

## MANUFACTURING TEST REQUIREMENT

MODEL NO : PA-1450-33HS  
OUTPUT POWER : 45W  
DATE : 2018 / 11 / 20  
REV : A

PREPARED BY: William Wu

APPROVED BY: Vincent Chiang

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REV.	ITEM	DESCRIPTIONS OF CHANGE		CHANGED
NO.		BEFORE	AFTER	DATE :
X01			INITIAL	2018 / 08 / 08
X02			Define cold start for tiny load	2018 / 09 / 12
A			Define cold start for No load	2018 / 11 / 20

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## 1. INPUT / OUTPUT REQUIREMENT

Input Voltage	Input Frequency
90VAC ~ 264VAC	47Hz ~ 63Hz

DC OUTPUT	Min	Nom	Max	Design Requirement
5V	0	1.5	3	4.75V ~ 5.25V
9V	0	1.5	3	8.55V ~ 9.45V
12V	0	1.5	3	11.40V ~ 12.60V
15V	0	1.5	3	14.25V ~ 15.75V

## 2. DETAIL DESCRIPTION:

### 2.1 INRUSH CURRENT

Test Condition			Design Requirement
AC Input	DC Output		
90V ~264V (47Hz ~ 63Hz)	5V	3A	Shall be <b>limited to a 29% margin</b> of the I2t rating of the input fuse and bridge rectifier.
	9V	3A	
	12V	3A	
	15V	3A	

### 2.2 RATED CURRENT

Test Condition			Design Requirement
AC Input	DC Output		
90V 47Hz	5V	3A	1.4A (max)
	9V	3A	
	12V	3A	
	15V	3A	

### 2.3 HOLD UP TIME

Test Condition			Design Requirement
AC Input	DC Output		
115V 60Hz	5V	3A	5ms (min)
	9V	3A	
	12V	3A	
	15V	3A	

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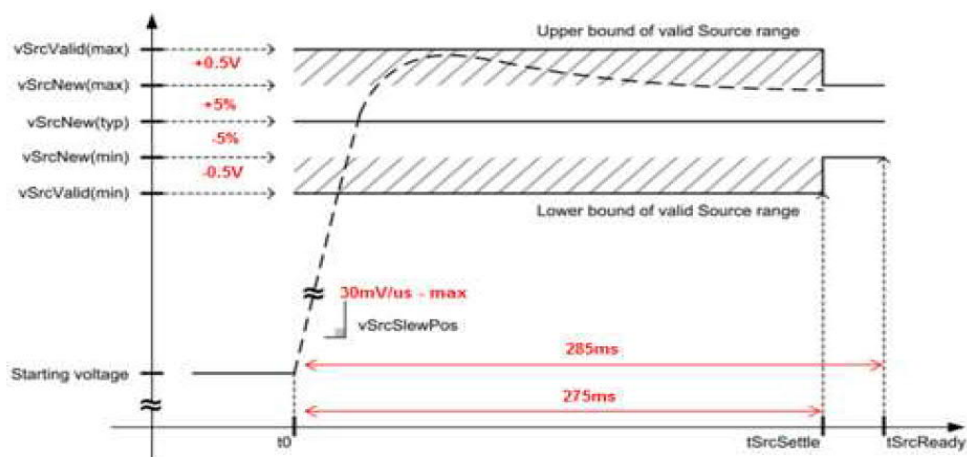
## 2.4 TURN ON TIME

Test Condition			Design Requirement
AC Input	DC Output		
90V 47Hz	5V	0A	5s (max)
		3A	

- A 1000uF / 25V electrolytic capacitor shall be used to terminate output at the measurement point for turn on test.

## 2.5 RISE TIME

Test Condition				Design Requirement	
AC Input	Output Voltage	Output Current	Measure Condition	Voltage	Time
90V ~ 264V (47Hz ~ 63Hz)	5V	0A, 3A	0V to 5V	4.75V~5.25V	275ms (max)
	9V	0A, 3A	5V to 9V	8.05V~9.95V	275ms (max)
				8.55V~9.45V	285ms (max)
	12V	0A, 3A	5V to 12V	10.90V~13.10V	275ms (max)
				11.40V~12.60V	285ms (max)
	15V	0A, 3A	5V to 15V	13.75V~16.25V	275ms (max)
				14.25V~15.75V	285ms (max)



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## 2.6 POWER SUPPLY EFFICIENCY

Test Condition			Design Requirement (full load current 100% 75% 50% 25% ,the average of these four value)
AC Input	DC Output		
115V 60Hz	5V / 3A	15W	Efficiency <b>80.50%</b> at cold start.
230V 50Hz			Efficiency <b>81.50%</b> (min) at warm up after 30min.
115V 60Hz	9V / 3A	27W	Efficiency <b>85.70%</b> at cold start.
230V 50Hz			Efficiency <b>86.70%</b> (min) at warm up after 30min.
115V 60Hz	12V / 3A	36W	Efficiency <b>86.41%</b> at cold start.
230V 50Hz			Efficiency <b>87.41%</b> (min) at warm up after 30min.
115V 60Hz	15V / 3A	45W	Efficiency <b>86.80%</b> at cold start.
230V 50Hz			Efficiency <b>87.80%</b> (min) at warm up after 30min.

## 2.7 NO LOAD AND LIGHT LOAD POWER LOSS

Test Condition		Design Requirement	
AC Input	DC Output	Pout	Pin
115V 60Hz  230V 50Hz	5V	0.00W	<b>0.1W</b> <b>0.2W (Cold Start)</b>
		0.25W	<b>0.5W</b> <b>0.6W (Cold Start)</b>
		0.50W	<b>1.0W</b>
		1.00W	<b>1.7W</b>
		1.50W	<b>2.4W</b>
	9V / 12V / 15V	0.00W	<b>NA</b>
		0.25W	<b>0.5W</b> <b>0.6W (Cold Start)</b>
		0.50W	<b>1.0W</b>
		1.00W	<b>1.7W</b>
		1.50W	<b>2.4W</b>

Note1: Integral 3mins at least by WT210.

Note2: For cold start is define integral 3s by WT210.

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## 2.8 OUTPUT COMBINE REGULATION & RIPPLE / NOISE TEST

Test Condition			Design Requirement	
AC Input	DC Output		Item	spec
90V ~264V (47Hz ~ 63Hz)	5V	0 ~ 3A	Ripple & Noise	<380mVp-p
	9V	0 ~ 3A	Ripple & Noise	<380mVp-p
	12V	0 ~ 3A	Ripple & Noise	<380mVp-p
	15V	0 ~ 3A	Ripple & Noise	<380mVp-p

- Use 20M Hz Bandwidth frequency scope.
- The ripple & noise voltage of the outputs shall be measured at the pins of the mating output connector.
- A high frequency 1μf ceramic capacitor and a 10μf tantum capacitor shall be used to terminate each output at the measurement point.

## 2.9 DYNAMIC LOAD

Test Condition			Design Requirement
AC Input	DC Output		Regulation
90V ~264V (47Hz ~ 63Hz)	5V	0.1A ~ 1.5A	4.50 ~ 6.0V
		1.5A ~ 3.0A	
		0.1A ~ 2.7A	
	9V	0.1A ~ 1.5A	8.10 ~ 9.90V
		1.5A ~ 3.0A	
		0.1A ~ 2.7A	
	12V	0.1A ~ 1.5A	10.80 ~ 13.2V
		1.5A ~ 3.0A	
		0.1A ~ 2.7A	
	15V	0.1A ~ 1.5A	13.50 ~ 16.50V
		1.5A ~ 3.0A	
		0.1A ~ 2.7A	

- Frequency: 1 Hz/ 5kHz; Slew Rate: 1A/us; Duty: 50%.
- Add Capacitor 1000uF on the load.

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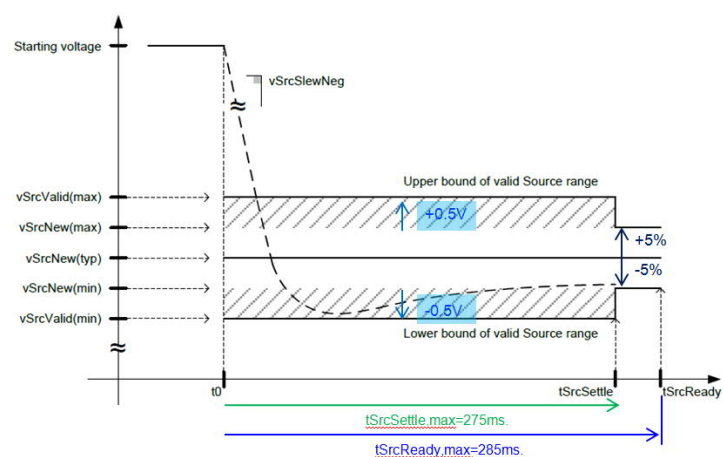
## 2.10 PEAK LOAD

NOMINAL VOLTAGE (V)	LOAD CURRENT(A) and Test Time(s)	Design Requirement
5V	2.25A (10ms) to 3.75A (10ms)	4.65 ~ 5.35V
	2.82A (3.6ms) to 4.5A (0.4ms)	
	2.85A (2.85ms) to 6A (0.15ms)	
9V	2.25A (10ms) to 3.75A (10ms)	8.37 ~ 9.63V
	2.82A (3.6ms) to 4.5A (0.4ms)	
	2.85A (2.85ms) to 6A (0.15ms)	
12V	2.25A (10ms) to 3.75A (10ms)	11.16 ~ 12.84V
	2.82A (3.6ms) to 4.5A (0.4ms)	
	2.85A (2.85ms) to 6A (0.15ms)	
15V	2.25A (10ms) to 3.75A (10ms)	13.95 ~ 16.05V
	2.82A (3.6ms) to 4.5A (0.4ms)	
	2.85A (2.85ms) to 6A (0.15ms)	

- Add Capacitor 1000uF on the DC load.
- AC Input: 90Vac/47Hz & 264Vac/63Hz

## 2.11 NEGATIVE VOLTAGE TRANSITION

Test Condition				Design Requirement	
AC Input	Output Voltage	Output Current	Measure Condition	Voltage	Time
90V ~ 264V (47Hz ~ 63Hz)	9V	0A, 3A	9V to 5V	4.75~5.25V	275ms (max)
	12V	0A, 3A	12V to 5V	4.75~5.25V	275ms (max)
	15V	0A, 3A	15V to 5V	4.75~5.25V	275ms (max)



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### 3. PROTCOTION

#### 3.1 OUTPUT OVER VOLTAGE PROTCOTION

Test Condition		Design Requirement	
AC Input	DC Output	Max	Function
90V ~264V (47Hz ~ 63Hz)	5V	7.25V	The power supply is <b>latched</b> and power on reset is required.
	9V	13.05V	
	12V	17.40V	
	15V	21.75V	

- Short the "PC300" secondary.

#### 3.2 OUTPUT OVER CURRENT PROTCOTION

Test Condition		Design Requirement	
AC Input	DC Output	Max	Function
90V ~264V (47Hz ~ 63Hz)	5V / 9V /12V / 15V	5A	The power supply will <b>latch</b> after removing the overload condition. <b>DC unplug and plug can release.</b>

#### 3.3 OUTPUT SHORT CIRCUIT PROTCOTION

Test Condition		Design Requirement
AC Input	DC Output	Function
90V ~264V (47Hz ~ 63Hz)	5V / 9V / 12V / 15V	The power supply will <b>latch</b> after removal of the short circuit fault. <b>DC unplug and plug can release.</b>

- Short output terminal of the DC plug + and -.

#### 3.4 OVER TEMPERATURE PROTCOTION

The power supply shall incorporate over temperature protection (OTP), when OTP occurs, the PSU will shut down and latch off until the AC reset. **Please short the RT100 or RT300 to make sure the OTP circuit could work well.** It simulates the over temperature condition occurs.  
(Note: The test with input 90V/47Hz at output 15V/3A)

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**4. HI-POT TEST**

Apply DC 4242V on primary to secondary for 1 sec and DC 2150V on Primary to PE for 1 sec.  
No component, no arcing, no noise, and the cut off current shall below 0.6mA.

**5. INSULATION RESISTANCE**

Apply DC 500V to primary-secondary. The resistance shall large then 30M ohms.

**6. GROUND LEAKAGE CURRENT**

The power supply ground leakage current shall be less than 40uA at 250Vac/50Hz.

**7. FIREWARE CHECKSUM**

The check sum is 8F0D.

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