



■ Features :

- Universal AC input / Full range (up to 295VAC)
- Fully isolated plastic case with IP64 level
- Built-in constant current limiting circuit with adjustable OCP level
- Protections: Short circuit / Overload / Over voltage / Over temperature
- Built-in active PFC function
- IP64 design for indoor or outdoor installations
- UL1310 Class 2 power unit
- Pass LPS
- Cooling by free air convection
- 100% full load burn-in test
- High reliability
- Suitable for LED lighting and moving sign applications
- Compliance to worldwide safety regulations for lighting
- 2 years warranty



SPECIFICATION

MODEL		PLN-45-12	PLN-45-15	PLN-45-20	PLN-45-24	PLN-45-27	PLN-45-36	PLN-45-48
OUTPUT	DC VOLTAGE	12V	15V	20V	24V	27V	36V	48V
	CONSTANT CURRENT OPERATION VOLTAGE <small>Note.6</small>	9 ~ 12V	11.25 ~ 15V	15 ~ 20V	18 ~ 24V	20.25 ~ 27V	27 ~ 36V	36 ~ 48V
	RATED CURRENT	3.8A	3A	2.3A	1.9A	1.7A	1.25A	0.95A
	CURRENT RANGE	0 ~ 3.8A	0 ~ 3A	0 ~ 2.3A	0 ~ 1.9A	0 ~ 1.7A	0 ~ 1.25A	0 ~ 0.95A
	RATED POWER	45.6W	45W	46W	45.6W	45.9W	45W	45.6W
	RIPPLE & NOISE (max.) <small>Note.2</small>	2Vp-p	2.4Vp-p	1.8Vp-p	2.7Vp-p	2.7Vp-p	3.6Vp-p	4.6Vp-p
	VOLTAGE ADJ. RANGE <small>Note.5</small>	11.5 ~ 13V	14.5 ~ 16.2V	19.5 ~ 22V	24 ~ 26V	25 ~ 30V	32.5 ~ 39V	43.6 ~ 51.8V
	CURRENT ADJ. RANGE <small>Note.5</small>	Can be adjusted by internal potential meter SVR1						
	VOLTAGE TOLERANCE <small>Note.3</small>	±10%						
	LINE REGULATION	±3.0%						
LOAD REGULATION	±5.0%							
SETUP TIME	1500ms / 230VAC 3000ms / 115VAC at full load							
INPUT	VOLTAGE RANGE <small>Note.4</small>	90 ~ 295VAC 127 ~ 417VDC						
	FREQUENCY RANGE	47 ~ 63Hz						
	POWER FACTOR	PF ≥ 0.9 at 75 ~ 100% load, 115VAC / 230VAC						
	EFFICIENCY(Typ.)	83.5%	85%	86.5%	86.5%	86.5%	87.5%	87.5%
	AC CURRENT	0.55A/115VAC 0.25A/230VAC						
	INRUSH CURRENT(max.)	40A/230VAC						
LEAKAGE CURRENT	<0.75mA / 240VAC							
PROTECTION	OVER CURRENT	95 ~ 110%						
	SHORT CIRCUIT	Protection type : Constant current limiting, recovers automatically after fault condition is removed						
	OVER VOLTAGE	13.8 ~ 16V	17.5 ~ 21V	22.8 ~ 25V	28 ~ 32V	31 ~ 35V	41 ~ 46V	54 ~ 60V
	OVER TEMPERATURE	95°C ±10°C (TSW1) detect on heatsink of power transistor						
ENVIRONMENT	WORKING TEMP.	-30 ~ +50°C (Refer to output load derating curve)						
	WORKING HUMIDITY	20 ~ 95% RH non-condensing						
	STORAGE TEMP., HUMIDITY	-40 ~ +80°C, 10 ~ 95% RH						
	TEMP. COEFFICIENT	±0.03%/°C (0 ~ 50°C)						
	VIBRATION	10 ~ 500Hz, 2G 12min./1cycle, period for 72min. each along X, Y, Z axes						
SAFETY & EMC	SAFETY STANDARDS	UL879, UL8750, UL1310 Class 2, TUV EN61347-1, EN61347-2-13 independent, CAN/CSA C22.2 No. 223-M91(except for 48V), IP64 approved						
	WITHSTAND VOLTAGE	I/P-O/P:3.75KVAC I/P-FG:1.88KVAC O/P-FG:0.5KVAC						
	ISOLATION RESISTANCE	I/P-O/P:100M Ohms / 500VDC / 25°C / 70% RH						
	EMI CONDUCTION & RADIATION	Compliance to EN55015						
	HARMONIC CURRENT	Compliance to EN61000-3-2 Class C (≥ 75% load) ; EN61000-3-3						
	EMS IMMUNITY	Compliance to EN61000-4-2,3,4,5,6,8,11; En61547, light industry level, criteria A						
OTHERS	MTBF	497.8Khrs min. MIL-HDBK-217F (25°C)						
	DIMENSION	181*61.5*35mm (L*W*H)						
	PACKING	0.5Kg; 24pcs/13Kg/0.75CUFT						
NOTE	<ol style="list-style-type: none"> 1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25°C of ambient temperature. 2. Ripple & noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1uf & 47uf parallel capacitor. Direct connecting to LEDs is not suggested for models with "RIPPLE & NOISE" >±10% and using additional drivers is highly recommended. 3. Tolerance : includes set up tolerance, line regulation and load regulation. 4. Derating may be needed under low input voltage. Please check the static characteristics for more details. 5. Output voltage can be adjusted through the SVR1 on the PCB ; limit of output constant current level can be adjusted through the SVR2 on the PCB. 6. Constant current operation region is within 75% ~100% rated output voltage. This is the suitable operation region for LED related applications, but please reconfirm special electrical requirements for some specific system design. 7. The power supply is considered as a component that will be operated in combination with final equipment. Since EMC performance will be affected by the complete installation, the final equipment manufacturers must re-qualify EMC Directive on the complete installation again. 							



Test Report: PLN-45-24

45W Single Output LED Power Supply

■ DESIGN VERIFY TEST

Output Function Test

Input Function Test

Protection Function Test

Control Function Test

Component Stress Test

■ SAFETY & E.M.C. TEST

Safety Test

E.M.C. Test

■ RELIABILITY TEST

ENVIRONMENT TEST

DESIGN VERIFY TEST
OUTPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	RIPPLE & NOISE	V1 : 2.7 Vp-p (Max)	I/P : 230VAC O/P : FULL LOAD Ta : 25°C	V1 : 1.03 Vp-p (Max)	P
2	OUTPUT VOLTAGE ADJUST RANGE	CH1 : 24 V ~ 26 V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	21.47 V ~ 26.74 V / 230 VAC 21.47 V ~ 26.72 V / 115 VAC	P
3	OUTPUT VOLTAGE TOLERANCE	V1 : -10 % ~ 10 % (Max)	I/P : 100VAC / 295 VAC O/P : FULL / MIN LOAD Ta : 25°C	V1 : -2.4 % ~ 2.4 %	P
4	LINE REGULATION	V1 : -3 % ~ 3 % (Max)	I/P : 100VAC ~ 295 VAC O/P : FULL LOAD Ta : 25°C	V1 : -0.4 % ~ 0.4 %	P
5	LOAD REGULATION	V1 : -5 % ~ 5 % (Max)	I/P : 230 VAC O/P : FULL ~ MIN LOAD Ta : 25°C	V1 : -0.45 % ~ 0.45 %	P
6	SET UP TIME	230VAC : 1500 ms (Max) 115VAC : 3000 ms (Max)	I/P : 230 VAC I/P : 115 VAC O/P : FULL LOAD Ta : 25°C	230VAC / 1019 ms 115VAC / 2038 ms	P
9	OVER/UNDERSHOOT TEST	< ±10%	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	TEST : < 10 %	P
10	CONSTANT CURRENT OPERATION VOLTAGE	18V ~ 24 V	I/P : 230 VAC I/P : 115 VAC O/P : CV MODE Ta : 25°C	230VAC / 15.16V~24 V 115VAC / 15.2V~24 V	P

INPUT FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	INPUT VOLTAGE RANGE	90 VAC~ 295 VAC	I/P : TESTING O/P : FULL LOAD Ta : 25°C I/P : LOW-LINE-3V= 87V HIGH-LINE+15%=300 V O/P : FULL/MIN LOAD ON : 30 Sec . OFF : 30 Sec 10MIN (AC POWER ON/OFF NO DAMAGE)	71V~295V TEST : OK	P
2	INPUT FREQUENCY RANGE	47HZ ~63 HZ NO DAMAGE OSC	I/P : 90 VAC ~ 295 VAC O/P : FULL -MIN LOAD Ta : 25°C	TEST : OK	P
3	POWER FACTOR	0.9 / 230 VAC(TYP) 0.9 / 115 VAC(TYP) 0.9 /230VAC(TYP) 0.9 /115VAC(TYP))	I/P : 230 VAC I/P : 115VAC O/P : 75% ~100% LOAD Ta : 25°C	PF= 0.95 / 100% PF= 1 / 100% PF= 0.92 / 75% PF= 1 / 75%	P
4	EFFICIENCY	86.5 % (TYP)	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	86.6 %	P
5	INPUT CURRENT	230V/ 0.25 A 115V/ 0.55 A	I/P : 230 VAC I/P : 115VAC O/P : FULL LOAD Ta : 25°C	I = 0.22 A/ 230 VAC I = 0.42 A/ 230 VAC	P
6	INRUSH CURRENT	230V/ 40 A (TYP) COLD START	I/P : 230 VAC O/P : FULL LOAD Ta : 25°C	I = 35 A/ 230 VAC	P
7	LEAKAGE CURRENT	< 0.75 mA / 240 VAC	I/P : 264 VAC O/P : Min LOAD Ta : 25°C	L-FG : 0.28 mA N-FG : 0.26 mA	P

PROTECTION FUNCTION TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	OVER LOAD PROTECTION	110%(max)	I/P : 230 VAC I/P : 115 VAC O/P : TESTING Ta : 25°C	106%/ 230 VAC 106%/ 115 VAC Constant Current Limiting	P
2	OVER VOLTAGE PROTECTION	CH1 : 28V- 32V	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	30.98V/ 230 VAC 31.05V/ 115 VAC Shut down Re- power ON	P
3	OVER TEMPERATURE PROTECTION	SPEC : TSW1 : 95 ± 10°C O.T.P. NO DAMAGE	I/P : 230 VAC O/P : FULL LOAD	O.T.P. Active Shut down o/p voltage , recovers automatically after temperature goes down	P
4	SHORT PROTECTION	SHORT EVERY OUTPUT 1 HOUR NO DAMAGE	I/P : 264 VAC O/P : FULL LOAD Ta : 25°C	NO DAMAGE Hiccup Mode	P

CONTROL FUNCTION TEST

1	CURRENT ADJ. RANGE	3% ~ -25 %	I/P : 230 VAC I/P : 115 VAC O/P : MIN LOAD Ta : 25°C	0.873 A ~ 2.799 A/230VAC 0.873 A ~ 2.802 A/115 VAC	P
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COMPONENT STRESS TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	Power Transistor (D to S) or (C to E) Peak Voltage	Q 1 Rated : 2SK4111 10A/600V	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on (2) Output Short (3)Full load continue Ta : 25°C	(1) 562 V (2) 498 V (3) 556 V	P
2	Diode Peak Voltage	D100 Rated : BYV32E-200 20A/200V	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on (2)Output Short (3)Full load continue Ta : 25°C	(1) 157 V (2) 127 V (3) 150 V	P
3	Clamp Diode Peak Voltage	D 2 Rated : 2A/800V GP20K	I/P : High-Line +3V = 298 V O/P : (1)Full load continue Ta : 25°C	(1) 490 V	P
4	Control IC Voltage Test	U1 Rated : PWM TDA4863G 10.5V~ 22 V	I/P : High-Line +3V = 298 V O/P : (1)Full Load Turn on /Off (2) Min load Turn on /Off (3)Full Load /Min load Change Ta : 25°C	(1) 15.435 V (2) 13.631 V (3) 13.623 V	P

SAFETY & E.M.C. TEST
SAFETY TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	WITHSTAND VOLTAGE	I/P-O/P : 3.75KVAC/min I/P-FG : 1.5 KVAC/min O/P-FG : 0.5 KVAC/min	I/P-O/P : 4.2 KVAC/min I/P-FG : 2.25 KVAC/min O/P-FG : 0.6 KVAC/min Ta : 25°C	I/P-O/P : 4.98 mA I/P-FG : 4.21 mA O/P-FG : 2.38 mA NO DAMAGE	P
2	ISOLATION RESISTANCE	I/P-O/P : 500VDC>100MΩ I/P-FG : 500VDC>100MΩ O/P-FG : 500VDC>100MΩ	I/P-O/P : 500 VDC I/P-FG : 500 VDC O/P-FG : 500 VDC Ta : 25°C /70%RH	I/P-O/P : 30 GΩ I/P-FG : 23.6 GΩ O/P-FG : 30 GΩ NO DAMAGE	P
3	GROUNDING CONTINUITY	FG(PE) TO CHASSIS OR TRACE < 100 mΩ	40 A / 2min Ta : 25°C / 70%RH	41 mΩ	P
4	APPROVAL	TUV : Certificate NO : UL : File NO :			N/A

E.M.C TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT
1	HARMONIC	EN61000-3-2 CLASS C	I/P : 230 VAC/50HZ O/P : 95% LOAD/75%LOAD Ta : 25°C	PASS	P
2	CONDUCTION	EN55015 CLASS B	I/P : 230 VAC (50HZ) O/P : 95% LOAD /50% LOAD Ta : 25°C	PASS Test by certified Lab	P
3	RADIATION	EN55015 CLASS B	I/P : 230 VAC (50HZ) O/P : 95% LOAD Ta : 25°C	PASS Test by certified Lab	P
4	E.S.D	EN61000-4-2 LIGHT INDUSTRY AIR : 8KV / Contact : 4KV	I/P : 230 VAC/50HZ O/P : 95% LOAD Ta : 25°C	CRITERIA A	P
5	E.F.T	EN61000-4-4 INDUSTRY INPUT : 2KV	I/P : 230 VAC/50HZ O/P : 95% LOAD Ta : 25°C	CRITERIA A	P
6	SURGE	IEC61000-4-5 INDUSTRY L-N : 1KV L,N-PE : 4KV	I/P : 230 VAC/50HZ O/P : 95% LOAD Ta : 25°C	CRITERIA A	P
7	Test by certified Lab & Test Report Prepare				

RELIABILITY TEST

ENVIRONMENT TEST

NO	TEST ITEM	SPECIFICATION	TEST CONDITION	RESULT	VERDICT																																																												
1	TEMPERATURE RISE TEST	MODEL : PLN-45-24 1. ROOM AMBIENT BURN-IN : 1.5 HRS I/P : 230VAC O/P : FULL LOAD Ta= 27.9 °C 2. HIGH AMBIENT BURN-IN : 4 HRS I/P : 230VAC O/P : FULL LOAD Ta= 43 °C	<table border="1"> <thead> <tr> <th>NO</th> <th>Position</th> <th>P/N</th> <th>ROOM AMBIENT Ta= 27.9 °C</th> <th>HIGH AMBIENT Ta= 43 °C</th> </tr> </thead> <tbody> <tr><td>1</td><td>BD1</td><td>4A/800V SILICON US4KB80R-7000</td><td>59.1°C</td><td>68.9°C</td></tr> <tr><td>2</td><td>Q1</td><td>TK10B60D 10A/600V</td><td>69.6°C</td><td>78.9°C</td></tr> <tr><td>3</td><td>D2</td><td>3A/600V GP30J</td><td>84.0°C</td><td>90.9°C</td></tr> <tr><td>4</td><td>C46</td><td>100u/50V UL7Kh 8*11.5 KY</td><td>64.2°C</td><td>72.8°C</td></tr> <tr><td>5</td><td>T1 COIL</td><td>TF1547A-R0</td><td>69.5°C</td><td>77.8°C</td></tr> <tr><td>6</td><td>D100</td><td>BYV32E-200 20A/200V</td><td>63.9°C</td><td>73.9°C</td></tr> <tr><td>7</td><td>C106</td><td>1000u/35V UL10Kh 12.5*20 KY</td><td>61.6°C</td><td>71.1°C</td></tr> <tr><td>8</td><td>TSW1</td><td>ST-22W-R0 95°C 60mm</td><td>61.5°C</td><td>71.1°C</td></tr> <tr><td>9</td><td>U1</td><td>PWM TDA4863G</td><td>69.5°C</td><td>77.1°C</td></tr> <tr><td>10</td><td>C8</td><td>224/450V 10% P=10 MMX</td><td>67.8°C</td><td>76.8°C</td></tr> <tr><td>11</td><td>CASE</td><td>UP CASE</td><td>51.3°C</td><td>61.9°C</td></tr> </tbody> </table>	NO	Position	P/N	ROOM AMBIENT Ta= 27.9 °C	HIGH AMBIENT Ta= 43 °C	1	BD1	4A/800V SILICON US4KB80R-7000	59.1°C	68.9°C	2	Q1	TK10B60D 10A/600V	69.6°C	78.9°C	3	D2	3A/600V GP30J	84.0°C	90.9°C	4	C46	100u/50V UL7Kh 8*11.5 KY	64.2°C	72.8°C	5	T1 COIL	TF1547A-R0	69.5°C	77.8°C	6	D100	BYV32E-200 20A/200V	63.9°C	73.9°C	7	C106	1000u/35V UL10Kh 12.5*20 KY	61.6°C	71.1°C	8	TSW1	ST-22W-R0 95°C 60mm	61.5°C	71.1°C	9	U1	PWM TDA4863G	69.5°C	77.1°C	10	C8	224/450V 10% P=10 MMX	67.8°C	76.8°C	11	CASE	UP CASE	51.3°C	61.9°C		P
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2	OVER LOAD BURN-IN TEST	NO DAMAGE 1 HOUR (MIN)	I/P : 230 VAC O/P : FULL LOAD O/P SHORT Ta : 25°C	TEST : OK	P																																																												
3	LOW TEMPERATURE TURN ON TEST	TURN ON AFTER 2 HOUR	I/P : 295VAC/100VAC O/P : 100 % LOAD Ta= -30 °C	TEST : OK	P																																																												
4	HIGH HUMIDITY HIGH TEMPERATURE HIGH VOLTAGE TURN ON TEST	AFTER 12 HOURS IN CHAMBER ON CONTROL °C NO DAMAGE	I/P : 295 VAC O/P : FULL LOAD Ta= 40 °C HUMIDITY= 95 %R.H	TEST : OK	P																																																												
5	TEMPERATURE COEFFICIENT	± 0.03 % (0-50°C)	I/P : 230 VAC O/P : FULL LOAD	± 0.015 % (0-50°C)	P																																																												
6	STORAGE TEMPERATURE TEST	1. Thermal shock Temperature : -45°C~ +90°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 5 CYCLE 5. Input/Output condition : STATIC		OK	P																																																												
7	THERMAL SHOCK TEST	1. Thermal shock Temperature : -35°C~ +45°C 2. Temperature change rate : 25°C / MIN 3. Dwell time low and high temperature : 30 MIN/EACH 4. Total test cycle : 10 CYCLE 5. Input/Output condition : 230VAC/Full Load		OK	P																																																												

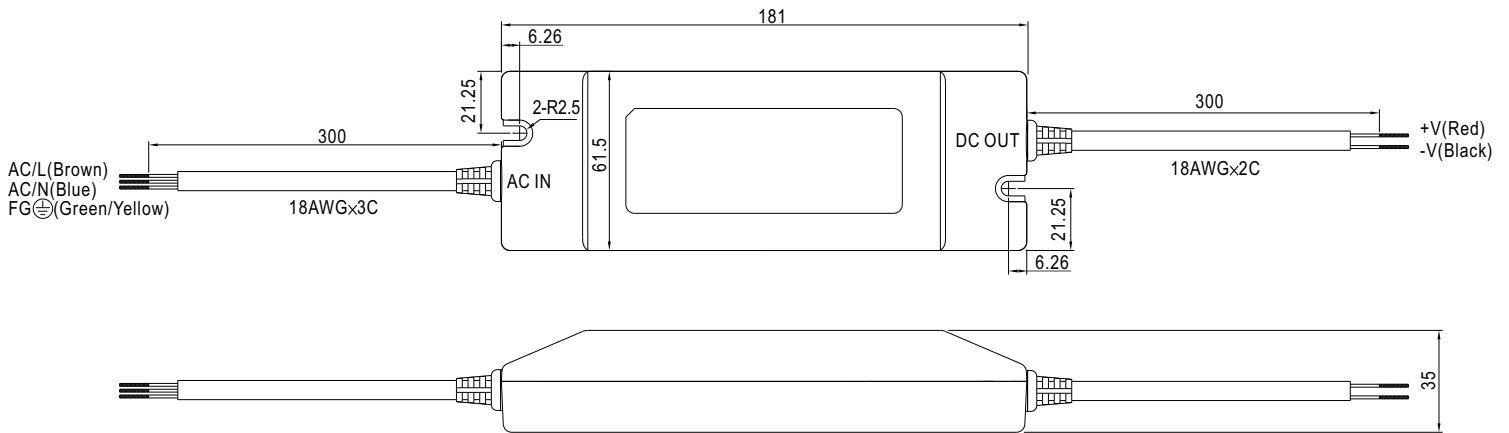
8	VIBRATION TEST	1 Carton & 1 Set (1) Waveform : Sine Wave (2) Frequency : 10-500Hz (3) Sweep Time : 12min/sweep cycle (4) Acceleration : 2G (5) Test Time : 60min in each axis (X.Y.Z) (6) Ta : 25°C	TEST : OK	P
9	CAPACITOR LIFE CYCLE	PLN-45-24 : SUPPOSE C106 IS THE MOST CRITICAL COMPONENT (1) I/P : 230VAC O/P : FULL LOAD Ta= 25 °C LIFE TIME (2) I/P : 230VAC O/P : FULL LOAD Ta= 40 °C LIFE TIME	(1) 303310HRS (2) 158147.5HRS	P
10	MTBF	MIL-HDBK-217F NOTICES2 PARTS COUNT TOTAL FAILURE RATE : 497.8K HRS		P

DATE	SAMPLE	TEST RESULT	TESTER	APPROVAL
2009/10/7	RD SAMPLE	PASS	SANFORD SU	VINCENT TSENG
2009/11/10	PRODUCT SAMPLE W0910C56	PASS	SANFORD SU	VINCENT TSENG

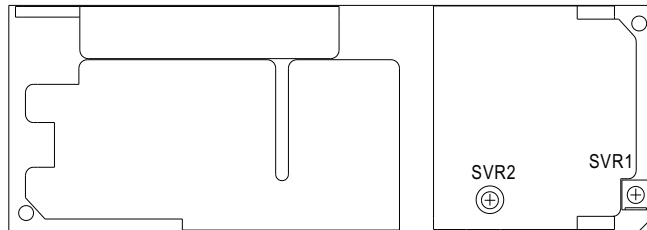
2003/12/12 A50-F023

Mechanical Specification

Case No.960A Unit:mm

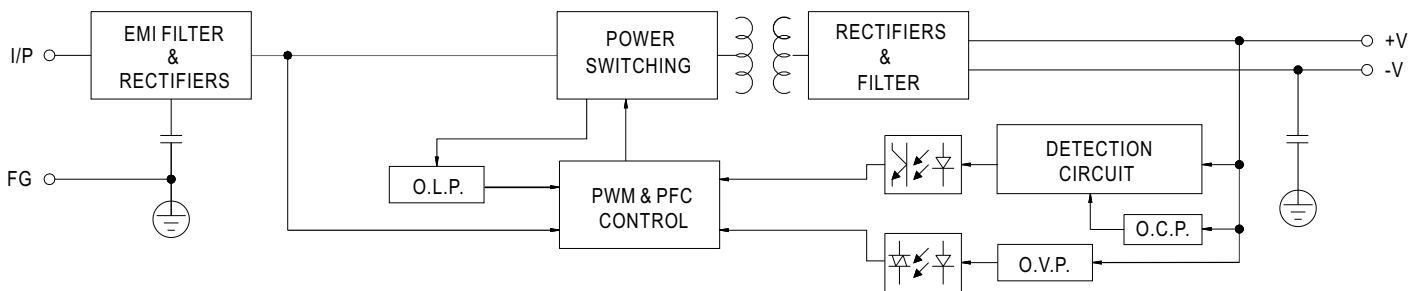


Output voltage and current adjustment : remove the upper case and adjust through SVR1 & SVR2 shown in the diagram.

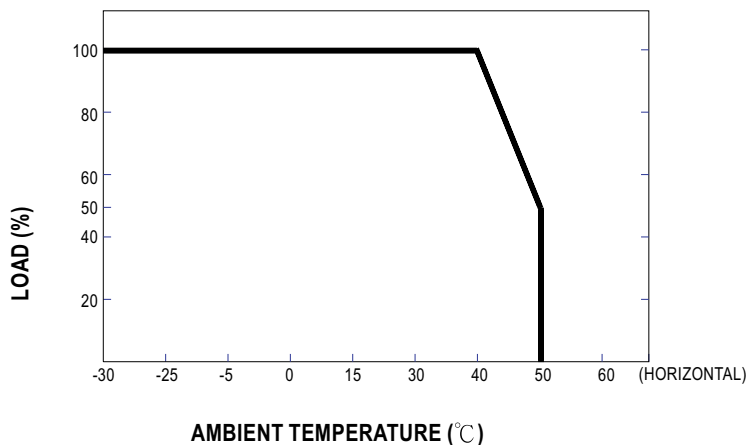


Block Diagram

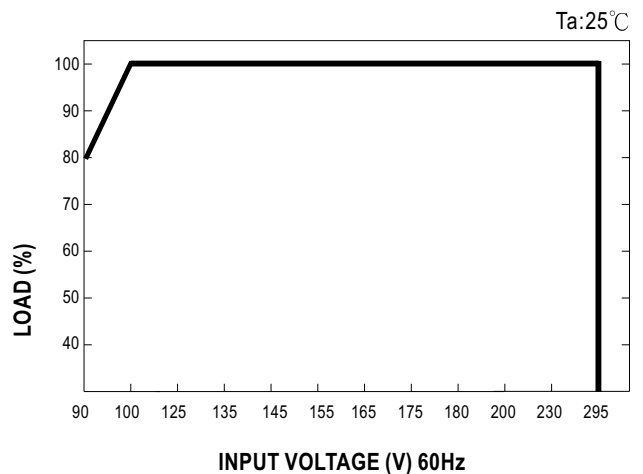
fosc : 95KHz(115VAC)
135KHz(230VAC)



Derating Curve



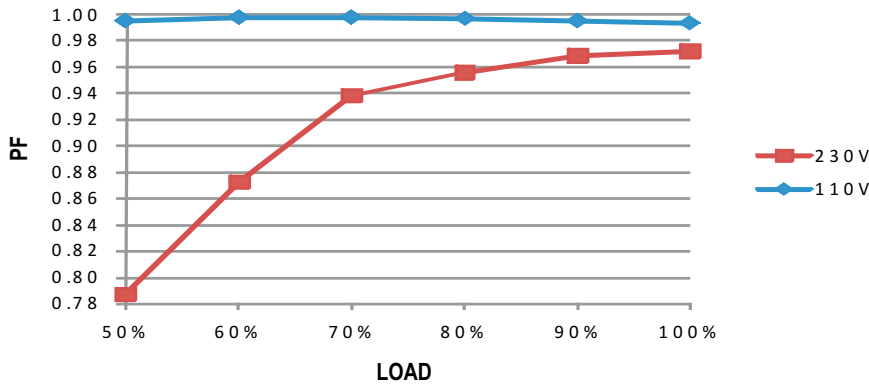
Static Characteristics



Power Factor Characteristic

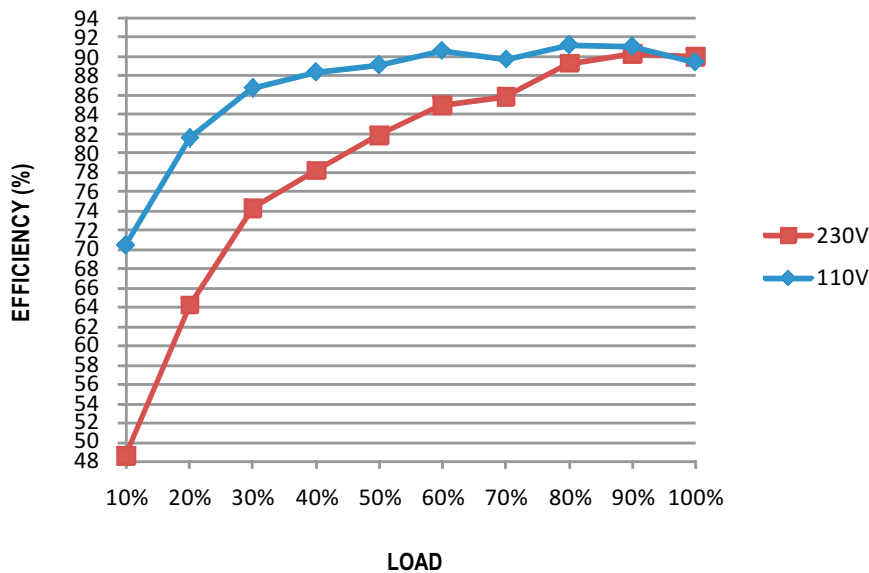
Power factor will be higher than 0.9 when output loading is 75% or higher.

Constant Current Mode



EFFICIENCY vs LOAD (48V Model)

PLN-45 series possess superior working efficiency that up to 87.5% can be reached in field applications.

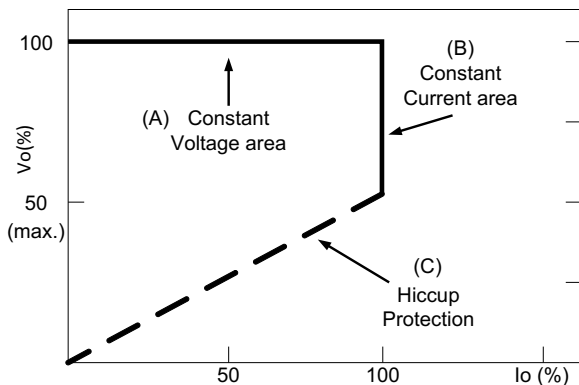


DRIVING METHODS OF LED MODULE

There are two major kinds of LED drive method "direct drive" and "with LED driver".

A typical LED power supply may either work in "constant voltage mode (CV) or constant current mode (CC)" to drive the LEDs.

Mean Well's LED power supply with CV+ CC characteristic can be operated at both CV mode [with LED driver, at area (A)] and CC mode [direct drive, at area (B)].



Typical LED power supply I-V curve