

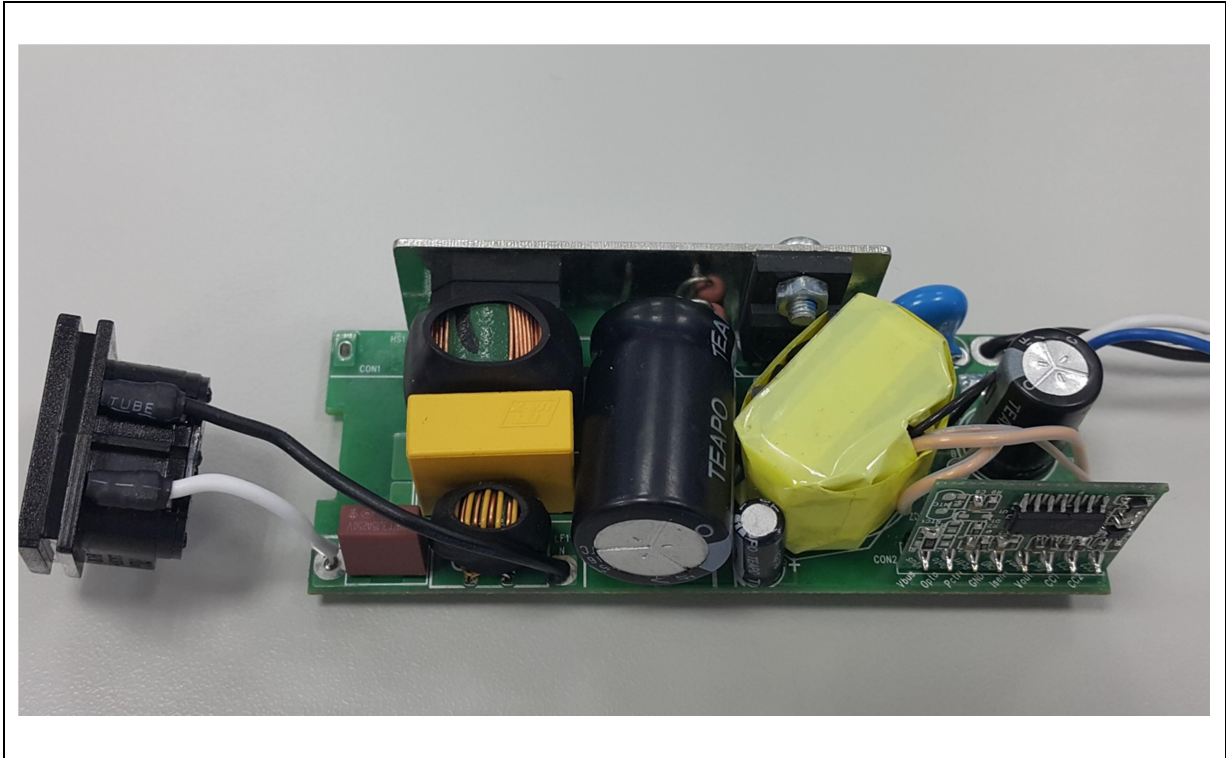
Demo Board Test Report for  
LD5763&LD6610&LD8525

--- 45W (5V/3A,9V/3A,  
15V/3A,20V/2.25A) Adapter

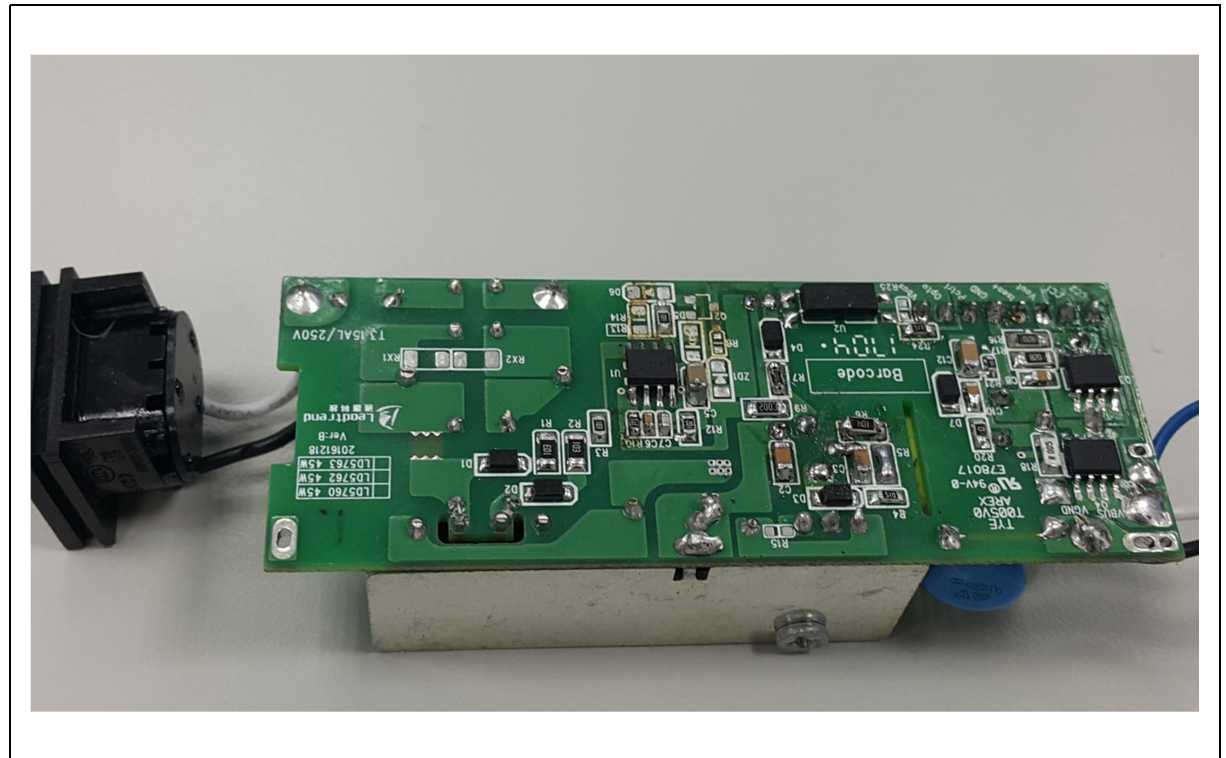
<b>Tested by</b>	<b>Reviewed by</b>	<b>Approved by</b>
John Liu	John Liu	Henry Guo

<b>Total pages</b>	<b>Revision</b>	<b>Date</b>
24	01	2017/06/09

TOP VIEW



BOTTOM VIEW



Size 85.25mm(L) x 32.68mm(W) x 18mm(H)

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## I. Design Check List

NO. (項目)	TEST ITEM (測試項目)	SPEC (規格)	PAGE (頁)
1	Power Saving	<75mW	6
2	Efficiency	-	8
3	LOAD / LINE / CROSS REGULATION	-	10
4	Over Current Protection	<120%	11
5	Output ripple and noise	<350mV	13
6	Output dynamic response	<1%	17
7	Voltage Stress on MOSFET	<95%	20

## II. EXECUTIVE SUMMARY

Test Equipment	
Equipment	Equipment Model No.
Electrical Load	Chroma 63030
Power Meter	WT210
AC power source	Chroma 61602
Scope	TDS 3014C

All test conditions is based on ambient temperature 25°C

### 1. Input Voltage & Frequency

The unit shall be capable of operating as a universal AC input power supply accepting AC inputs. The power supply shall operate between the following voltages (from 90V to 264V). The supply will be designed to operate for a Table 1.

	Minimum	Normal	Maximum
Input Voltage	90Vac	110Vac	264Vac
Frequency	47HZ	60HZ	63HZ

Table 1

### 2. Output Load

The line and load regulation for each of the outputs are shown in Table. 2.

Parameter	Output Voltage			Output Current	
	Minimum	Typical	Maximum	Minimum	Maximum
+5V	4.75V	5V	5.25V	0A	3A
+9V	8.55V	9V	9.45V	0A	3A
+15V	14.25V	15V	15.75V	0A	3A
+20V	19V	20V	21V	0A	2.25A

Table 2

### 3. Green Mode Power Consumption

The marking shall be put for up – date Energy – star (EPA 2.0) and CECP

Requirement on the label

Below is Mandatory (When input is above or equal to 12W ,adapter efficiency shall

Follow , Test condition after heat-up 15 minutes.)(For reference)

Output Load (W)	Input Power (Max)
0W	0.075W
0.25W	0.5W
0.50W	1W

Table 3

#### Test Condition:

Input: 90Vac(60Hz)/264Vac(50Hz)

Output: +5V

Burn-In 20mintues

Vin(V <sub>AC</sub> )	Pout(W)	Pin(mW)	Spec.(mW)
90	No Load	29	75
264	No Load	43	

Table 3-1

#### Power Efficiency Measurement by Small-Load :

Output Load	Output Voltage	Input Voltage	Input Current	Input Power	Output Voltage	Output Current	Output Power	Efficiency
W	V	V	mA	Pin(W)	DC(V)	DC(mA)	W	%
0.25W	5V	115V/60Hz	17.48	0.323	4.950	50.6	0.250	77.39%
		230V/50Hz	29.31	0.377	4.950	50.6	0.250	66.31%
0.25W	9V	115V/60Hz	17.48	0.363	8.935	29.2	0.260	71.62%
		230V/50Hz	29.41	0.394	8.935	29.2	0.260	65.98%
0.25W	15V	115V/60Hz	18.87	0.400	14.897	17.2	0.256	64.00%
		230V/50Hz	29.47	0.432	14.897	17.2	0.256	59.25%
0.25W	20V	115V/60Hz	18.72	0.447	19.874	12.7	0.252	56.37%
		230V/50Hz	29.66	0.475	19.875	12.7	0.252	53.89%

Output Load	Output Voltage	Input Voltage	Input Current	Input Power	Output Voltage	Output Current	Output Power	Efficiency
W	V	V	mA	Pin(W)	DC(V)	DC(mA)	W	%
0.5W	5V	115V/60Hz	22.04	0.607	4.949	101.2	0.500	82.37%
		230V/50Hz	30.21	0.645	4.949	101.2	0.500	77.51%
0.5W	9V	115V/60Hz	22.17	0.636	8.935	56.2	0.502	78.93%
		230V/50Hz	30.77	0.674	8.935	56.2	0.502	74.48%
0.5W	15V	115V/60Hz	24.78	0.714	14.897	33.7	0.502	70.30%
		230V/50Hz	30.58	0.745	14.897	33.7	0.502	67.38%
0.5W	20V	115V/60Hz	25.05	0.812	19.875	26.2	0.520	64.12%
		230V/50Hz	31.17	0.827	19.875	26.2	0.520	62.87%

Table 4

#### 4. Efficiency Test

According to Energy Star, We chose input voltage value including 115Vac/230Vac and 10%、25%、50%、75%、100% load current, Then Calculate the efficiency and average efficiency.

##### Test Condition:

Input: 115Vac(60Hz)/230Vac(50Hz)

Output: 10%、25%、50%、75%、100% of Max Load

Burn-In 30mintues

5V/3A (on board test)

AC Input	Output Load	Pin (W)	Pout (W)	Vout (V)	Iout (A)	Efficiency (%)	Avg. Eff. (%)	Spec. (%)
115VAC	100%	17.90	15.86	5.284	3.003	88.603	88.90	-
	75%	13.10	11.68	5.183	2.255	89.210		
	50%	8.570	7.655	5.087	1.505	89.323		
	25%	4.230	3.743	4.991	0.750	88.486		
	10%	1.700	1.479	4.947	0.299	87.00	87.00	-
230VAC	100%	17.98	15.854	5.283	3.001	88.175	87.425	-
	75%	13.29	11.666	5.185	2.250	87.780		
	50%	8.750	7.639	5.086	1.502	87.302		
	25%	4.330	3.743	4.991	0.750	86.443		
	10%	1.760	1.480	4.948	0.299	84.00	84.00	-

9V/3A (on board test)

AC Input	Output Load	Pin (W)	Pout (W)	Vout (V)	Iout (A)	Efficiency (%)	Avg. Eff. (%)	Spec. (%)
115VAC	100%	31.18	27.87	9.282	3.003	89.38	89.88	-
	75%	22.88	20.65	9.180	2.255	90.25		
	50%	15.14	13.65	9.084	1.503	90.15		
	25%	7.560	6.785	8.987	0.755	89.74		
	10%	3.060	2.725	8.937	0.305	89.05	89.05	-
230VAC	100%	30.89	27.86	9.279	3.003	90.19	89.08	-
	75%	23.04	20.70	9.183	2.255	89.84		
	50%	15.30	13.65	9.085	1.503	89.21		
	25%	7.790	6.785	8.988	0.755	87.09		
	10%	3.130	2.726	8.939	0.305	87.09	87.09	-



## 15V/3A (on board test)

AC Input	Output Load	Pin (W)	Pout (W)	Vout (V)	Iout (A)	Efficiency (%)	Avg. Eff. (%)	Spec. (%)
115VAC	100%	51.510	45.816	15.257	3.003	88.945	89.660	-
	75%	37.840	34.170	15.153	2.255	90.301		
	50%	25.100	22.623	15.052	1.503	90.131		
	25%	12.650	11.292	14.957	0.755	89.264		
	10%	5.190	4.546	14.908	0.305	87.591	87.591	-
230VAC	100%	50.260	45.834	15.263	3.003	91.193	90.143	-
	75%	37.640	34.181	15.158	2.255	90.810		
	50%	25.140	22.635	15.060	1.503	90.035		
	25%	12.760	11.297	14.963	0.755	88.534		
	10%	5.240	4.548	14.913	0.305	86.793	86.793	-

## 20V/2.25A

AC Input	Output Load	Pin (W)	Pout (W)	Vout (V)	Iout (A)	Efficiency (%)	Avg. Eff. (%)	Spec. (%)
115VAC	100%	50.66	45.397	20.150	2.253	89.611	89.160	-
	75%	37.54	33.744	20.074	1.681	89.880		
	50%	25.28	22.56	20.001	1.128	89.240		
	25%	13.05	11.460	19.931	0.575	87.810		
	10%	5.380	4.575	19.895	0.230	85.030	85.030	-
230VAC	100%	49.99	45.406	20.154	2.253	90.830	89.264	-
	75%	37.47	33.742	20.073	1.681	90.050		
	50%	25.310	22.565	20.005	1.128	89.154		
	25%	13.17	11.461	19.933	0.575	87.023		
	10%	5.410	4.575	19.895	0.230	84.565	84.565	-

Table 5

**5. LOAD / LINE / CROSS REGULATION**

Output	REGULATION TOLERANCE (From Nominal)	MAXIMUM CURRENT
5V	+5%/-5%	3A
9V	+5%/-5%	3A
15V	+5%/-5%	3A
20V	+5%/-5%	2.25A

**5V**

Input Vac	Output Current ( A )	Output Voltage( V )	SPEC
90V/47Hz	0	4.957V	4.75V~5.25V
	3	5.282V	
264V/63Hz	0	4.957V	
	3	5.283V	

**9V**

Input Vac	Output Current ( A )	Output Voltage( V )	SPEC
90V/47Hz	0	8.944V	8.55V~9.45V
	3	9.282V	
264V/63Hz	0	8.944V	
	3	9.280V	

**15V**

Input Vac	Output Current( A )	Output Voltage( V )	SPEC
90V/47Hz	0	14.909	14.30V~15.80V
	3	15.255	
264V/63Hz	0	14.909	
	3	15.261	

**20V**

Input Vac	Output Current( A )	Output Voltage( V )	SPEC
90V/47Hz	0	19.889	19.0V~21.0V
	2.25	20.144	
264V/63Hz	0	19.890	
	2.25	20.152	

Table 6

## 6. Over Current Protection

The supply shall be designed with appropriate output over current protection. This protection shall be activated in the event of a short or long-term condition during which one or more of the output current load increases such that the primary current exceeds a predetermined limit. The primary shall limit the total power without inflicting any damage to any internal supply components and shall be reversible pending removal of the cause of the condition and without any user intervention.

### Test Condition:

Input: 90Vac(60Hz)/115Vac(60Hz)/230Vac(50Hz)/264Vac(50Hz)

Output: +5V

Vin	Current Limit Value	Spec
(V <sub>AC</sub> )	(A)	(A)
90	3.73	<3.6
115	3.73	
230	3.73	
264	3.73	

Output: +9V

Vin	Current Limit Value	Spec
(V <sub>AC</sub> )	(A)	(A)
90	3.73	<3.6
115	3.73	
230	3.73	
264	3.73	

Output: +15V

Vin	Current Limit Value	Spec
(V <sub>AC</sub> )	(A)	(A)
90	3.74	<3.6
115	3.74	
230	3.74	
264	3.74	

Output: +20V

Vin	Current Limit Value	Spec
(V <sub>AC</sub> )	(A)	(A)
90	3.07	<2.7
115	3.07	
230	3.07	
264	3.07	

Table 7

## 7. Output ripple and noise

This refers to the peak-to-peak residual AC that remains on the DC power line after passing through all the filtering processes conducted within the power supply. The peak to peak output ripple and noise shall be considered to comprise of the complex envelope of the low frequency saw tooth voltage ripple and the high frequency switching noise. It shall be measured across output terminals using a single ended measurement with an oscilloscope (bandwidth limited to 20 MHz) and a high persistence display. Readings shall be made through the range of minimum to maximum load current and within 350mV.

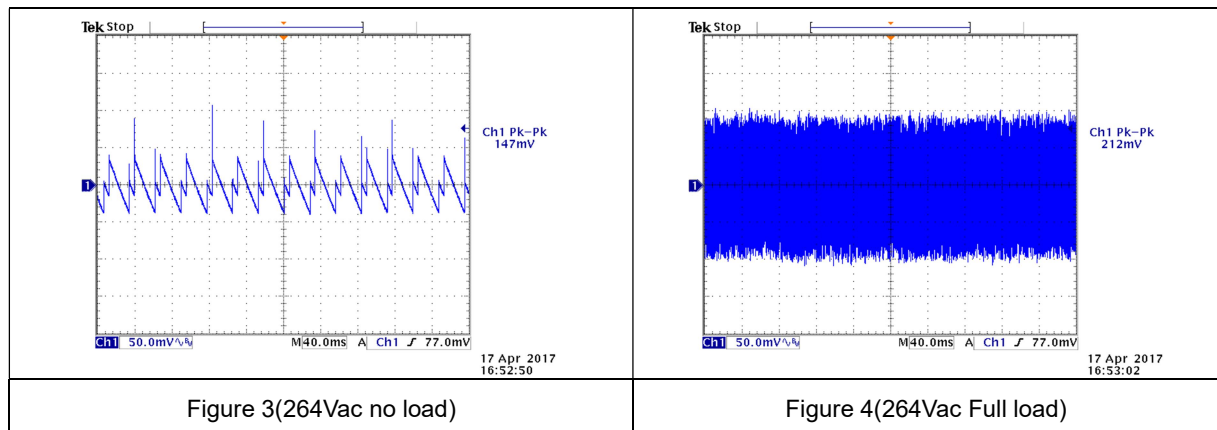
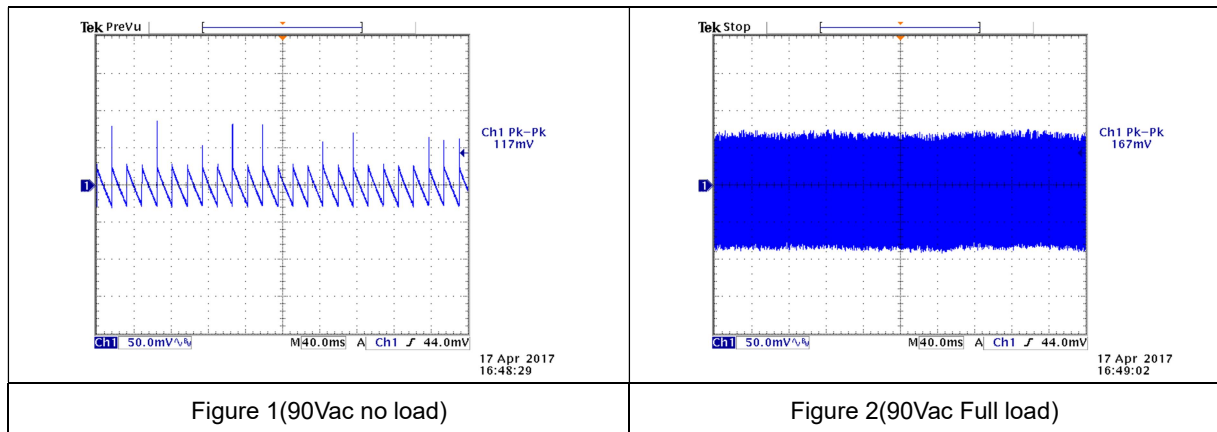
### Test Condition:

Input: 90Vac(60Hz)/264Vac(50Hz)

Output: +5V/3A

Vin(V <sub>AC</sub> )	Voltage Limit Value(V)		Spec(V)
	No Load	Full Load	
90	117mV	167mV	<350mV
264	147mV	212mV	

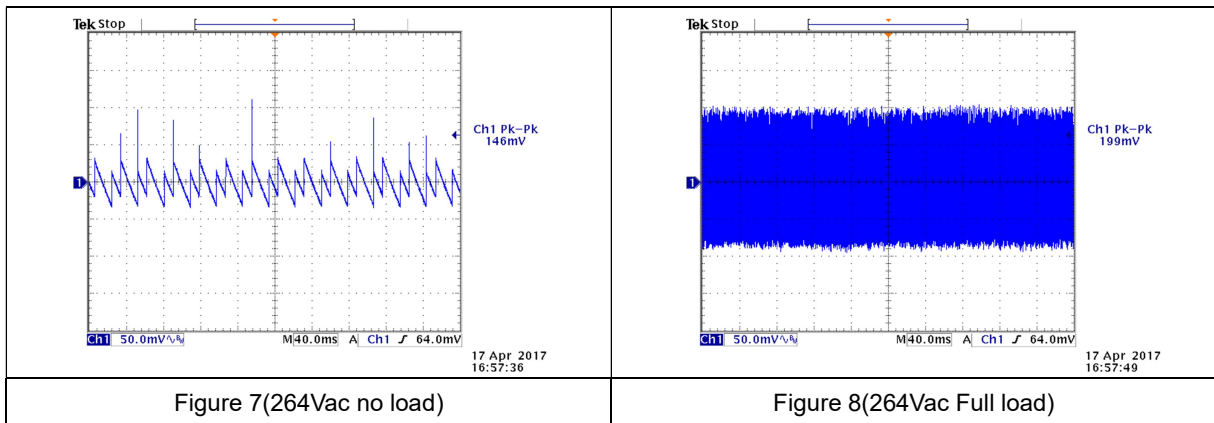
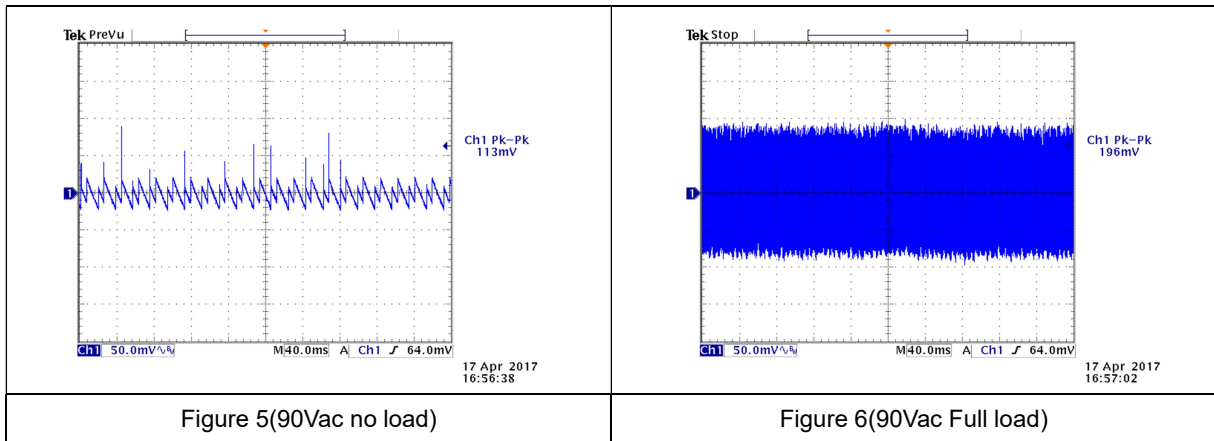
Table 8



Output: +9V/3A

Vin(V <sub>AC</sub> )	Voltage Limit Value(V)		Spec(V)
	No Load	Full Load	<350mV
90	121mV	195mV	
264	146mV	199mV	

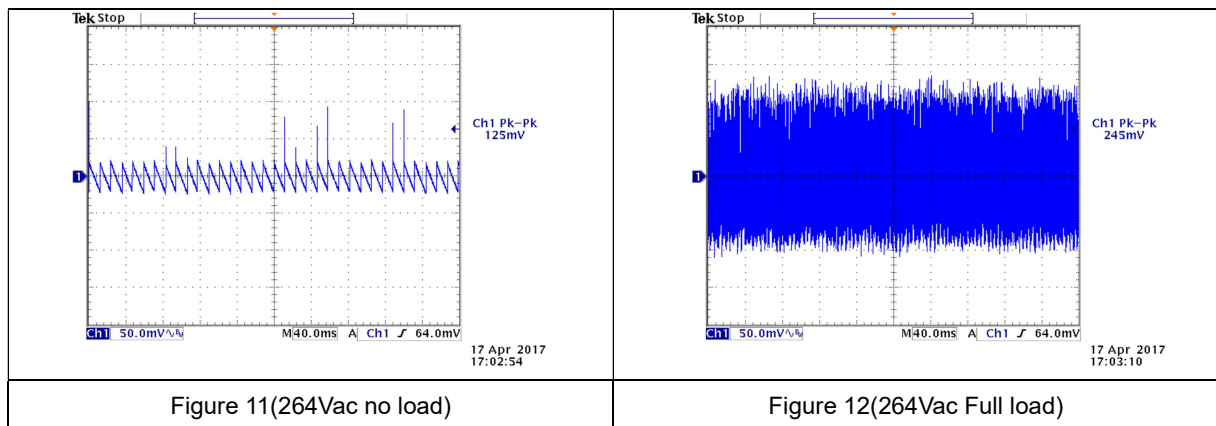
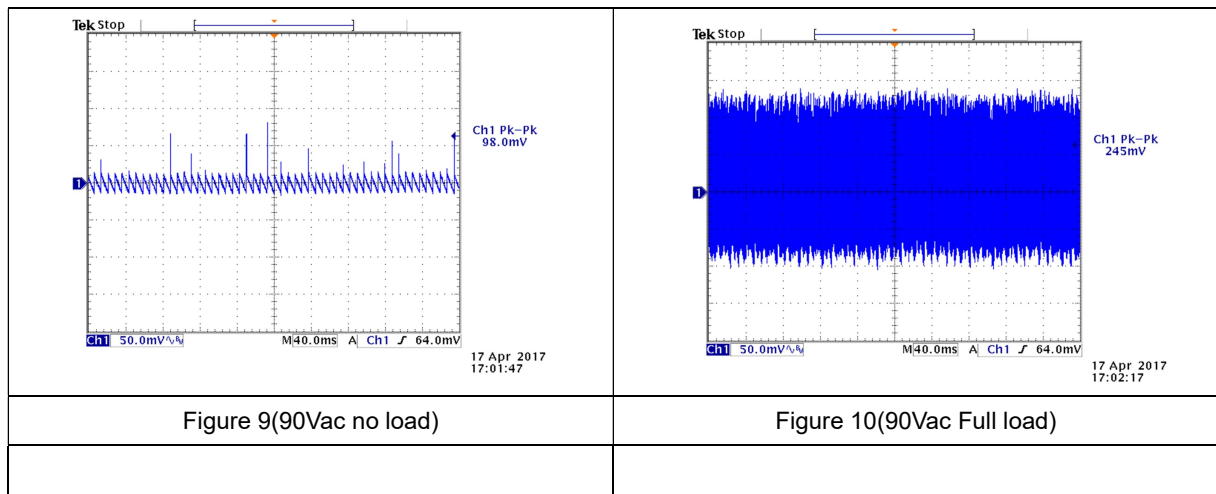
Table 9



Output: +15V/3A

Vin(V <sub>AC</sub> )	Voltage Limit Value(V)		Spec(V)
	No Load	Full Load	
90	98mV	245mV	<350mV
264	125mV	245mV	

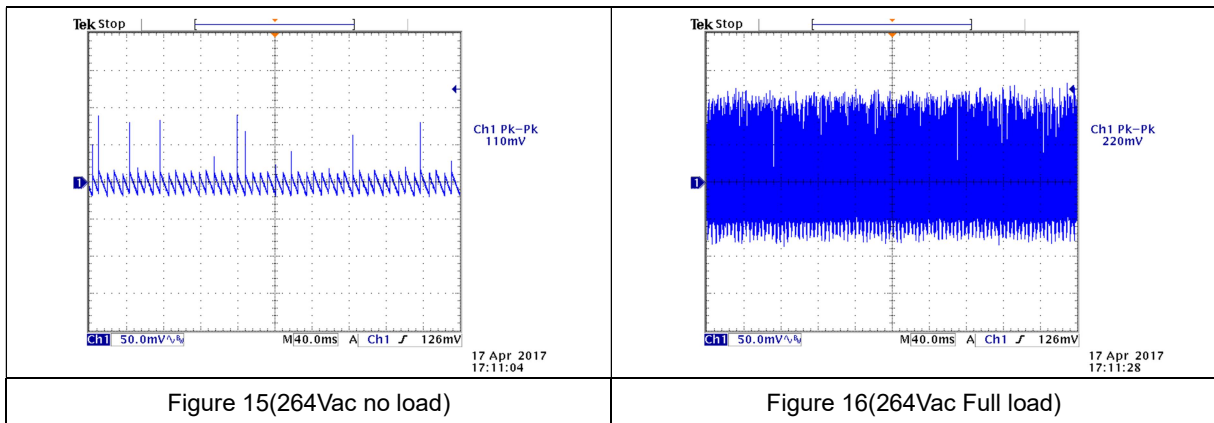
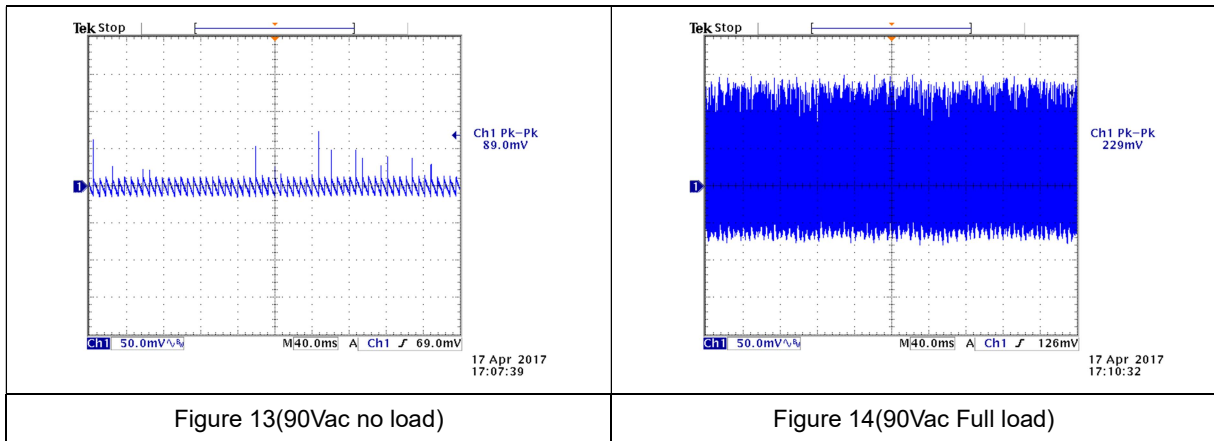
Table 10



Output: +20V/2.25A

Vin(V <sub>AC</sub> )	Voltage Limit Value(V)		Spec(V)
	No Load	Full Load	
90	89.0mV	229mV	<350mV
264	110mV	220mV	

Table 11





### 8. Output dynamic response

Under resistive load condition, any change in output current at a rate of 0.1A/us, over a range of 25% to 100% full load, shall cause the output to deviate by more than (+7%/-5%) of its nominal value.

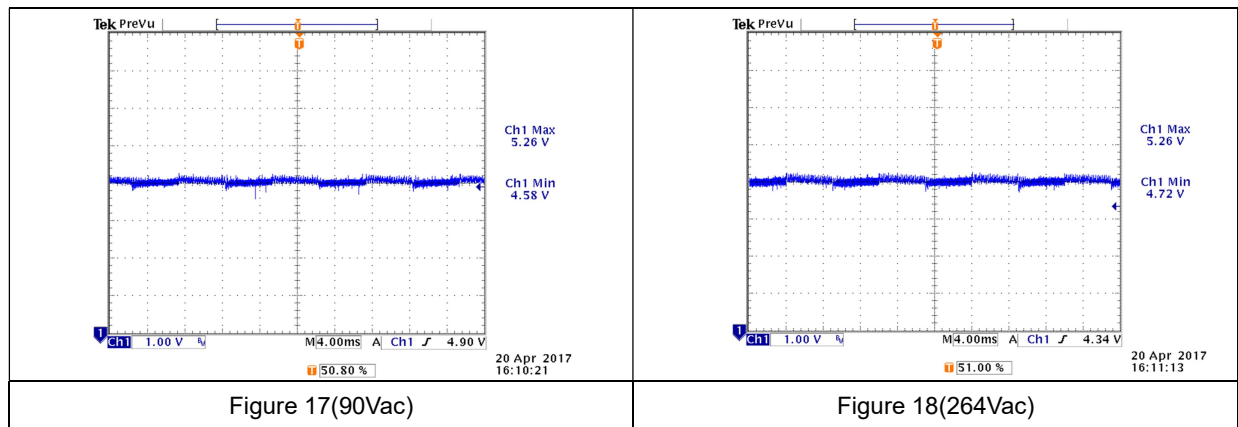
**Test Condition:**

Input: 90Vac(60Hz)/115Vac(60Hz)/230Vac(50Hz)/264Vac(50Hz)

Output: +5V/3A

Vin(V <sub>AC</sub> )	Voltage Limit Value(V)		Spec(V)
	max	min	
90	5.26	4.58	4.75~5.35
264	5.26	4.72	

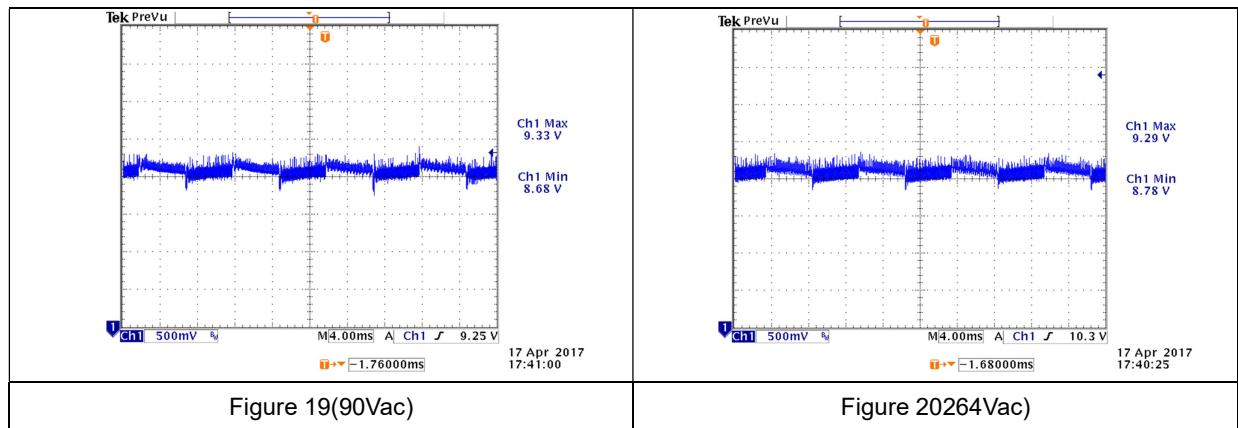
Table 12



Output: +9V/3A

Vin(V <sub>AC</sub> )	Voltage Limit Value(V)		Spec(V)
	max	min	
90	9.32	8.68	8.55~9.63
264	9.29	8.78	

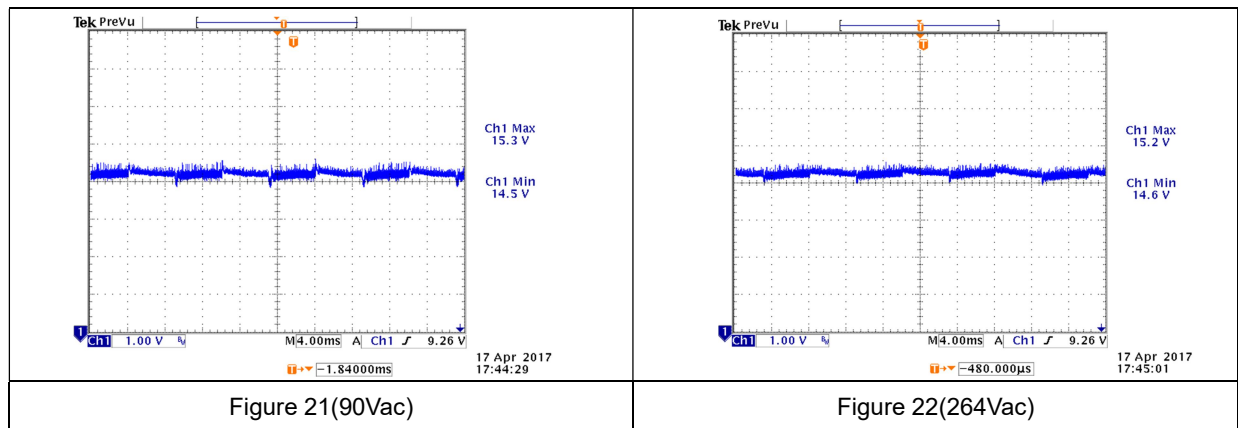
Table 13



Output: +15V/3A

Vin(V <sub>AC</sub> )	Voltage Limit Value(V)		Spec(V)
	max	min	
90	15.3	14.5	14.25~16.05
264	15.2	14.6	

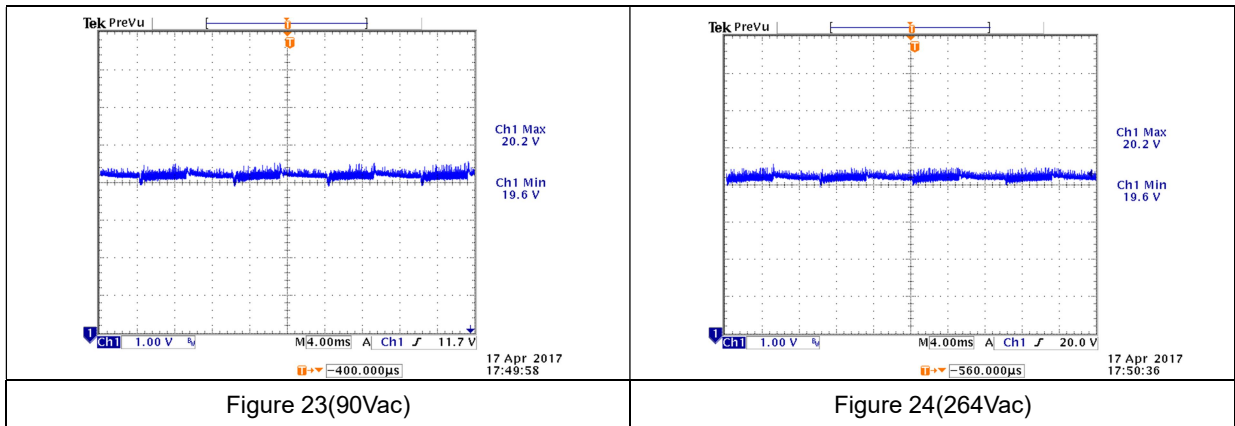
Table 14



Output: +20V/2.25A

Vin(V <sub>AC</sub> )	Voltage Limit Value(V)		Spec(V)
	max	min	
90	20.2	19.6	19~21.4
264	20.2	19.6	

Table 15



### 9. Voltage Stress on MOSFET

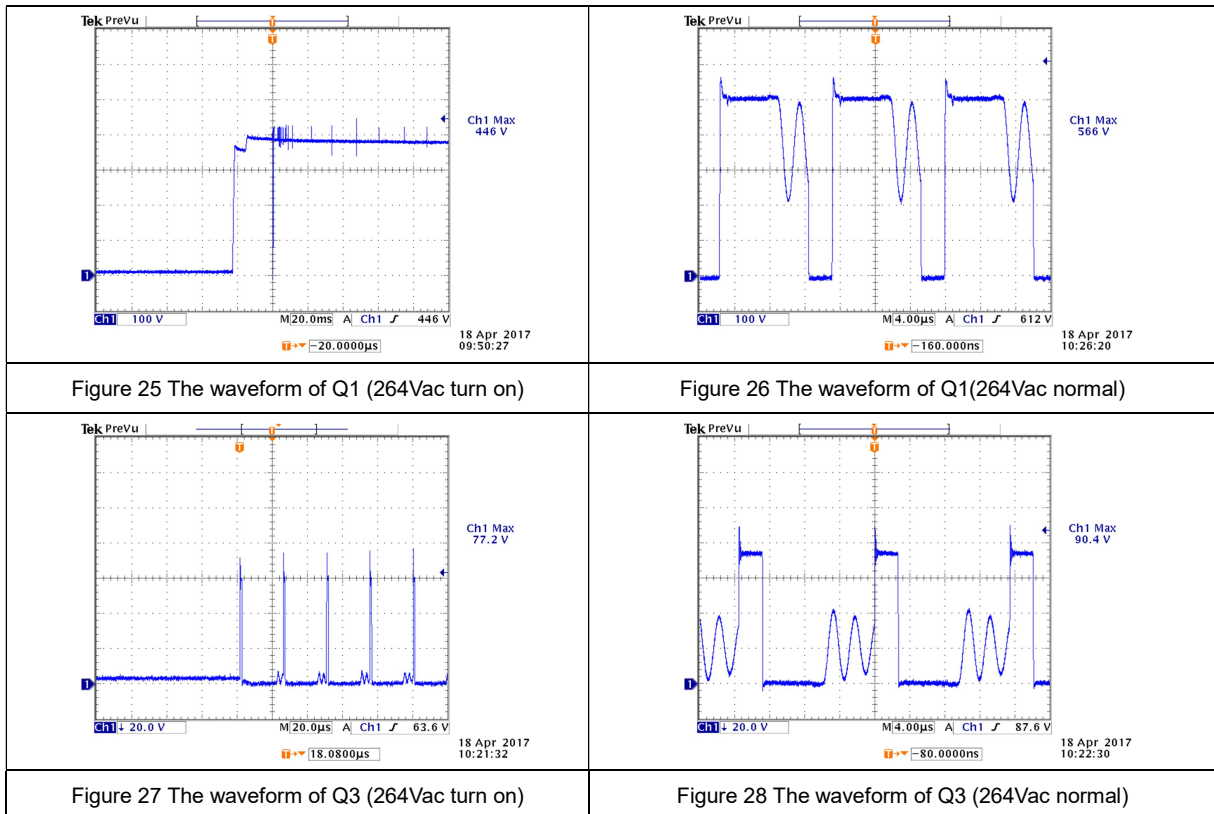
Test Condition:

Input: 264Vac(50Hz)

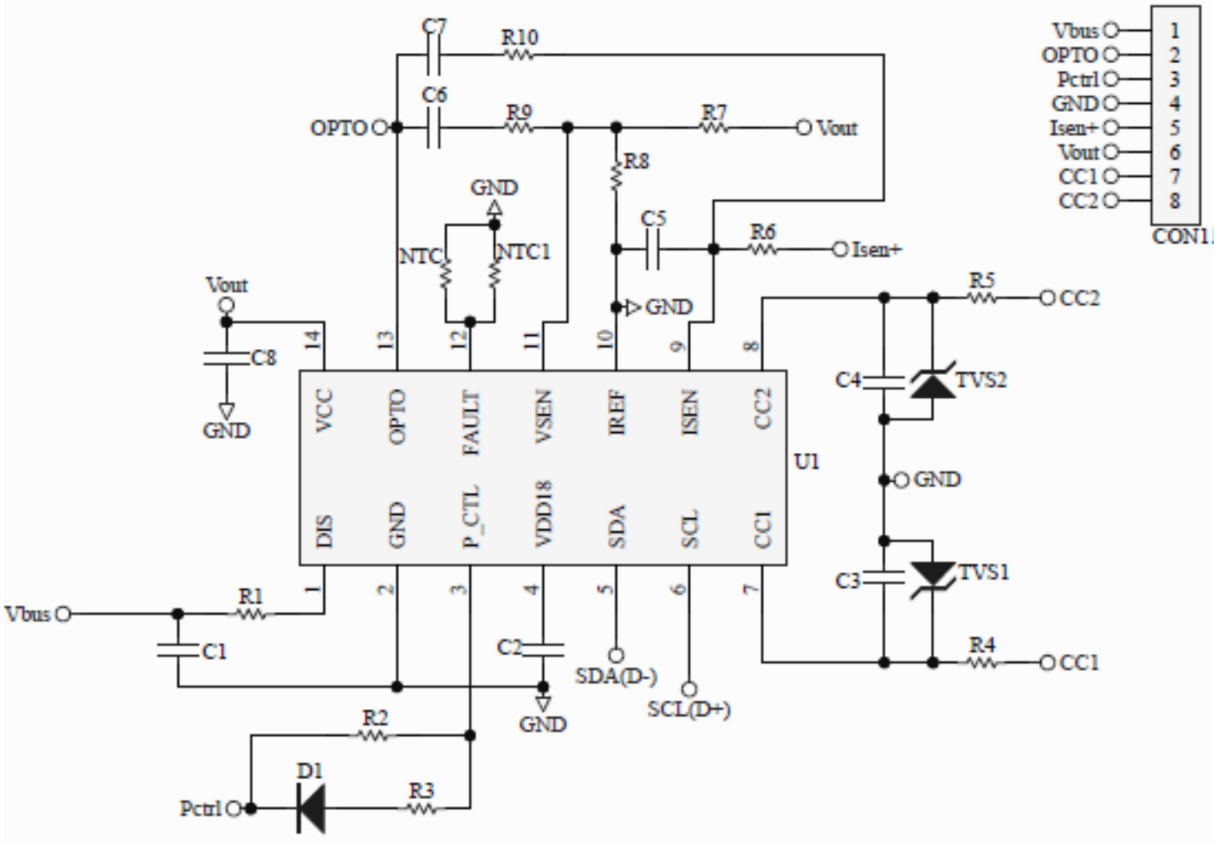
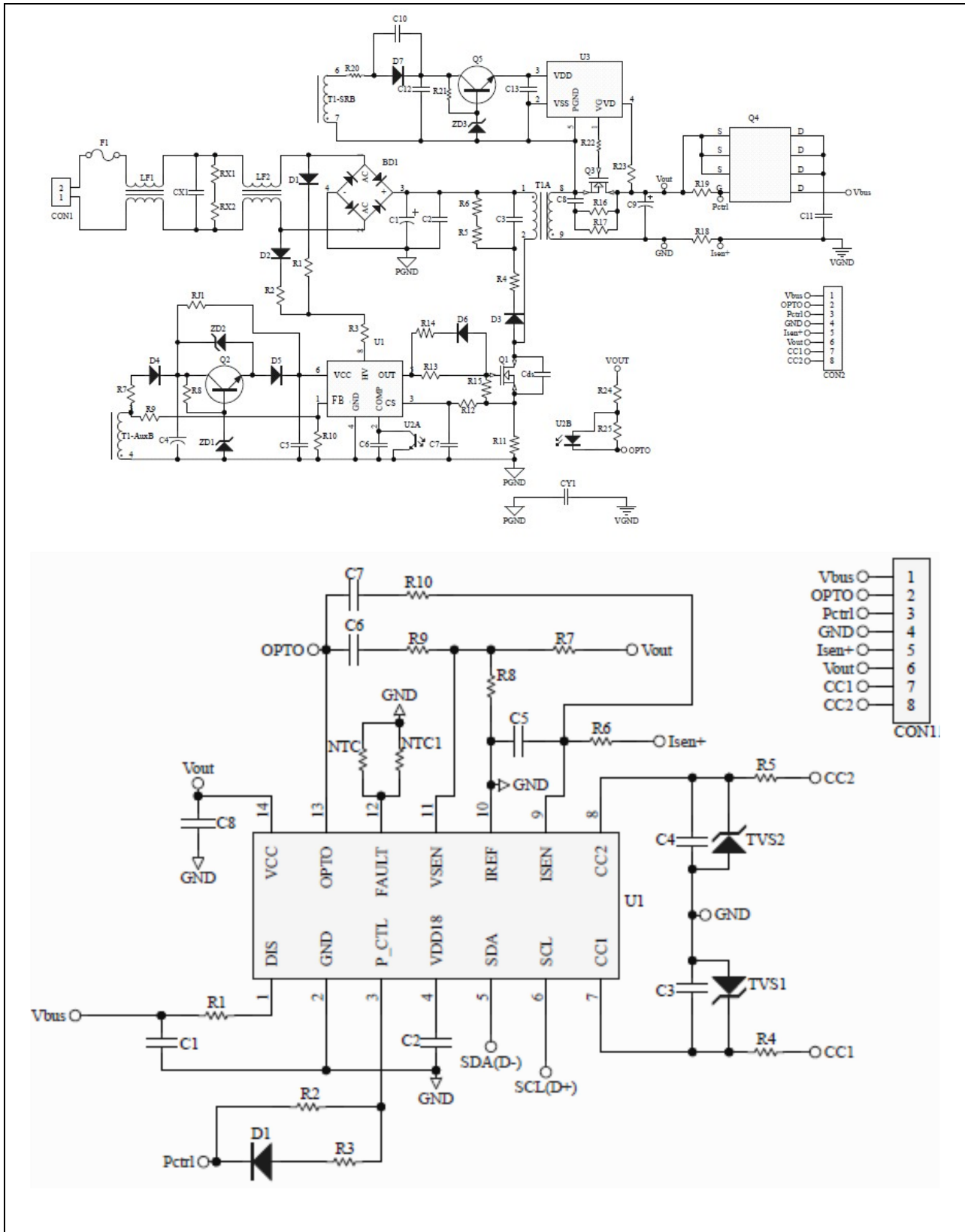
(1)20V/2.25A output:

Vin(V <sub>AC</sub> )	Voltage Limit Value(V)	Spec(V)
	MOSFET	
Q1:Vds(Turn on)	446	650V
Q1:Vds(Normal)	566	650V
Q3:Vds(Turn on)	77.2	100V
Q3:Vds(Normal)	86.8	100V

Table 16



## II. Schematic



#### IV. BOM (Main board)

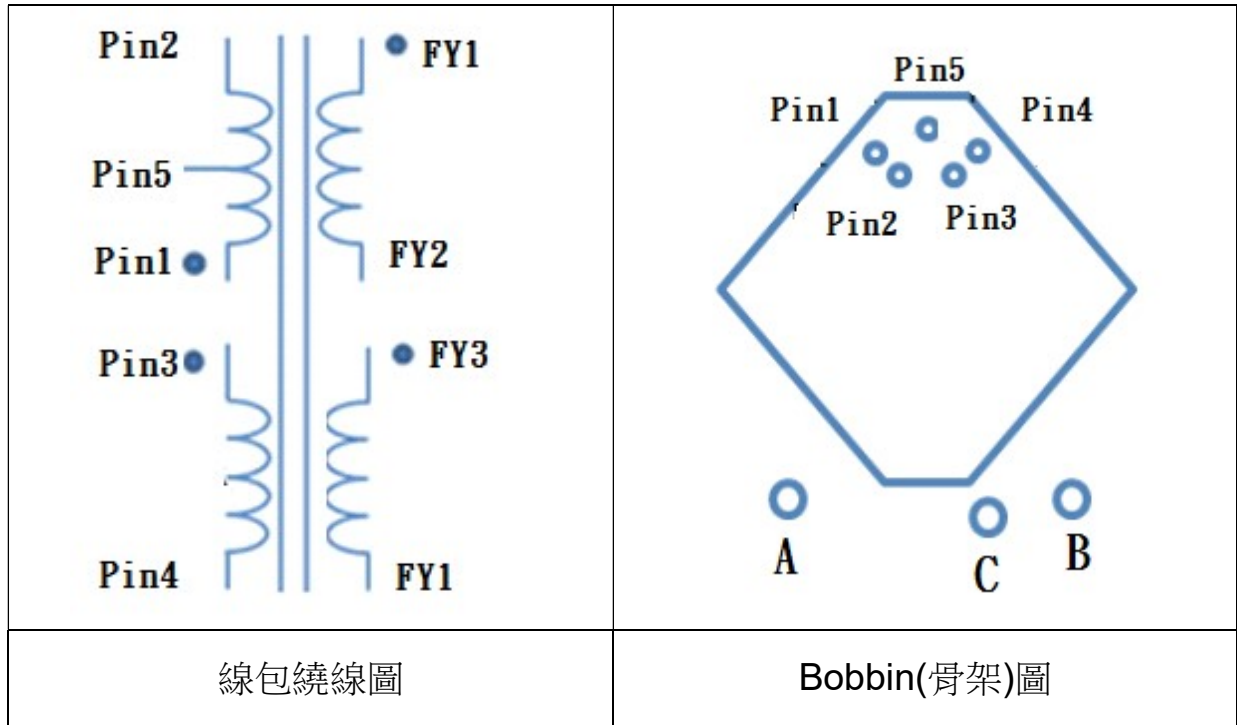
P/N	Component Value	Note	P/N	Component Value	Note
R1,R2	10KΩ,SMD1206	2	C11	NC	0
R3	10KΩ,SMD1206	1	C12	220pF/250V,SMD0805	1
R4	51Ω,SMD0805	1	C13	4.7uF/25V,SMD0805	1
R5,	100kΩ,SMD1206	1	CX1	0.33uF/250V( X CAP)	1
R6	100KΩ,SMD1206	1	CY1	222PF/250V (Y CAP)	1
R7	5.1Ω,SMD0805	1	D1,D2,D6 D7	1N4007(A7),SMD	4
R9	200kΩ,SMD1206	1	BD1	KBP206G	1
R10	22KΩ,SMD0603	1	D3	FR107(F7),SMD	1
R11	0.43Ω/2W DIP	1	D5	NC	0
R12	1KΩ,SMD 0805	1	ZD1	NC	0
R13	10Ω, SMD0805	1	ZD2	NC	0
R16,R17	82Ω,SMD1206	2	ZD3	SMD ZD 12V SOD-123	1
R18	5mΩ, SMD1206	1	F1	T3.15A/250V	1
R8,R19	NC	0	Q1	10A/650V TO-220	1
R20	0Ω,SMD0603	1	Q2	NC	0
R21	100KΩ,SMD0603	1	Q5	PMMT624 SMD	1
R22	2.2Ω,SMD0603	1	Q3	BA6014 SOT-8	1
R23	150Ω,SMD0603	1	Q4	RPB1Y SOT-8	1
R24	510Ω,SMD0805	1	U1	LD5763 SOT-8	1
R25	NC	0	U2	EL1018	1
C1	68uF/400V ( E-cap)	1	U3	LD8525	1
C3	103pF/1KV, SMD1206	1	T1	RM8	1
C4	4.7uF/100V ( E-cap)	1	LF1	Common choke (8ts)	1
C5	0.22uF/250V,SMD1206	1	LF2	Common choke (22mH)	1
C6,C8	102pF/SMD0603	2	CON1	Connector (2pin)	1
C7	330pF/SMD0603	1	Output table	20AWG*1 米	1
C9	1000uF/25V(E-cap)	1	PCB	PCB	1

#### IV. BOM (Daughter board)

P/N	Component Value	Note	P/N	Component Value	Note
R1	20Ω,SMD 1206	1			
R2	10KΩ,SMD 0603	1			
R3	NC	0			
R4,R5	47Ω,SMD0603	2			
R6,R10	10KΩ,SMD0603	2			
R7	90.9KΩ,SMD0603,1%	1			
R8	13KΩ,SMD0603,1%	1			
R9	2.2KΩ,SMD0603	1			
NTC,NTC1	NC	0			
C1	NC	1			
C2	105pF/16V,SMD0603	1			
C3,C4	330pF/25V,SMD0603	2			
C5,C6,C7	103pF/25V,SMD0603	3			
C8	104pF/25V,SMD0603	1			
U1	LD6610	1			
D1	NC	0			
TVS1,TVS2	PDWB024012-SOD-323	2			
USB1	NC	0			
CON1	8pin	1			
PCB	PCB	1			

## V. Transformer spec

Transformer : RM8, PC40  
 Inductance: 700uH @ 1KHz, 1V  
 Np:Ns:Naux: 57:8:25:20  
 Ae: 64mm<sup>2</sup>



Winding No.	Pin No.		Winding types	Number turns		Remarks
	Start	Finish		Winding	Mylar tape	
N1	1	5	0.28mm $\phi$ × 2P	27	1	Np
N2	3	4	0.12mm $\phi$ × 2P	25	1	Na
N3	FY3	FY1	TIW 0.2mm $\phi$ × 1P	20	1	Ns1
N4	FY1	FY2	TIW 0.8mm $\phi$ × 1P	8	1	Ns
N5	5	2	0.25mm $\phi$ × 2P	30	3	Np
N6	4	-	0.12mm $\phi$ × 1P	full	1	Shielding
Pin 1-2 700uH ± 7%						

**CORE** 下一次側的 **GND**