

SPECIFICATION FOR APPROVAL

Customer :
 Part name : LED POWER SUPPLY
 Customer Model No. :
 Customer Part No. :
 Supplier Model No. : LHP100-S36-01
 Supplier Part No. :
 Total page : 14
 Date : 2009-07-10

Customer approval signature:		
Prepared by	Checked by	Approved by

Supplier approval signature:		
Prepared by	Checked by	Approved by

Result : Pass Reject

Date :

Explain: Please return to us "SPECIFICATION FOR APPROVAL" with your approved signatures.

TOKGAWA
 SMPS Professional Supplier

深圳市德川泛亞科技有限公司
 TOKGAWA TECHNOLOGY (H.K.) LIMITED

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Version: 1.0

Version	Release date	Notes
1.0	2009-07-10	First release

PRED. by	BH-Li	TOKGAWA TOKGAWA TECHNOLOGY LIMITED			
CHKD. by	XJ-Chou				
APVD. by	MK-Chen	Model: LHP100-S36-01	Ver:1.0	No.2	of 14 page

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1. Scope:

For LED Used Only.

2. Input & Output characteristics:

2.1. Input characteristics:

Test item	Min.	Nor.	Max.	Unit	Test conditions
Rated input voltage	100	—	240	V	
Input voltage range	90	—	264	V	
Input current 1	—	—	1.00	A	Vi=110V@ Nom. output current
Input current 2	—	—	0.41	A	Vi=220V@ Nom. output current
Inrush current 1(Cold)	—	—	30	A	Vi=110V@ Nom. output current
Inrush current 2(Cold)	—	—	60	A	Vi=220V@ Nom. output current
Rated input frequency	47	—	63	Hz	

2.2. Output characteristics:

Test item		Vo1						Unit	Test conditions
Rated output voltage		+26- +36					—	v	—
Output voltage Accuracy							—	%	—
Min. output current		2000					—	mA	—
Max. output current		3600					—	mA	—
Ripple & Noise(R&N)		2500					—	mV	See2.2.1
Load effect		—					—	%	See2.2.2
Source voltage effect		—					—	%	See2.2.3
Temperature effect	Voltage	±0.05					—	%/°C	See2.2.4
	R&N	—					—	%/°C	
Drift	Voltage	—					—	%	See2.2.5
	R&N	—	—	—	—	—	—	%	
Max. turn-on time					950			mS	See2.2.6
Max. rise time					55			mS	See2.2.7
Min. maintain time					—			mS	See2.2.8
Overshoot(turn-on)					10			%	See2.2.9
Overshoot(turn-off)					10			%	
Overshoot(load effect)					—			%	See2.2.10
transient recovery time(load effect)					—			uS	
Max. capacitive load							—	uF	See2.2.11

Notes:

2.2.1. It shall use an oscilloscope with 20MHz bandwidth to measure the ripple & noise and parallel with a 50V/47uF elec-capacitor and a 0.1uF ceramic capacitor at the end of the

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output cable, the value is peak to peak . Load must be isolated from the ground of the power source.

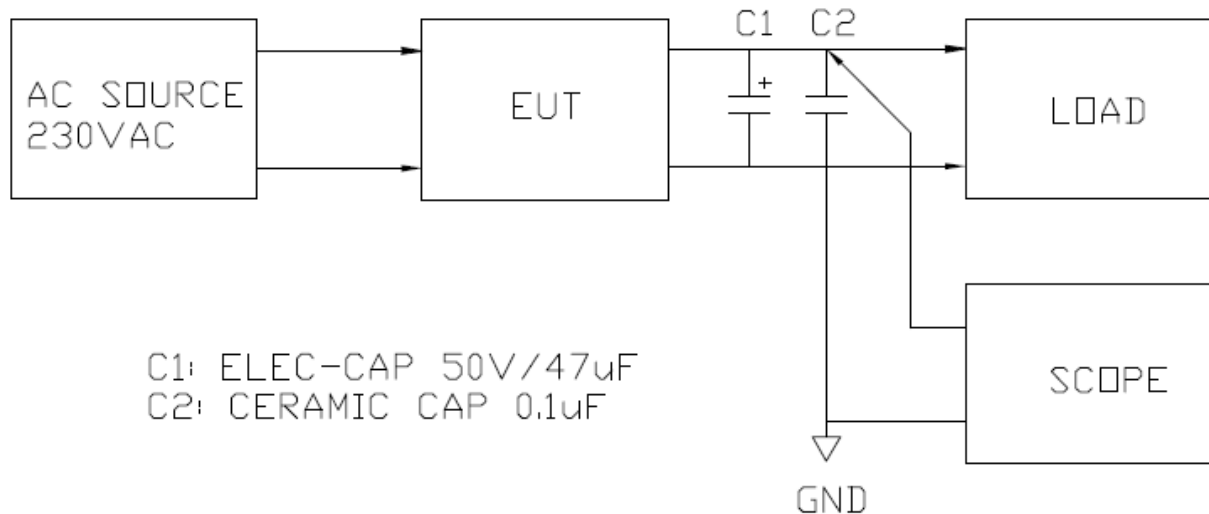


Figure1

2.2.2. Load effect= $(V_o I - V_o II) / V_o I * 100\%$,

Measure output variation at $V_i=220V$ and the output current change from normal output current to max. output current.

V_i : Input voltage;

$V_o I$: Value of output voltage at normal output current;

$V_o II$: Value of output voltage at max. output current;

2.2.3. Source voltage effect= $(V_o I - V_o III) / V_o II * 100\%$,

Measure at normal output current and the input voltage change from 90V to 264V,

$V_o I$: Value of output voltage at $V_i=90V$,

$V_o II$: Value of output voltage at $V_i=240V$,

$V_o III$: Value of output voltage $V_i=264V$.

2.2.4. Temperature effect= $(A-B) / C / \Delta T * 100\%$,

Measure output voltage and R(ripple)& N(noise) at $V_i=220V$ and normal output current, change the environmental temperature form $0^\circ C$ to $+40^\circ C$ within 8 hours.

A: min. value of the output voltage or R(ripple)& N(noise),

B: max. value of the output voltage or R(ripple)& N(noise),

C: value of the output voltage or R(ripple)& N(noise) at $25^\circ C$.

$\Delta T = T_a - T_b$

2.2.5. Drift = $(D-E) / F * 100\%$

Measured at $V_i=220V$ and normal output current, keep the environmental temperature from $+24^\circ C$ to $+26^\circ C$ within 8 hours,

D: min. value of the output voltage or R(ripple)& N(noise),

E: max. value of the output voltage or R(ripple)& N(noise),

F: the value of the output voltage or R(ripple)& N(noise) after operating half an hour.

2.2.6. Measure at $V_i=220V$ and normal output current.

$T_{on} = t_3 - t_1$; See figure2

T_{on} :max.turn on time of getting stable output voltage;

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t1:time of input power on;
 t3:time of getting stable output voltage.

2.2.7. Measure at $V_i=220V$ and normal output current.

$T_r=t_3-t_2$; See figure2

T_r :rise time of getting stable output voltage after power on;
 t2: time of getting 10% stable output voltage after power on.

2.2.8. Measure at $V_i=220V$ and normal output current.

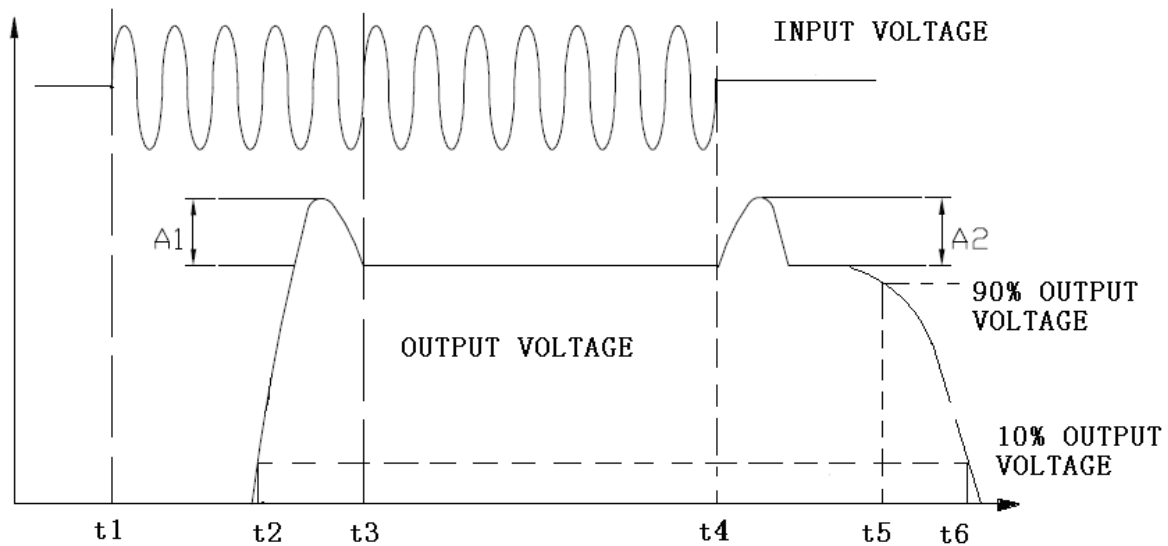
$T_d=t_6-t_5$;see figure2

T_d : fall time of output voltage after power off;

2.2.9. Measure at $V_i=220V$ and normal output current.

$T_m=t_5-t_4$; See figure2

2.2.10. Measure the variation and recovery time of the output voltage at $V_i=220$, the output current change from 50% max. output current to 75% max. output current, $di/dt=0.1A/uS$, See figure3



Remark

A1:turn on overshoot
 A2:turn off overshoot

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Figure 2

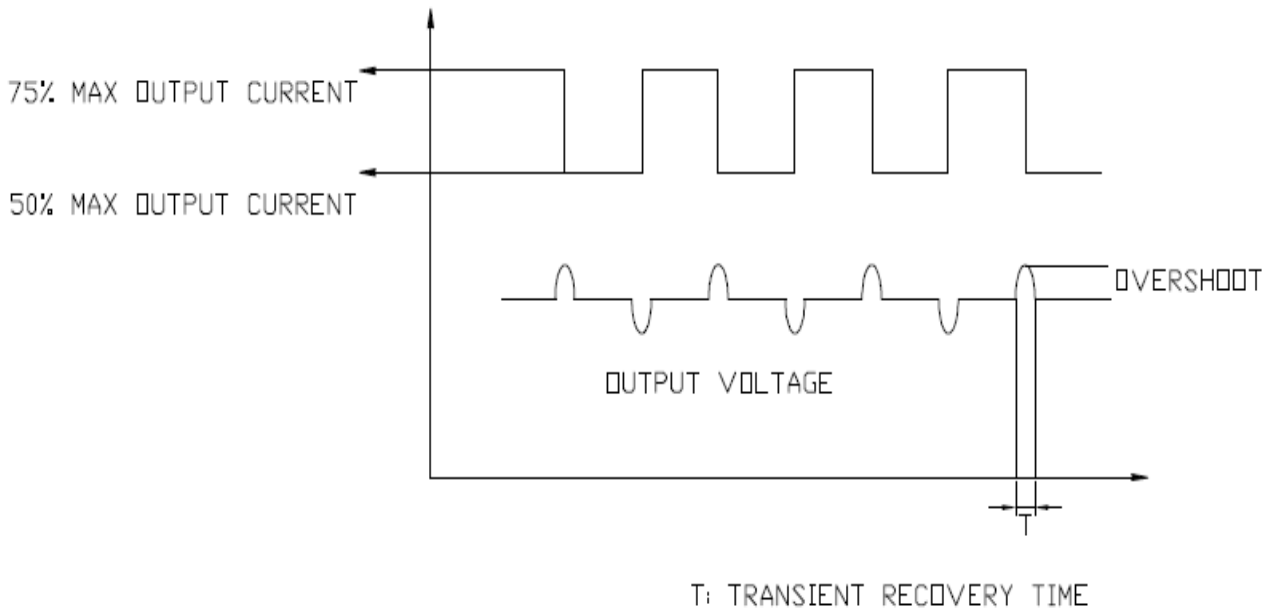


Figure 3

2.2.11. The SMPS should be able to power up and operate stably when parallel some capacitors with the DC output, the capacitive load only be used to check stability of SMPS, but should not be used to test ripple & noise .

3. Efficiency:

Test item	Min.	Nor.	Max.	Unit	Test condition
Efficiency 1	85	—	—	%	110V max output current
Efficiency 2	86	—	—	%	220V max output current

4. Protection characteristics:

4.1. Input protection characteristics:

Test item	Min.	Nor.	Max.	Unit	Test condition
Input fuse	—	3.15	—	A	Fuse:T3.15AL250V
Input under-voltage protection	—	—	—	V	N/A
Input over-voltage protection	—	—	—	V	N/A

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4.2. Output protection characteristics:

Test item		Vo1						Unit	Test condition	Result
Over-current protection	Min.	—						A	For single output	Auto-recovery
	Nor.	—						A		
	Max.	—						A		
Over-voltage protection	Min	—						V	220Vac& Max output current	Auto-recovery
	Nor.	43						V		
	Max	—						V		
Short protection		OK						—	264Vac	Auto-recovery

5. Safety & Reliability:

Test item		Min	Type	Max	Unit	Test condition
Hi-pot	Input -Output	—	4000	—	V	DC rms, 5mA,60S
	Input -Ground	—	—	—	V	
	Output -Ground	—	—	—	V	
Insulation resistance	Input -Output	50	—	—	MΩ	500VDC
	Input -Ground	—	—	—	MΩ	
	Output -Ground	—	—	—	MΩ	
Leakage current			—	0.25	mA	Input 220Vac
Safety standard:		GB8898-2003				
MTBF		≥30000Hours		Standard:MIL-HDBK-217F Condition: 25℃, Vi=220V,nom. output current		

6. EMC & RoHS:

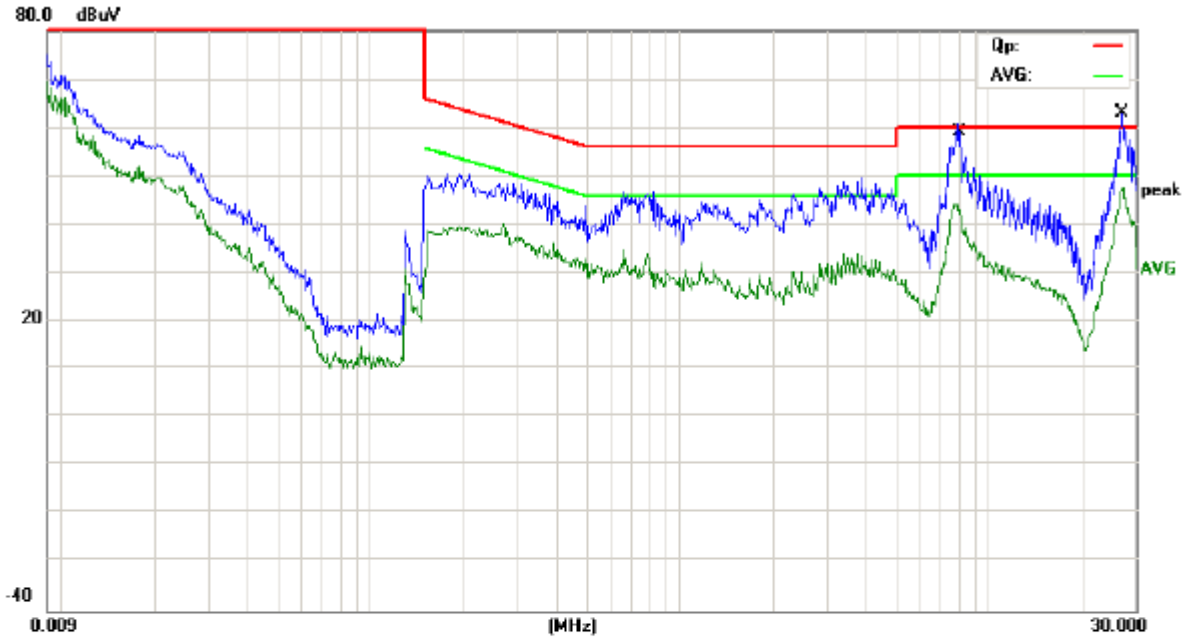
Test item	Standard	Test level
Harmonic current	EN61000-3-2 EN61000-4-7	CLASS C
Voltage fluctuations& flicker	EN61000-3-3	—
ESD	EN61000-4-2	Air:±8kV;Contact:±4kV;
Radiated immunity	EN61000-4-3	3V/m
EFT/B	EN61000-4-4	Input to Ground:0.5Kv,Tr/Th=1.2uS/50uS;
Surge	EN61000-4-5 CNS 14676-5	Input to Ground:0.5kV, Tr/Th=5uS/50nS,5kHz;
Conducted immunity	EN61000-4-6	0.15~80MHz,3Vrms,80%AM(1kHz)
Voltage dips & short interruptions & voltage variations immunity	EN61000-4-11	—
Conducted emissions	EN55015 CNS 14115	—

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Radiated emissions	GB13837	2003
RoHS	RoHS2002/95/EC	SMPS will be RoHS in mass production

Conducted Emission Measurement

File : FP08S012 Data :#5 Date: 09/07/10/ Time: 10/19/13



Site site #1 Phase: **N** Temperature: 26
 Limit: EN55015 Conduction QP Power: AC 230V/50Hz Humidity: 60 %
 EUT:
 M/N: LHP100-S36-01
 Mode: ON
 Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	8.0620	44.60	10.16	54.76	60.00	-5.24	QP	
2		8.0620	31.00	10.16	41.16	50.00	-8.84	AVG	
3		27.1420	44.50	9.00	53.50	60.00	-6.50	QP	
4		27.1420	34.80	9.00	43.80	50.00	-6.20	AVG	

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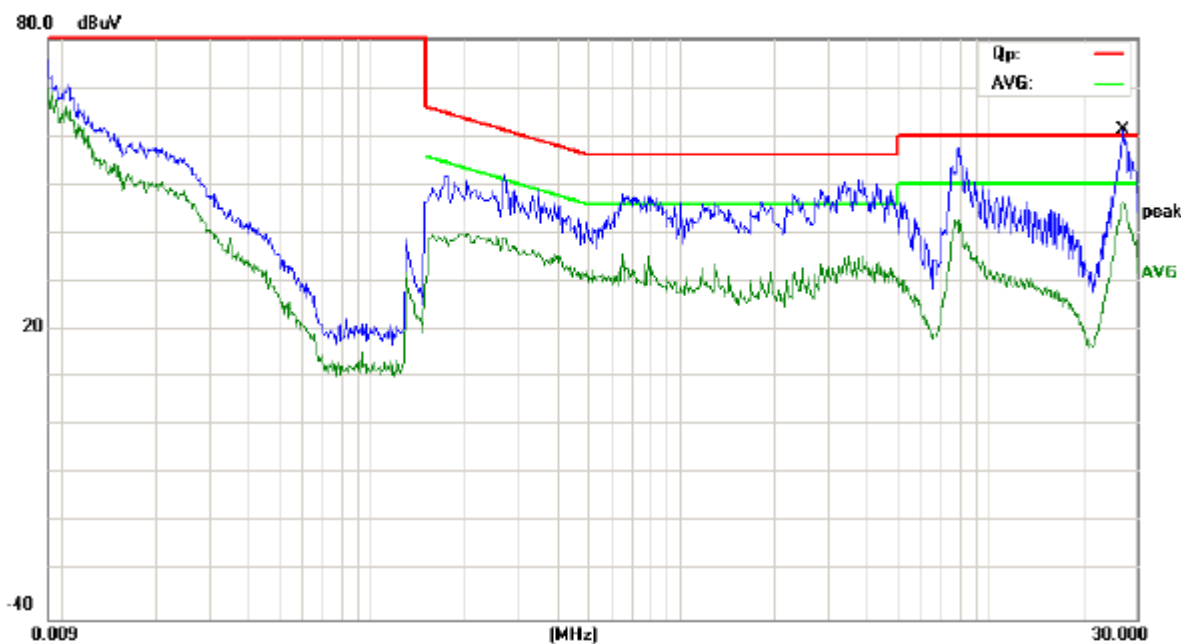
Conducted Emission Measurement

File : FP08S012

Data :#6

Date: 09/07/10/

Time: 10/25/39



Site site #1

Phase: **L1**

Temperature: 26

Limit: EN55015 Conduction QP

Power: AC 230V/50Hz

Humidity: 60 %

EUT:

M/N: LHP100-S36-01

Mode: ON

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	*	27.1460	43.60	9.00	52.60	60.00	-7.40	QP	
2		27.1460	33.00	9.00	42.00	50.00	-8.00	AVG	

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Surge Test Recorder Data

Surge Immunity Test											
Applicant: Tokgawa Technology Limited											
EUT: LED Streetlight Power Supply						M/N: LHP100-S36-01					
Operation Mode: ON						Input Voltage: AC 230V/50Hz					
Test Engineer: Duke.xu						Test Date: Jul. 14, 2009					
Test Condition: 26 °C, 50% RH			Test Criterion: B			Test Standard: <input checked="" type="checkbox"/> IEC61000-4-5:2005 <input type="checkbox"/> EN61000-4-5:2006 <input checked="" type="checkbox"/> CNS 14676-5			Test Result: <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		
Test Equipment: EM Test, M/N: UCS-500-M4											
Line : <input checked="" type="checkbox"/> AC Mains <input type="checkbox"/> DC Supply <input type="checkbox"/> Signal:											
Repetition: 1 times pre test Interval 30 seconds											
Test Results Describe											
Combination	Volt	500V		1KV		2KV		3KV		4KV	
L-N	Phase	+	-	+	-	+	-	+	-	+	-
	0°			PASS	PASS						
	90°			PASS	PASS						
	180°			PASS	PASS						
	270°			PASS	PASS						
N-PE	0°					PASS	PASS				
	90°					PASS	PASS				
	180°					PASS	PASS				
	270°					PASS	PASS				
L-PE	0°					PASS	PASS				
	90°					PASS	PASS				
	180°					PASS	PASS				
	270°					PASS	PASS				
Signal	0°										
	90°										
	180°										
	270°										

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HARMONICS CURRENT TEST REPORT

Company	Tokgawa Technology	Test Engineer	Duke.Xu
Model name	High power LED		
Type	LHP100-S36-01		
Serial No.		Type of test	EN61000-3-2:2006 *IEC61000-3-2 Ed3.0(2005)
Operating mode	ON		EN61000-4-7:2002 *IEC61000-4-7(2002)
Date of test	2009/07/14 13:03:06	Classification	Class C
Climatic condition	23.0%	Power analyzer	KHA1000, Ver1.50
Mem o		Supply Source	AC 230V/50Hz
		Reference Impedance	

Test Data of Current Harmonics

FINAL TEST RESULT **PASS**

Voltage	230.30V
Current	0.346A
Power	74.90W
Power factor	0.9389
Apparent Power	79.8VA

THC	0.035A
POHC/LIMIT	0.007A/ 0.032A *3
Nominal	230V/ 50Hz
Fundamental current	0.344A
Measuring period	150s
Margin	100%

HarmOrder	Limit1(A rms)	Limit2(A rms)	Ave(A rms)	Max(A rms)	LimitOver(s)	Judge
2	0.0069	0.0103	0.0010	0.001	0.0	N/A
3	0.0968	0.1453	0.0280	0.028	0.0	Pass
4	----	----	0.0010	0.001	----	N/A
5	0.0344	0.0516	0.0150	0.015	0.0	Pass
6	----	----	0.0010	0.001	----	N/A
7	0.0241	0.0361	0.0070	0.007	0.0	Pass
8	----	----	0.0010	0.001	----	N/A
9	0.0172	0.0258	0.0060	0.006	0.0	Pass
10	----	----	0.0010	0.001	----	N/A
11	0.0103	0.0155	0.0050	0.005	0.0	Pass
12	----	----	0.0010	0.001	----	N/A
13	0.0103	0.0155	0.0050	0.005	0.0	Pass
14	----	----	0.0010	0.001	----	N/A
15	0.0103	0.0155	0.0040	0.004	0.0	N/A
16	----	----	0.0010	0.001	----	N/A
17	0.0103	0.0155	0.0040	0.004	0.0	N/A
18	----	----	0.0010	0.001	----	N/A
19	0.0103	0.0155	0.0040	0.004	0.0	N/A
20	----	----	0.0010	0.001	----	N/A
21	0.0155	0.0155	0.0030	0.003	0.0	N/A
22	----	----	0.0010	0.001	----	N/A
23	0.0155	0.0155	0.0030	0.003	0.0	N/A
24	----	----	0.0010	0.001	----	N/A
25	0.0155	0.0155	0.0030	0.003	0.0	N/A
26	----	----	0.0010	0.001	----	N/A
27	0.0155	0.0155	0.0020	0.002	0.0	N/A
28	----	----	0.0010	0.001	----	N/A
29	0.0155	0.0155	0.0020	0.002	0.0	N/A
30	----	----	0.0010	0.001	----	N/A
31	0.0155	0.0155	0.0020	0.002	0.0	N/A
32	----	----	0.0010	0.001	----	N/A
33	0.0155	0.0155	0.0020	0.002	0.0	N/A
34	----	----	0.0010	0.001	----	N/A
35	0.0155	0.0155	0.0014	0.002	0.0	N/A
36	----	----	0.0010	0.001	----	N/A
37	0.0155	0.0155	0.0010	0.001	0.0	N/A
38	----	----	0.0010	0.001	----	N/A
39	0.0155	0.0155	0.0010	0.001	0.0	N/A
40	----	----	0.0010	0.001	----	N/A

Type of equipment behaviour: Quasi-Stationary

*3 When the POHC value does not exceed the POHC Limit, 150% of the Limit1 value is applied to each Limit1 value.

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7. Environmental characteristics:

Test item		Unit	Min.	Nor.	Max.	Test condition
Temperature	Operating	°C	-5	—	55	220Vac, Normal load
	Storing		-25	—	70	
Relative humidity	Operating	%	5	—	95	No dewdrop
	Storing		5	—	95	
Utterly humidity	Operating	g/m ³	0.25	—	—	
	Storing		0.25	—	—	
Altitude	Operating	m	0	—	2000	
	Storing		0	—	10000	
Vibration	Operating		—			
	Storing		IEC60068-2-6 Fc: sinusoidal 3 axes, 5 sweeps per axis unpowered on test card Freq. range: 5~35Hz displacement:0.15mm. Freq. range:58~150~58Hz Acceleration: 10m/s ²			
Shock	Operating		—			
	Storing		IEC60068-2-27 Ea: Shock 3 axes, 5 sweeps per axis unpowered on test card Freq. range: 5~35Hz displacement:0.15mm. Freq. range:58~150~58Hz Acceleration: 10m/s ²			
Bump	Operating		—			
	Storing		IEC60068-2-29 Eb: Bump Acceleration:50m/s ² Duration:16mS Degree:5~10			

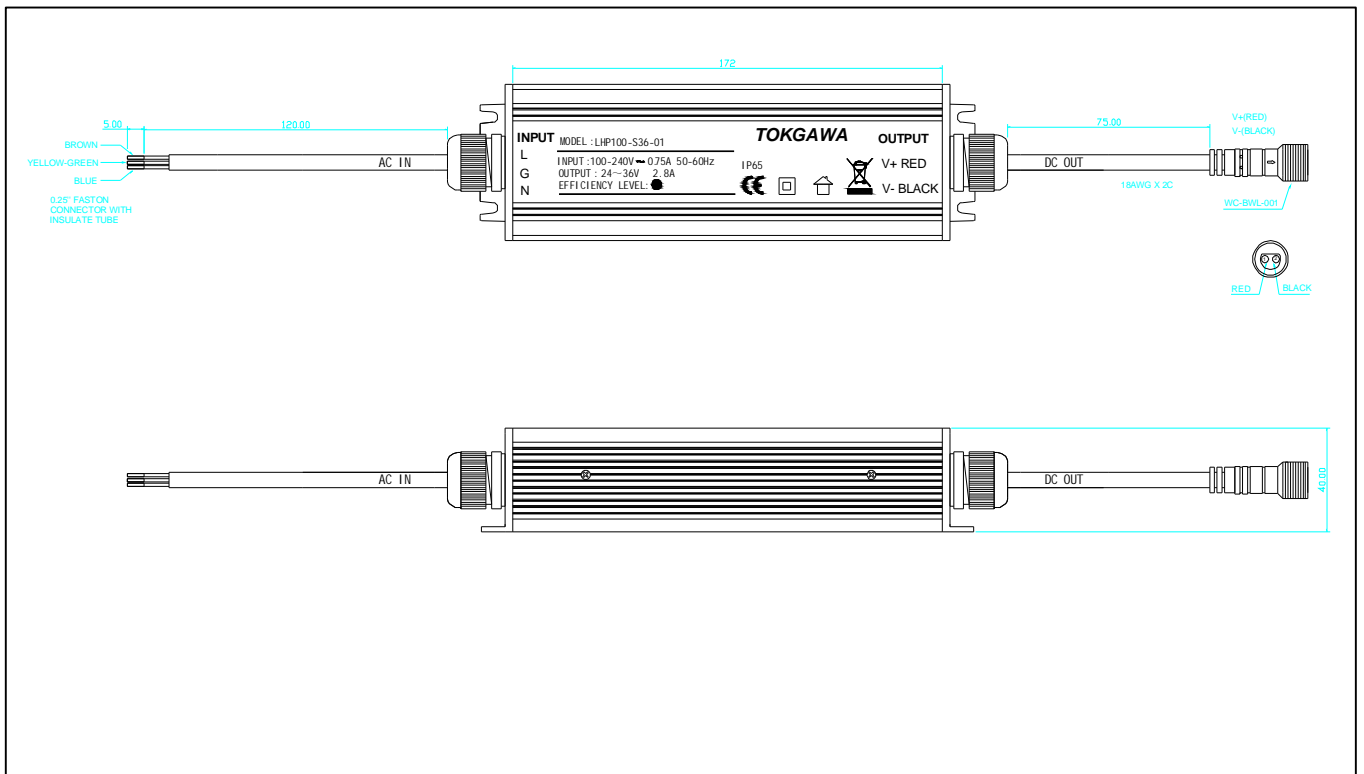
8. Other characteristics:

	Min.	Nor.	Max.	Unit	Test condition
Switching frequency	50K	—	150K	kHz	Input 220Vac

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9. Mechanical characteristics:

9.1. Mechanical drawing:



9.2. Input & Output connector:

Input connector: 3PIN 18AWG (BLACK-L YELLOW-EARTH WHITE-N)

Output connector: 2PIN 18AWG (BLACK-V- RED-V+)

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