

Introduction to iP7302 LED Power Solution



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6W Example Included

Outline

- iP7302 / iP770X Introduction
- iP7302 6 Watt LED Solution
- Test Data & Efficiency
- Electrical Characteristics

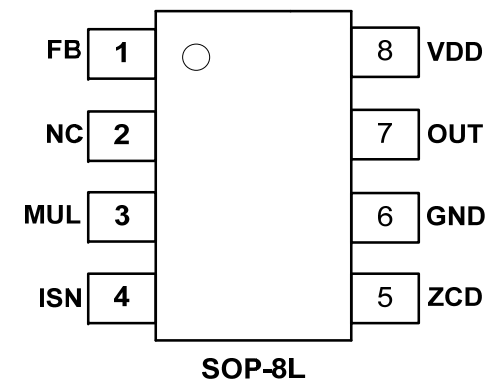
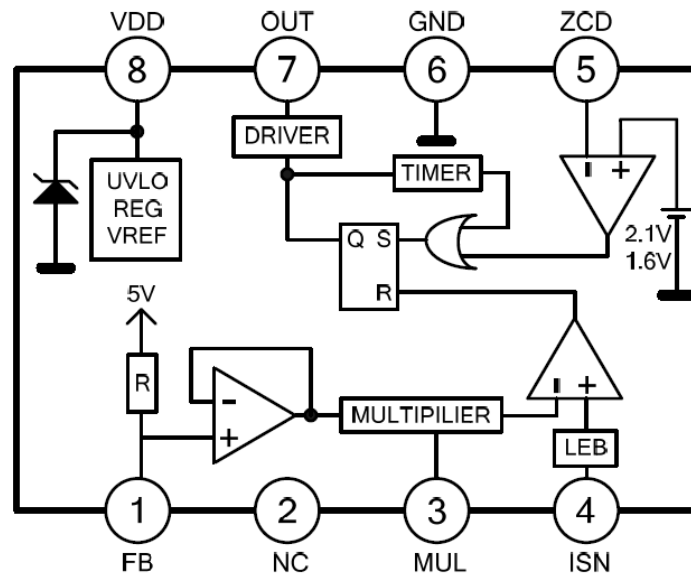


Features:

- Wide VDD operation range with internal output **voltage clamp at 18V**
- UVLO with low standby current
- Under-voltage lockout and leading edge blanking
- **Soft drive** for minimizing turn-on current spike
- **Zero current with valley voltage switching**
- Low operating current
- SOP-8L packaging, with few external components needed
- **High power factor with low THD**

Applications:

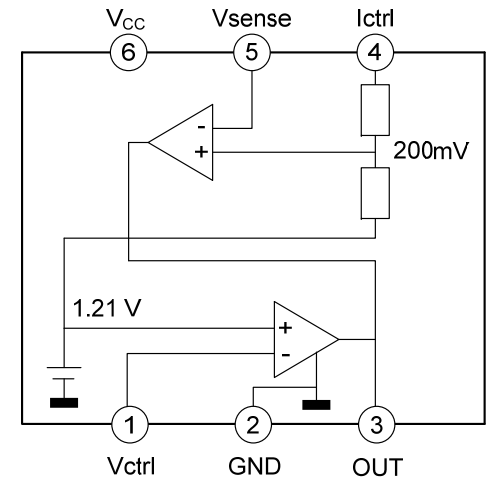
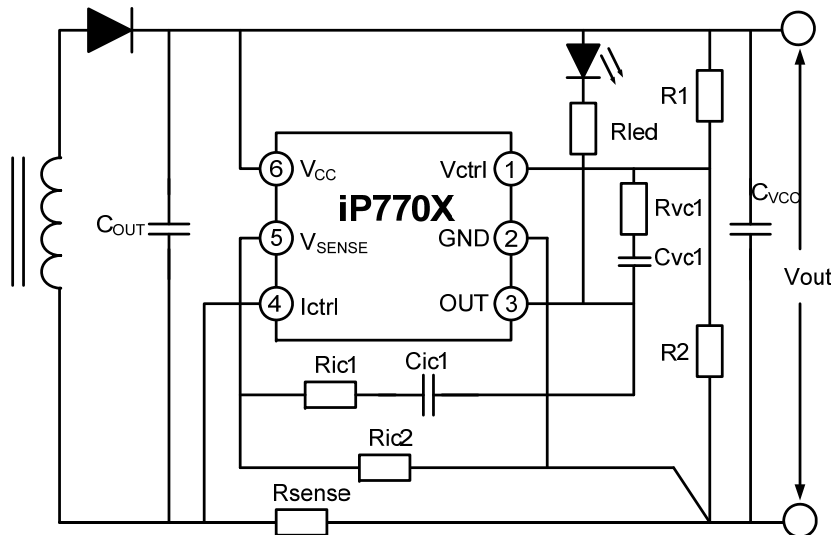
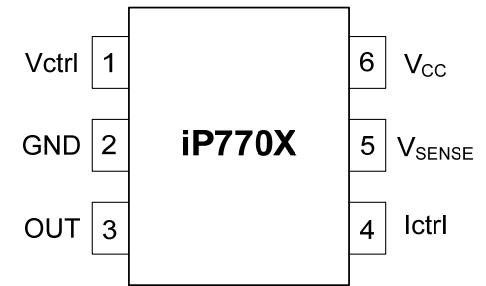
- LED power supply



Constant Voltage and Constant Current Controller

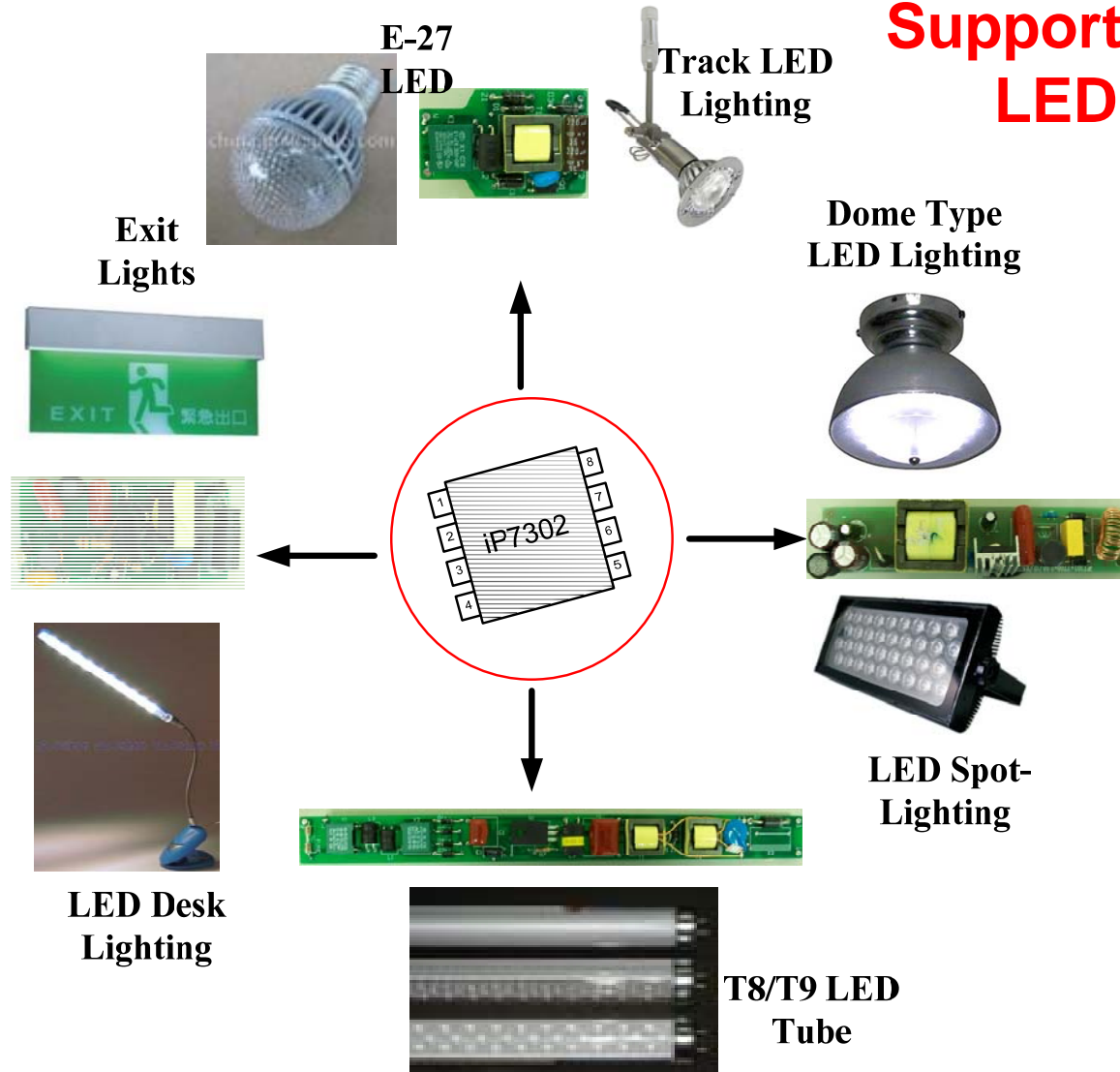
Features

- Secondary-side constant voltage and constant current control
- Wide operation voltage 2.5V-40 V
- Very low quiescent consumption
- High-accuracy internal reference, $V_{REF}=1.21V\pm 1.0\%$
- Current loop reference $V_{sense}=100mV$ or $200mV$
- Low external component count
- SOT23-6 micro package

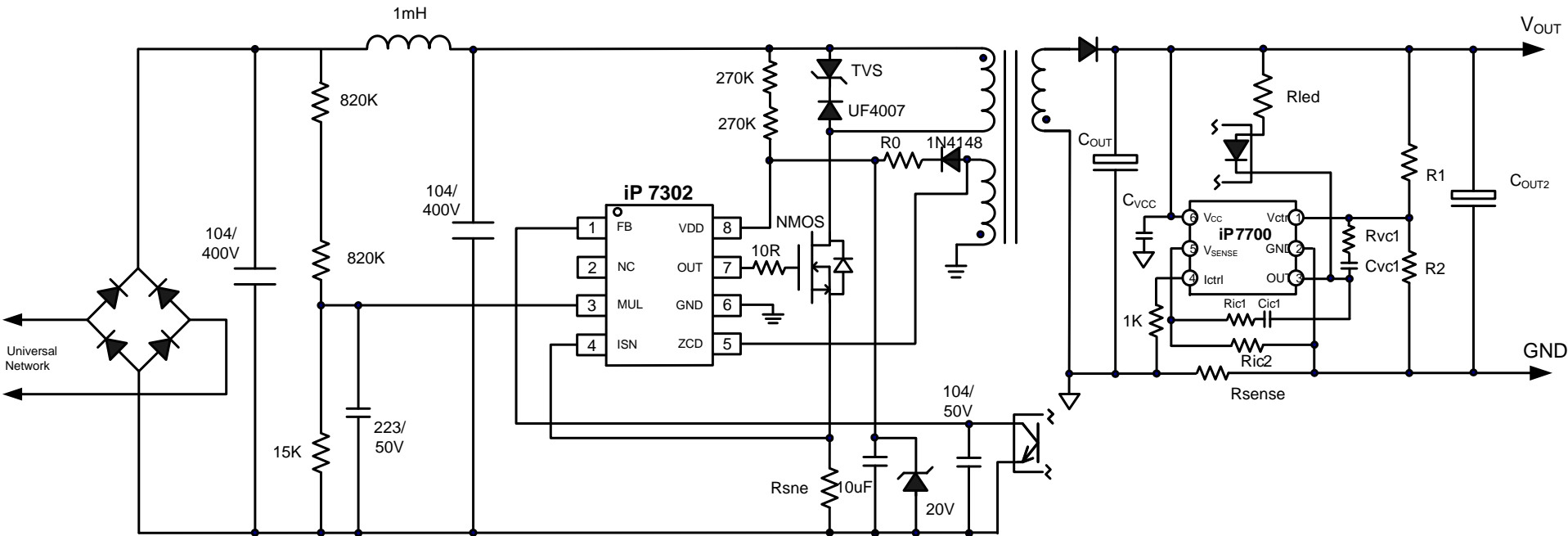


Main Application Field

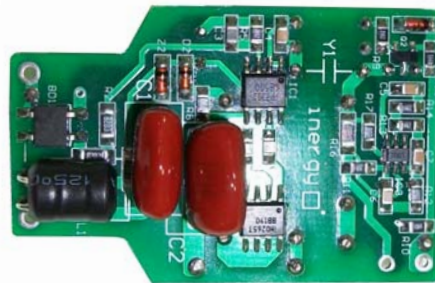
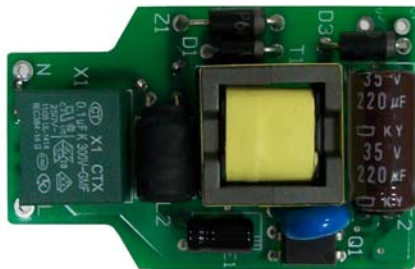
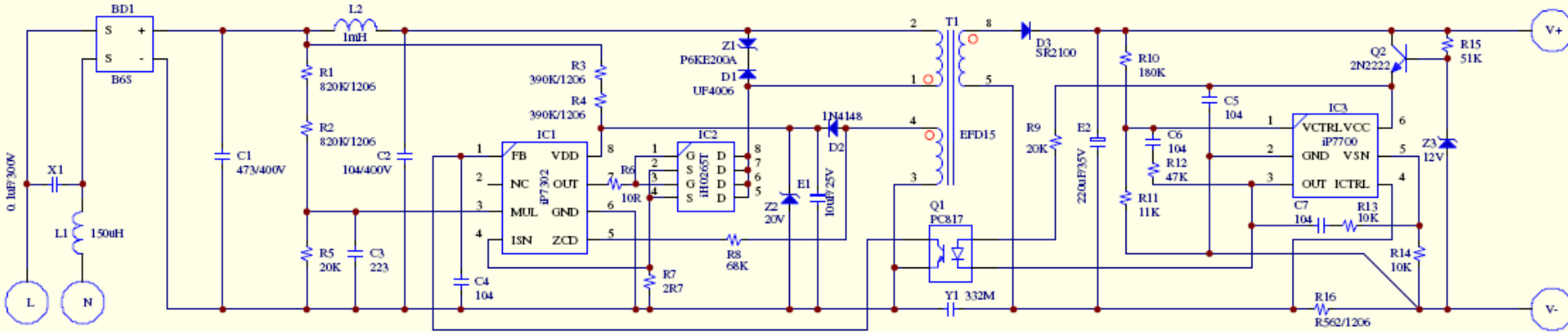
**Support up to 150W
LED Lighting**



iP7302 LED Application Circuit



iP7302 6Watt LED Circuit



Parameter	Specification
Input Voltage	90Vac~264Vac
Input Frequency	47Hz~63Hz
Output Voltage and Current	18.3V/0.35A
Output Power	7W (max.)
Efficiency	> 80% Full Load
Conduction	EN55015 Class B

Bill of Material

序號	品名	規格	數量	製程	打件位置
10	晶片電阻	RES SMD 1/4W 820K F 1206	2	SMD	R1,R2
20	晶片電阻	RES SMD 1/4W 390K F 1206	2	SMD	R3,R4
30	晶片電阻	RES SMD 1/8W 20K F 0805	2	SMD	R5,R9
40	晶片電阻	RES SMD 1/8W 10R F 0805	1	SMD	R6
50	晶片電阻	RES SMD 1/8W 2R2 F 0805	1	SMD	R7
60	晶片電阻	RES SMD 1/8W 68K F 0805	1	SMD	R8
70	晶片電阻	RES SMD 1/8W 180K F 0805	1	SMD	R10
80	晶片電阻	RES SMD 1/8W 11K F 0805	1	SMD	R11
90	晶片電阻	RES SMD 1/8W 47K F 0805	1	SMD	R12
100	晶片電阻	RES SMD 1/8W 10K F 0805	2	SMD	R13,R14
110	晶片電阻	RES SMD 1/8W 51K F 0805	1	SMD	R15
120	晶片電阻	RES SMD 1/8W 0R56 F 1206	1	SMD	R16
130	晶片電阻	RES SMD 1/8W 0R F 0805	1	SMD	R17
140	晶片電容	CAP SMD NPO 223 25V 0805	1	SMD	C3
150	晶片電容	CAP SMD NPO 104 25V 0805	4	SMD	C4,C5,C6,C7
160	PWM IC	iP7302 SO8	1	SMD	IC1
170	POWER MOS	iH0265T SO8	1	SMD	IC2
180	REFERENCE IC	iP7700 SOT-23-6L	1	SMD	IC3
190	橋式整流器	B6S 600V/0.8A	1	SMD	BD1
200	BIPOLAR	2N2222	1	SMD	Q2
210	二極體	1N4148 75V/200mA	1	SMD	D2
220	二極體	20V ZENER	1	SMD	Z2
230	二極體	12V ZENER	1	SMD	Z3

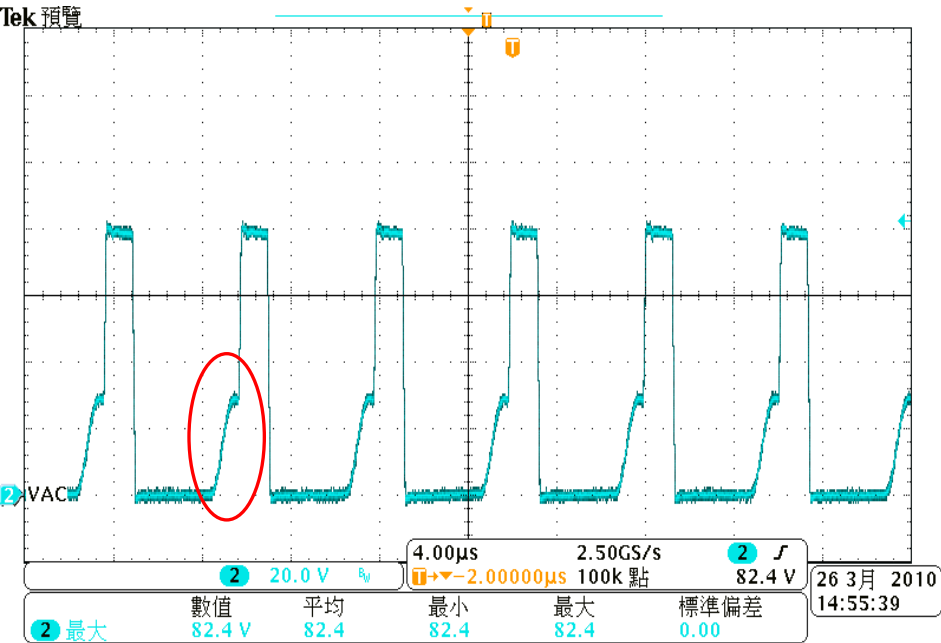
序號	品名	規格	數量	製程	打件位置
240	二極體	600V/1A UF4006 ULTRAFAST	1	DIP	D1
250	二極體	100V/2A SR2100 SCHOTTKY	1	DIP	D3
260	二極體	P6KE200A TVS	1	DIP	Z1
270	X-CAP	0.1uF/300VAC	1	DIP	X1
280	Y-CAP	332M	1	DIP	Y1
290	金屬皮膜電容	473/400V	1	DIP	C1
300	金屬皮膜電容	104/400V	1	DIP	C2
310	鋁質電解電容	10uF/25V LONG LIFE	1	DIP	E1
320	鋁質電解電容	220uF/35V LONG LIFE	1	DIP	E2
330	光耦合器	PC817 DIP4	1	DIP	Q1
340	電感	300uH	1	DIP	L1
350	電感	1mH	1	DIP	L2
360	變壓器	EFD15	1	DIP	T1

iP7302 6 Watt Efficiency and PF Value

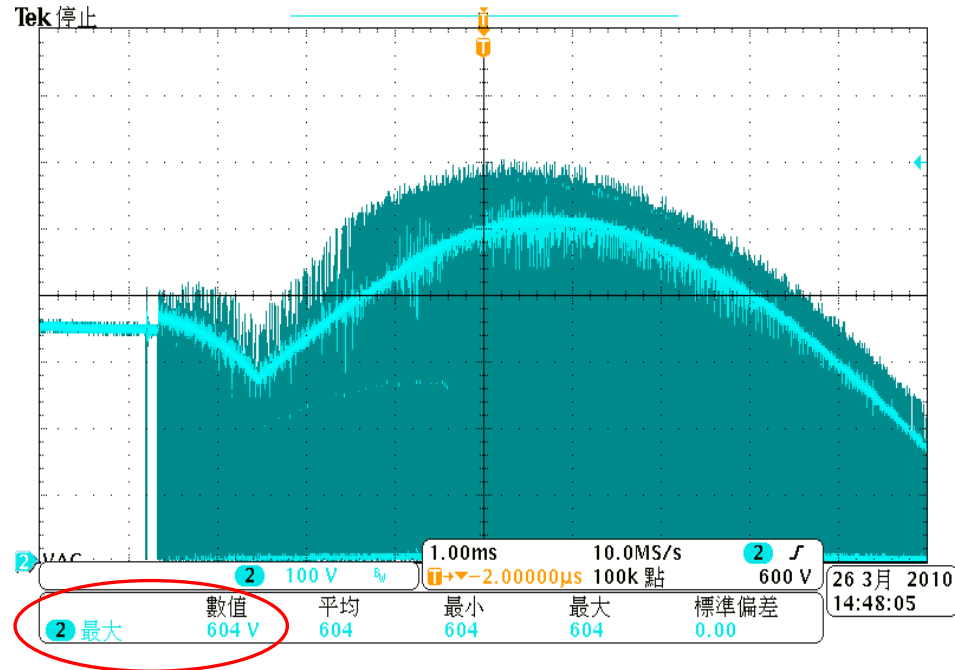
	90Vac	100Vac	110Vac
Vout (V)	18.39	18.34	18.30
Iout (mA)	353.6	353.3	353.4
Pin (W)	7.824	7.745	7.7
Pout (W)	6.503	6.48	6.467
PF	0.998	0.999	0.999
η (%)	83.11	83.66	83.99

	220Vac	230Vac	264Vac
Vout (V)	18.27	18.25	18.24
Iout (mA)	353.9	353.8	353.9
Pin (W)	7.967	7.994	8.158
Pout (W)	6.466	6.457	6.455
PF	0.928	0.913	0.861
η (%)	81.16	80.77	79.13

Soft Driver Output and Switching MOS Waveform



waveform of rectifier at $V_{in} = 264V_{ac}/50Hz$ & full-load



waveform of Drain at $V_{in} = 264V_{ac}/50Hz$ & full-load Startup

EMI Test Report

AC110V 60Hz

AC230V 50Hz

QuietTek

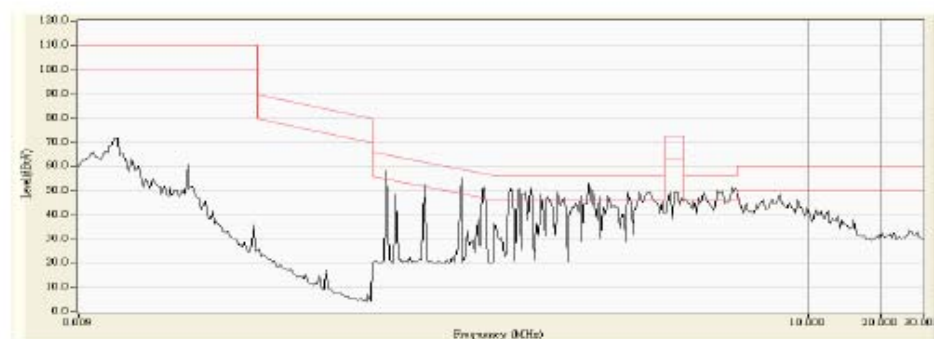
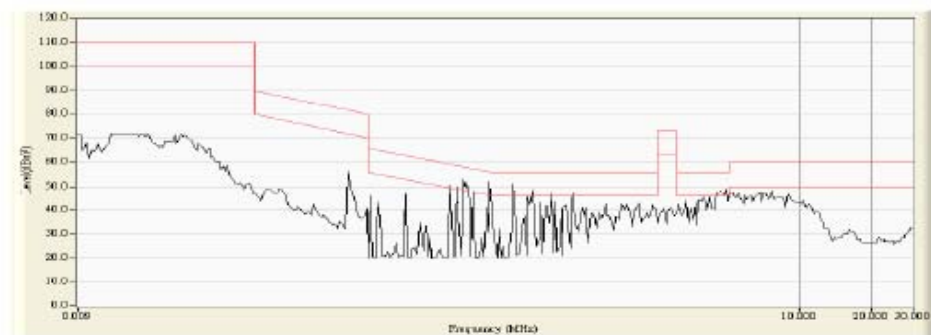
QuietTek

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Engineer : starfish	
Site : SR3	Time : 2010/03/31 - 09:52
Limit : CNS14115_00M_QP	Margin : 10
Probe : SR3_LISN(16A) - Line1	Power : AC 110V / 60Hz
EUT : Zippy LED7W	Note :

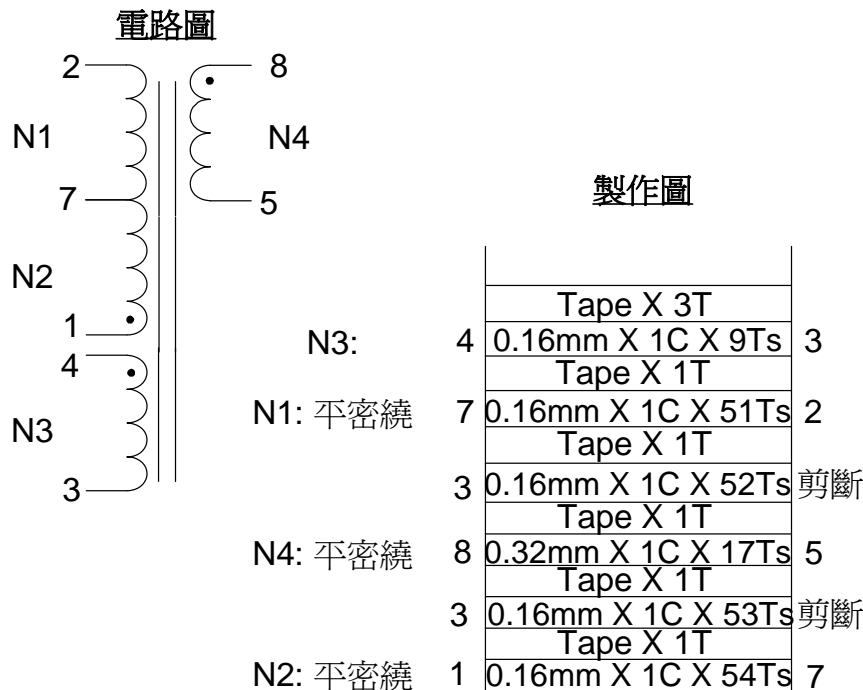
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Engineer : starfish	
Site : SR3	Time : 2010/03/31 - 09:45
Limit : CNS14115_00M_QP	Margin : 10
Probe : SR3_LISN(16A) - Line1	Power : AC 230V / 50Hz
EUT : Zippy LED7W	Note :



iP7302 18.5V/0.35A Transformer Design

- (1.1)PN: 7302-18.5V/0.35A**
- (1.2)CORE:PC40或同等級材質**
- (1.3)BOBBIN:EFD15**
- (1.4)L1-2=1mH**
- (1.6)PIN1, 2出腳加套管**
- (1.7)PIN6剪平, PIN7對齊bobbin底部修剪**
- (2.0)N4用三層絕緣線**
- (2.1)變壓器合浸**



Advantage Summary

- The complete function of iP7302 can provide IC secure protection & thorough monitoring, especially OVP protection and zero current detection.
- High power factor with low THD and Low operating current.
- Output soft drive function can improve EMI.
- Power-efficient boundary conduction mode of operation, Zero-voltage or valley switching for turn-on of switch MOS.
- iP770X (up to 40V) secondary-side CC and CV control with compact SOT23-6L package.

**Support up to 150W
LED Lighting**

ienergy Strengths

- 700V HV IC/MOS design experiences
- Integrated IC/MOS solutions for high efficiency and compact size
- Consolidation upstream IC design and downstream module design for Motor/Ballast/AC-DC Applications

Thanks !

