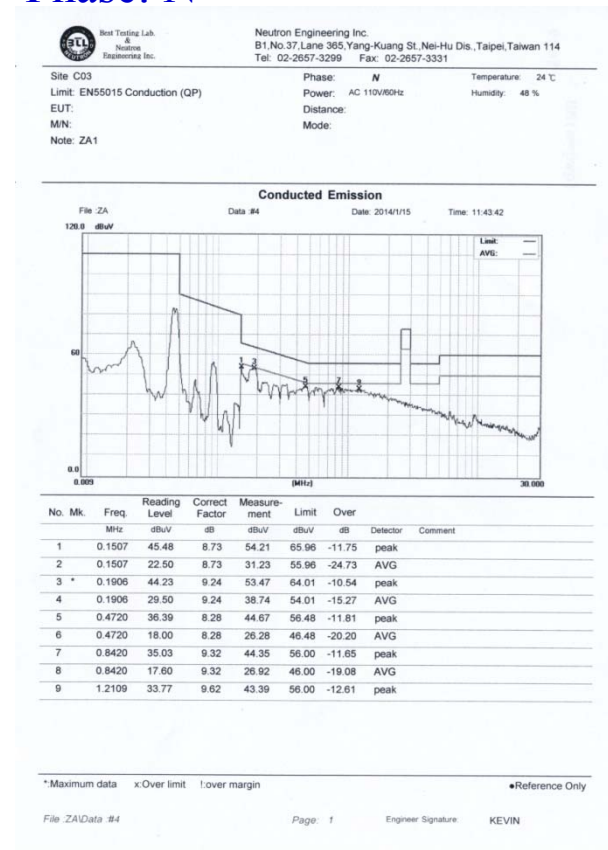
Test Condition: Load:15LED's

110Vac

Phase: L



Phase: N

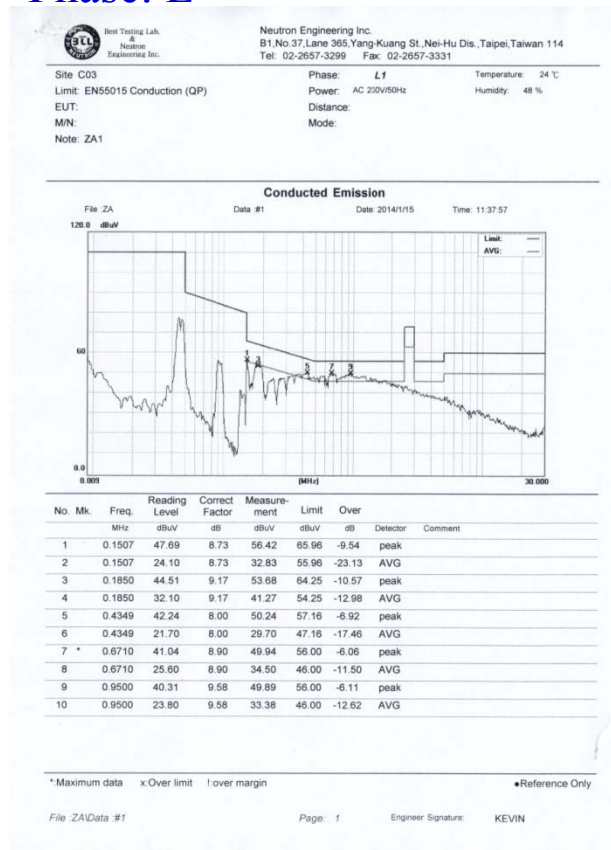


# EMI-Conduction

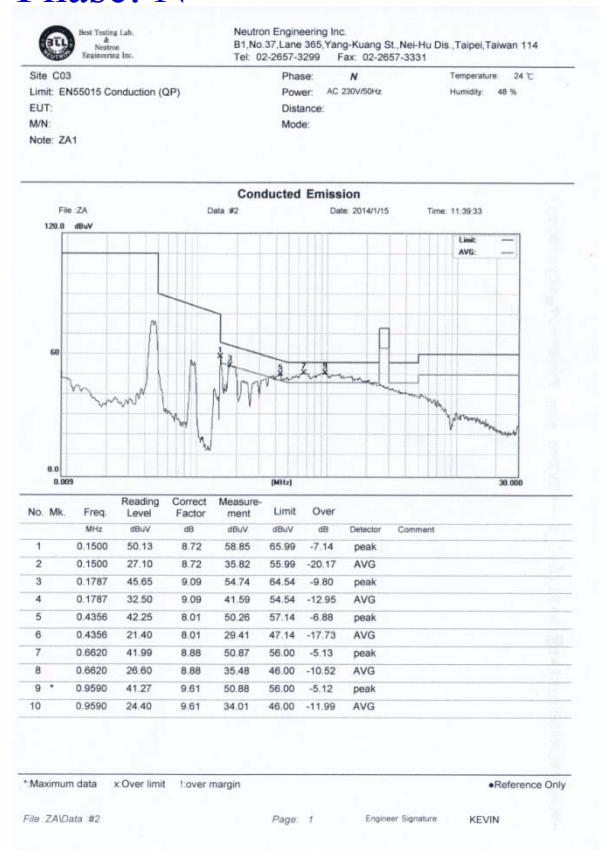
Test Condition: Load:15LED's

230Vac

Phase: L



Phase: N

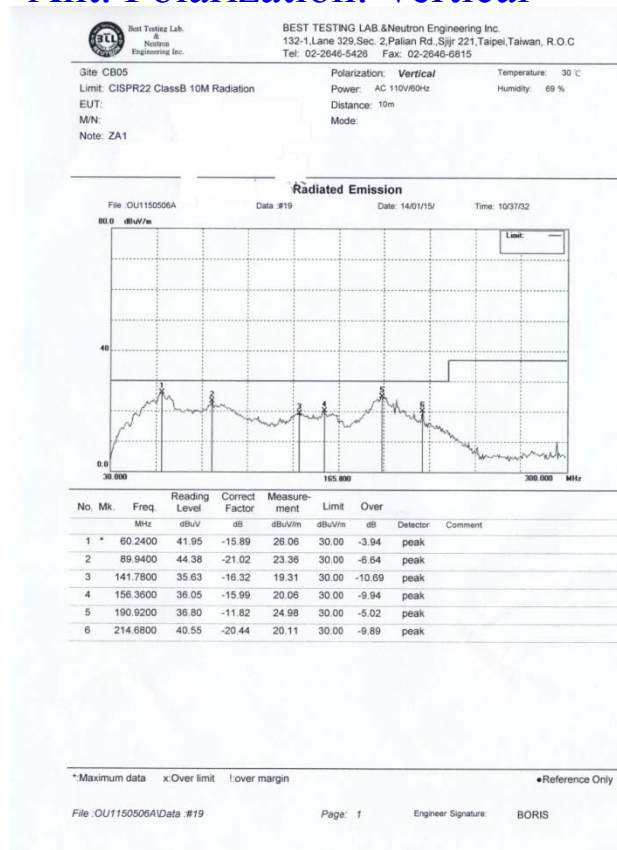


# EMI-Radiation

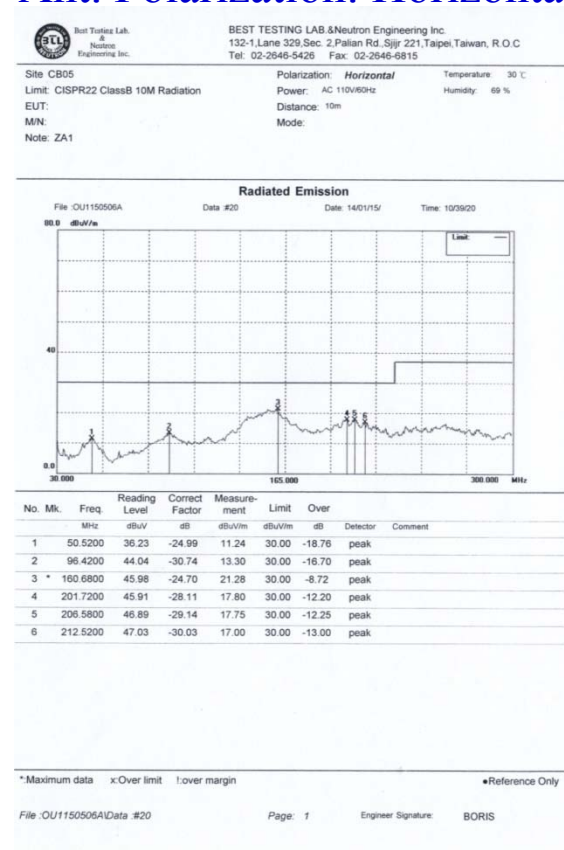
Test Condition: Load:15LED's

110Vac

Ant. Polarization: Vertical



Ant. Polarization: Horizontal




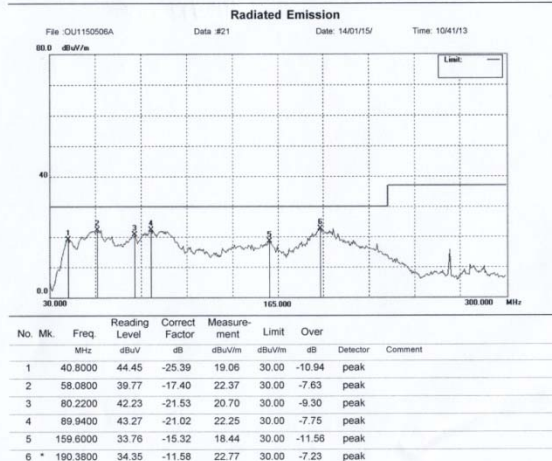
# EMI-Radiation

Test Condition: Load:15LED's

230Vac

Ant. Polarization: Vertical

 Best Testing Lab. & Neutron Engineering Inc.  
 BEST TESTING LAB & Neutron Engineering Inc.  
 132-1 Lane 329, Sec. 2, Pailan Rd., Sijr 221, Taipei, Taiwan, R.O.C  
 Tel: 02-2646-5426 Fax: 02-2646-6815  
 Site: CB05  
 Limit: CISPR22 ClassB 10M Radiation  
 EUT:  
 M/N:  
 Note: ZA1  
 Polarization: **Vertical**  
 Power: AC 230V/50Hz  
 Distance: 10m  
 Mode:  
 Temperature: 30 °C  
 Humidity: 69 %



\*Maximum data x:Over limit l:over margin

•Reference Only


File :OU1150506A/Data #21

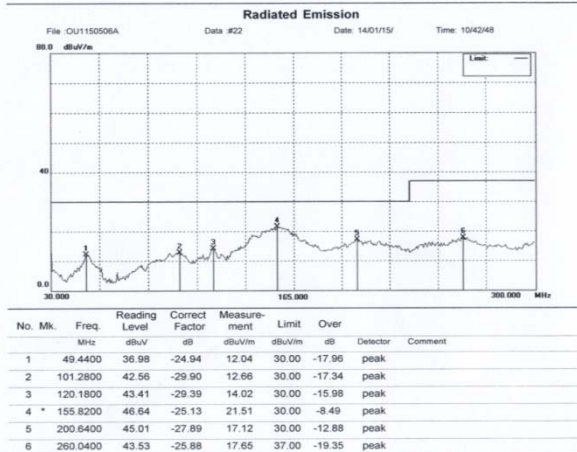
Page: 1

Engineer Signature:

BORIS

Ant. Polarization: Horizontal

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 132-1 Lane 329, Sec. 2, Pailan Rd., Sijr 221, Taipei, Taiwan, R.O.C  
 Tel: 02-2646-5426 Fax: 02-2646-6815  
 Site: CB05  
 Limit: CISPR22 ClassB 10M Radiation  
 EUT:  
 M/N:  
 Note: ZA1  
 Polarization: **Horizontal**  
 Power: AC 230V/50Hz  
 Distance: 10m  
 Mode:  
 Temperature: 30 °C  
 Humidity: 69 %



\*Maximum data x:Over limit l:over margin

•Reference Only

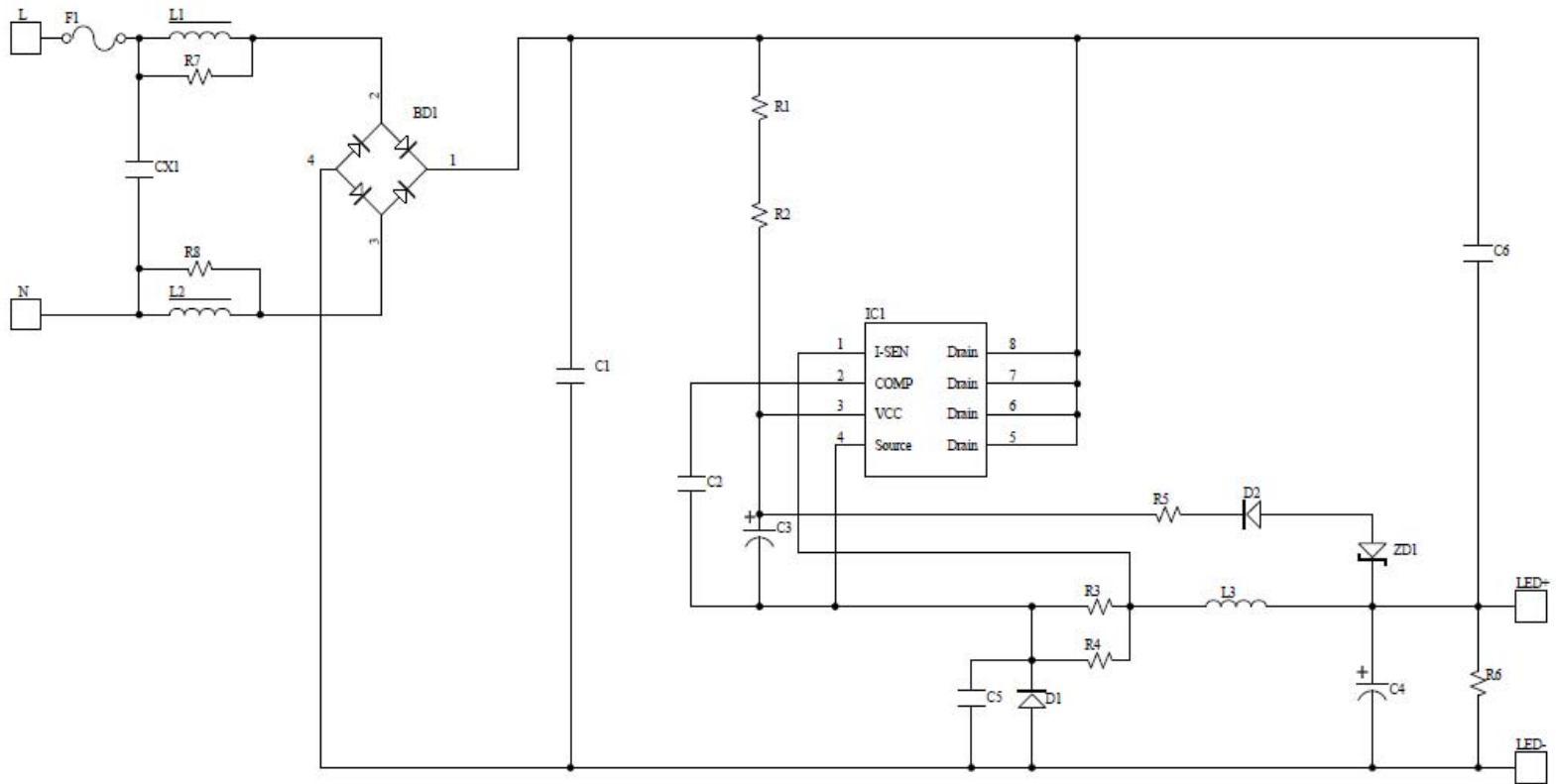
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Engineer Signature:

BORIS

# Schematic



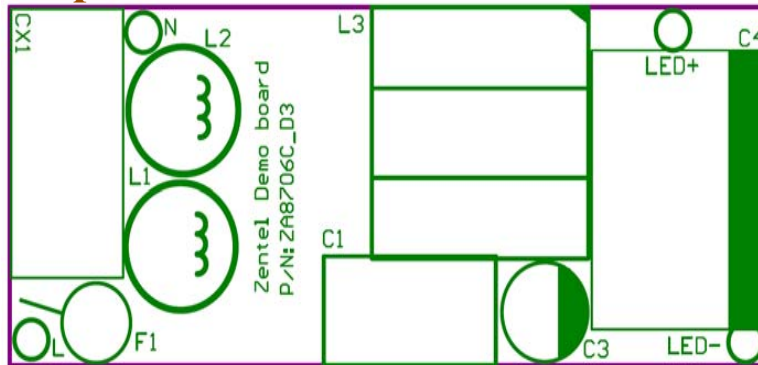
# BOM LIST

Item	Qty	Component	Specifications
1	1	F1	T1A250V
2	1	CX1	0.1uF 300V X2
3	2	R7,R8	4.7K 5% 1206
4	2	L1,L2	2.5mH 6X8mm
5	1	L3	1.8mH,10Φ*16mm
6	1	R3,R4	2 .1 ohm,1%,1206
7	2	R1,R2	270K,5% 0805
8	1	R5	10R,5%,0805
9	1	C1	0.1uF,450V,MEX
10	1	C3	10uF,50V,YXM 105°C
11	1	C4	82uF,100V,ZLH 105°C 10mmx16mm
12	1	C2	1uF/50V 0805
13	1	D1	2A600V,SF208A,Super Fast diode
14	1	D2	1A1000V,SMA,FFM107,Fast diode
15	1	ZD1	ZMM5256B (39v zener)
16	1	IC1	ZA8756H SOP-8
17	1	BD1	0.8A,600V,MD7L `
18	1	R6	100K 5%1206
19	1	PCB	22mm*57mm*1.2mm,FR4,1oz,94V0

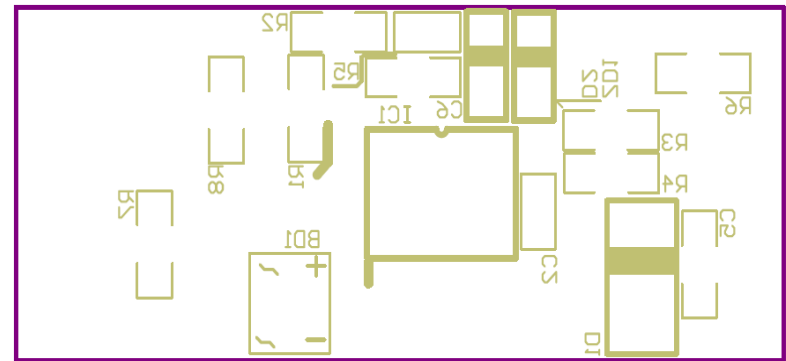


# PCB Layout

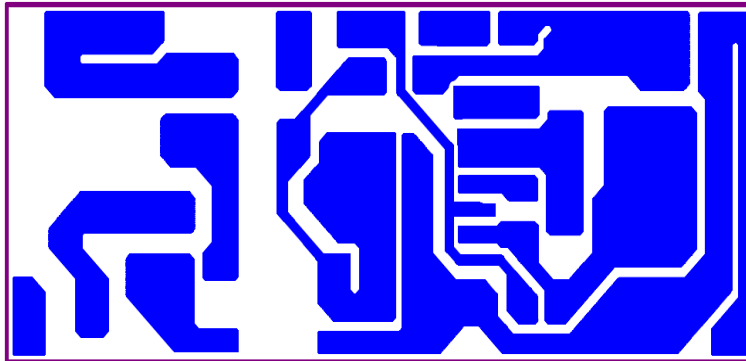
**Top Silkscreen**



**Bottom Silkscreen**



**Bottom Layout**



**PCB size**

