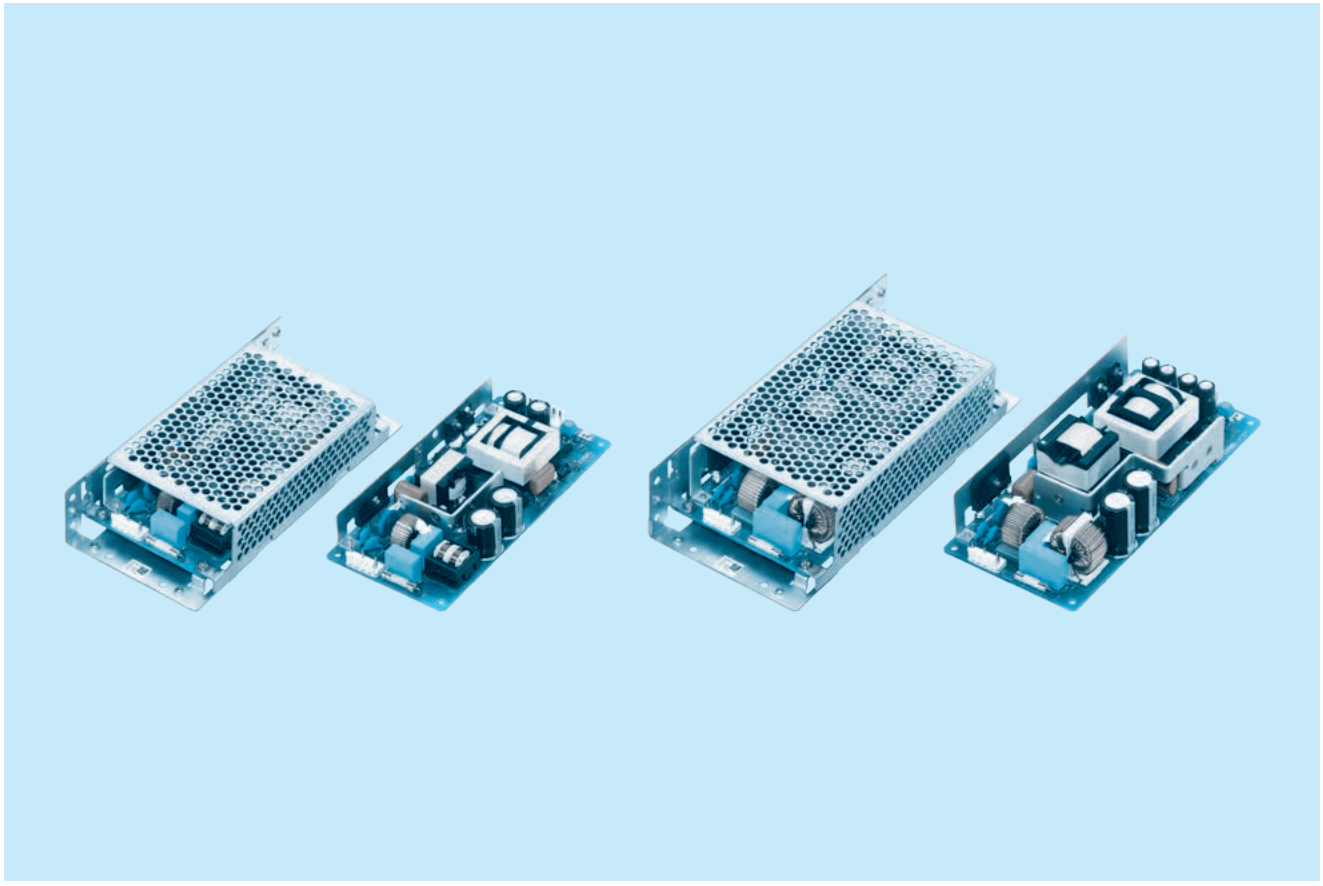
AC-DC Power Supplies Open Frame

Power Factor Correction | World wide | Safety Approvals | EMI | Inrush current limiting | OCP | OVP | Cost Effective | Rugged PCB type

LHP-series



Feature

OVC III
High power & high peak power
High efficiency
Low profile
Active Power factor correction
Harmonic attenuator (Complies with IEC61000-3-2)
Universal input (85 - 264 VAC)
Built-in inrush current, over current, over voltage protection

Safety agency approvals

UL62368-1, C-UL (equivalent to CAN/CSA-C22.2 No.62368-1), EN62368-1
EN62477-1 (OVC III)
Complies with DEN-AN
UL508 (Optional)

5-year warranty (refer to Instruction Manual)

CE marking

Low Voltage Directive
RoHS Directive

EMI

Complies with FCC-B, CISPR11-B, CISPR32-B, EN55011-B, EN55032-B, VCCI-B

EMS Compliance : EN61204-3, EN61000-6-2

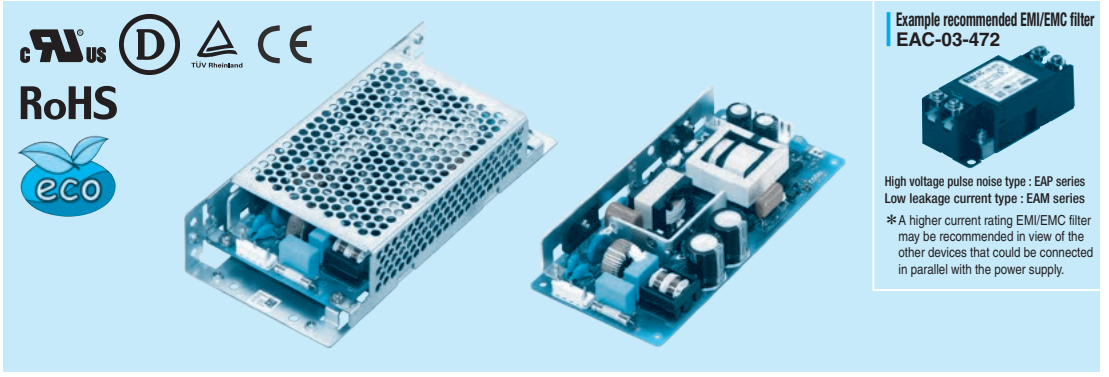
EN61000-4-2
EN61000-4-3
EN61000-4-4
EN61000-4-5
EN61000-4-6
EN61000-4-8
EN61000-4-11

COSEL AC-DC Power Supplies Open Frame

LHP150F

Ordering information

LH	P	150	F	-□□	-□
①	②	③	④	⑤	⑧



Example recommended EMI/EMC filter
EAC-03-472

High voltage pulse noise type : EAP series
Low leakage current type : EAM series

＊A higher current rating EMI/EMC filter may be recommended in view of the other devices that could be connected in parallel with the power supply.

①Series name
②Single output
③Output wattage
④Universal input
⑤Output voltage
⑥Optional ＊1
C : with Coating
G : Low leakage current
J4 : EP(TE Connectivity) connector type
R□ : with Remote ON/OFF
S : with Chassis
SN : with Chassis & cover
T : Terminal block type
T4 : Push-in Terminal Block Type
T5 : UL508
U1 : Can be attached the external capacitor unit

For option details, refer to instruction manual 7.1.

This power supply is manufactured by SMD technology. The stress to PCB like twisting or bending causes the defect of the unit, so handle the unit with care.
＊Make sure necessary tests will be carried out on your end equipment with the power supply installed in accordance with any required EMC/EMI regulations.

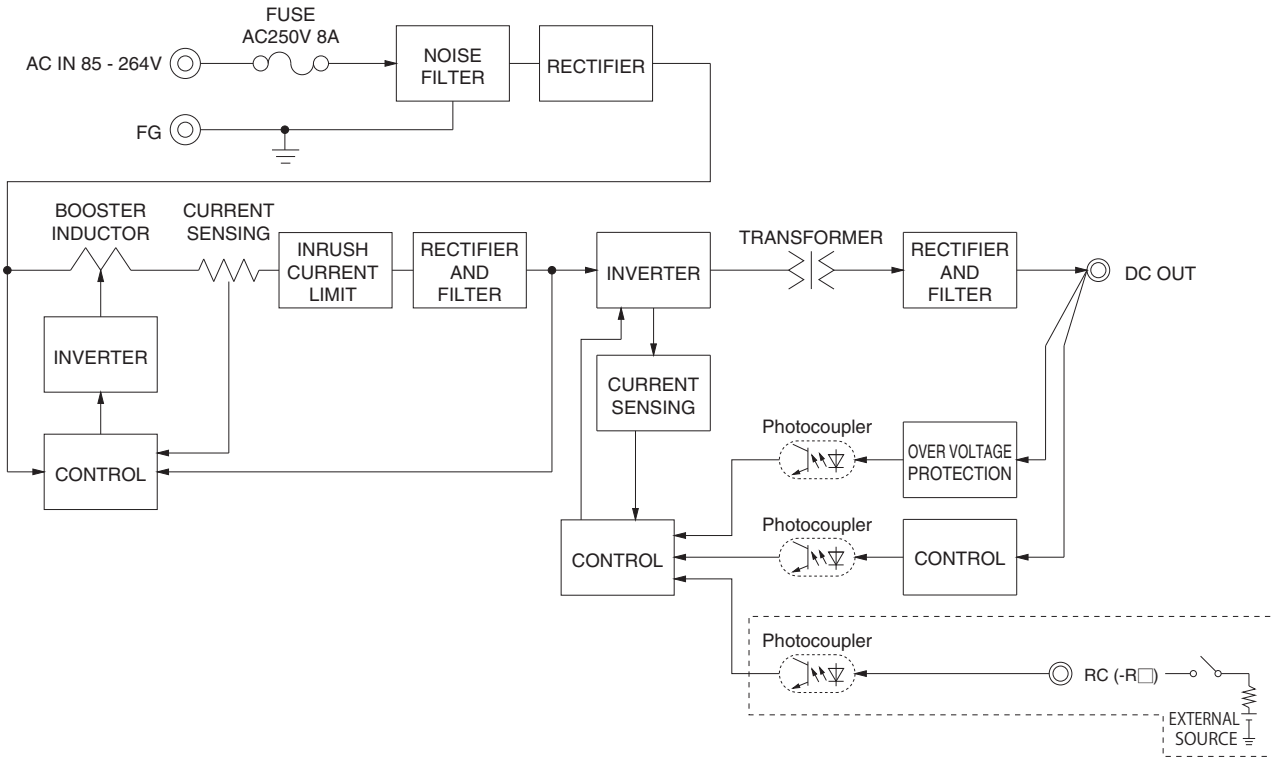
MODEL	LHP150F-24-Y	LHP150F-30-Y	LHP150F-36-Y	LHP150F-42-Y	LHP150F-48-Y
MAX OUTPUT WATTAGE[W] ＊2	151.2 (302.4)	150.0 (300.0)	151.2 (302.4)	151.2 (302.4)	153.6 (307.2)
DC OUTPUT ＊2	24V6.3A (12.6A)	30V5.0A (10.0A)	36V4.2A (8.4A)	42V3.6A (7.2A)	48V3.2A (6.4A)

SPECIFICATIONS

	MODEL		LHP150F-24-Y	LHP150F-30-Y	LHP150F-36-Y	LHP150F-42-Y	LHP150F-48-Y
INPUT	VOLTAGE[VAC]		85 - 264 1φ (Refer to "Derating" and Instruction Manual 1.1) ＊8				
	CURRENT[A]	ACIN 100V	1.80typ				
		ACIN 230V	0.80typ				
	FREQUENCY[Hz]		50 / 60 (45 - 66)				
	EFFICIENCY[%]	ACIN 100V	90.0typ	90.0typ	90.5typ	90.5typ	91.0typ
		ACIN 230V	92.0typ	92.0typ	92.5typ	92.5typ	93.0typ
	POWER FACTOR (Io=100%)	ACIN 100V	0.99typ				
		ACIN 230V	0.93typ				
	INRUSH CURRENT[A] ＊3	ACIN 100V	15typ (Io=100%) Ta=25℃at cold start				
		ACIN 230V	35typ (Io=100%) Ta=25℃at cold start				
	LEAKAGE CURRENT[mA]		0.40/0.75max (ACIN 100 / 240V, 60Hz, Io=100%, According to IEC62368-1, and DEN-AN)				
OUTPUT	VOLTAGE[V]		24	30	36	42	48
	CURRENT[A] ＊2＊8		6.3 (Peak 12.6)	5.0 (Peak 10.0)	4.2 (Peak 8.4)	3.6 (Peak 7.2)	3.2 (Peak 6.4)
	LINE REGULATION[mV] ＊4		96max	120max	144max	168max	192max
	LOAD REGULATION[mV] ＊4		150max	150max	180max	210max	240max
	RIPPLE[mVp-p] ＊5	0 to +50℃	250max	280max	280max	280max	280max
		-10 to 0℃	310max	330max	330max	330max	330max
		Io=0 to 10%	310max	330max	330max	330max	330max
	RIPPLE NOISE[mVp-p] ＊5	0 to +50℃	290max	310max	310max	310max	310max
		-10 to 0℃	330max	360max	360max	360max	360max
		Io=0 to 10%	330max	360max	360max	360max	360max
	TEMPERATURE REGULATION[mV]	0 to +50℃	240max	300max	360max	420max	480max
		-10 to +50℃	290max	370max	450max	530max	600max
	DRIFT[mV] ＊6		96max	120max	144max	168max	192max
	START-UP TIME[ms]		350typ (ACIN 100V, Io=100%)				
	HOLD-UP TIME[ms]		20typ (ACIN 100V, Io=100%)				
	OUTPUT VOLTAGE ADJUSTMENT RANGE[V]		22.80 to 26.40	28.50 to 33.00	34.20 to 39.60	39.90 to 46.20	45.60 to 52.80
	OUTPUT VOLTAGE SETTING[V]		24.00 to 24.96	30.00 to 31.20	36.00 to 37.44	42.00 to 43.68	48.00 to 49.92
PROTECTION CIRCUIT AND OTHERS	OVERCURRENT PROTECTION		Works over 101% of rating and recovers automatically				
	OVERVOLTAGE PROTECTION [V]		27.6 to 33.6	34.5 to 42.0	41.4 to 50.4	48.3 to 58.8	55.2 to 67.2
	OPERATING INDICATION		Not provided				
	REMOTE SENSING		Not provided				
	REMOTE ON/OFF (-R□)		Option (Refer to Instruction Manual 7.1)				
ISOLATION	INPUT-OUTPUT・RC ＊7		AC3,000V 1minute Cutoff crrent = 10mA, DC500V 100MΩ min (At Room Temperature)				
	INPUT-FG		AC2,000V 1minute Cutoff crrent = 10mA, DC500V 100MΩ min (At Room Temperature)				
	OUTPUT-FG ＊7		AC500V 1minute Cutoff crrent = 25mA, DC500V 100MΩ min (At Room Temperature)				
	OUTPUT-RC ＊7		AC100V 1minute Cutoff crrent = 25mA, DC100V 100MΩ min (At Room Temperature)				
ENVIRONMENT	OPERATING TEMP.,HUMID.AND ALTITUDE ＊8		-10 to +70℃, 20 - 90%RH (Non condensing), 5,000m (16,000 feet) max, (EN62477-1 (OVC Ⅲ):2,000m (6,600 feet) max)				
	STORAGE TEMP.,HUMID.AND ALTITUDE		-20 to +75℃, 20 - 90%RH (Non condensing), 9,000m (30,000 feet) max				
	VIBRATION		10 - 55Hz 19.6m/s² (2G) 3minutes period, 60minutes each along X,Y and Z axis				
	IMPACT		196.1m/s² (20G), 11ms, once each X, Y and Z axis				
SAFETY AND NOISE REGULATIONS	AGENCY APPROVALS		UL62368-1, C-UL (equivalent to CAN / CSA-C22.2No.62368-1), EN62368-1, EN62477-1 (OVC Ⅲ) Complies with DEN-AN				
	CONDUCTED NOISE		Complies with FCC-B, VCCI-B, CISPR32-B, EN55011-B, EN55032-B				
	HARMONIC ATTENUATOR ＊9		Complies with IEC61000-3-2 (Class A)				
OTHERS	CASE SIZE/WEIGHT		75X27X160mm [2.95×1.07×6.30 inches] (W×H×D) / 320g max (with chassis & cover : 570g max)				
	COOLING METHOD ＊8		Convection / Forced air (Requires external fan) (Refer to "Derating")				

＊1 The listed optios may affect the published standard specifications. Please contact us for detailed product specifications and safety approvals.
＊2 Peak loading for 10sec. And Duty 40% max, refer to Instruction Manual 6. In detail. ( ) means peak current. There is a possibility that an internal device is damaged when the specification is exceeded.
＊3 The current of input surge to a built-in EMI/EMS Filter (0.2ms or less) is excluded.
＊4 In the case of dynamic fluctuations, the specifications may not be met.
＊5 Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN : RM104). Please refer to the instruction manual 1.7.
＊6 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25℃, with the input voltage held constant at the rated input/output.
＊7 Applicable when Remote ON/OFF (optional) is added.
＊8 Derating required.For use with DC input is Refer to Instruction Manual 1.1 and 7.1.
＊9 Please contact us about another class.
＊ To meet the specification, do not operate overload conditon.
＊ Parallel operation is not possible.
＊ Sound noise may be generated by power supply in case of pulse load.
＊ Burst operation may occur when the load factor is 10% or less.

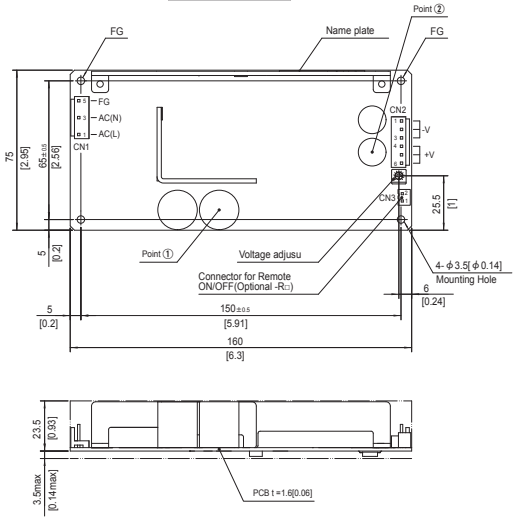
Block diagram



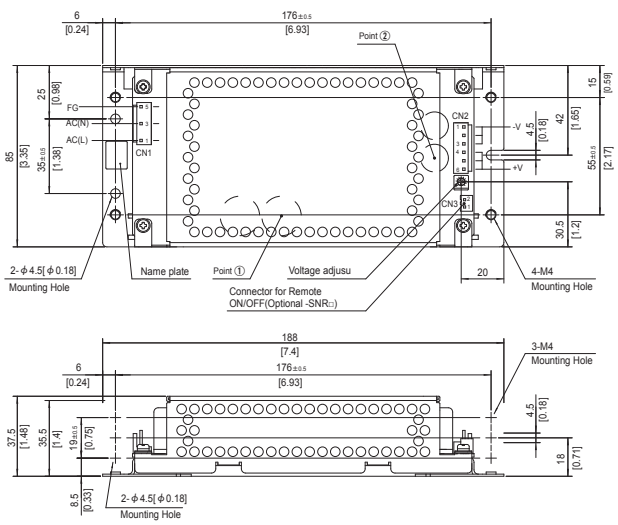
External view

※ External size of option is different from standard type.

Standard type



Chassis and cover type



※ Use the spacer of 8mm [0.31] length or more for isolation.
And do not use press-fitting bush.
※ The back side of PCB of the power supply is assembled some SMDs.
Be careful not to bump against the attached area by vibration.
※ Point ①, Point ② are thermometry points. Please refer to Instruction Manual 3. and 7.1.

※ Dimensions in mm, [ ]=inches
※ Tolerance : ±1 [±0.04]
※ Weight : 320g max (with chassis and cover : 570g max)
※ PCB Material / thickness : FR-4 / 1.6mm [0.06]
※ Optional chassis and cover material : Hot-dip galvanizing steel board
※ Mounting torque (Mounting hole of chassis) : 1.5N·m max

< Mating connector and terminal >

I/O Connector		Mating connector	Terminal		Mfr.
CN1	B3P5-VH	VHR-5N	Chain	SVH-21T-P1.1	J.S.T.
			Loose	BVH-21T-P1.1	
CN2	B6P-VH	VHR-6N	Chain	SVH-21T-P1.1	
			Loose	BVH-21T-P1.1	

※ Option:-J4:EP (TE Connectivity) connector type.

Connector		Mating connector	Terminal		Mfr.
CN3	B2B-XH-A	XHP-2	Chain	SXH-001T-P0.6	J.S.T.
			Loose	BXH-001T-P0.6	

< Pin assignments >

CN1

Pin No.	Input
1	AC(L)
2	
3	AC(N)
4	
5	FG

CN2

Pin No.	Output
1 to 3	-V
4 to 6	+V

CN3 Option

PIN No.	Contents
1	RC(+)
2	RC(-)

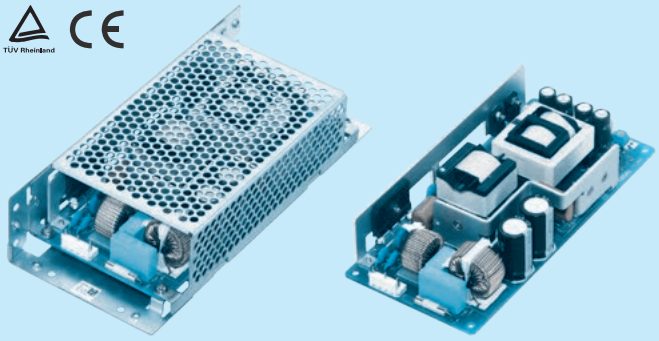
※ Pin No.2 and 4 is NC at CN1.
※ Keep drawing current per pin below 5A for CN2.

COSEL AC-DC Power Supplies Open Frame

LHP300F

Ordering information

LH	P	300	F	-□□	-□
①	②	③	④	⑤	⑥



Example recommended EMI/EMC filter
EAC-06-472

High voltage pulse noise type : EAP series
Low leakage current type : EAM series

＊A higher current rating EMI/EMC filter may be recommended in view of the other devices that could be connected in parallel with the power supply.

①Series name
②Single output
③Output wattage
④Universal input
⑤Output voltage
⑥Optional ＊1
C : with Coating
G : Low leakage current
J4 : EP(TE Connectivity) connector type
J5 : 8pin type (Output connector)
R□ : with Remote ON/OFF
S : with Chassis
SN : with Chassis & cover
T : Terminal block type
T4: Push-in Terminal Block Type
T5: UL508
U1: Can be attached the external capacitor unit

For option details, refer to instruction manual 7.1.

This power supply is manufactured by SMD technology. The stress to PCB like twisting or bending causes the defect of the unit, so handle the unit with care.
＊Make sure necessary tests will be carried out on your end equipment with the power supply installed in accordance with any required EMC/EMI regulations.

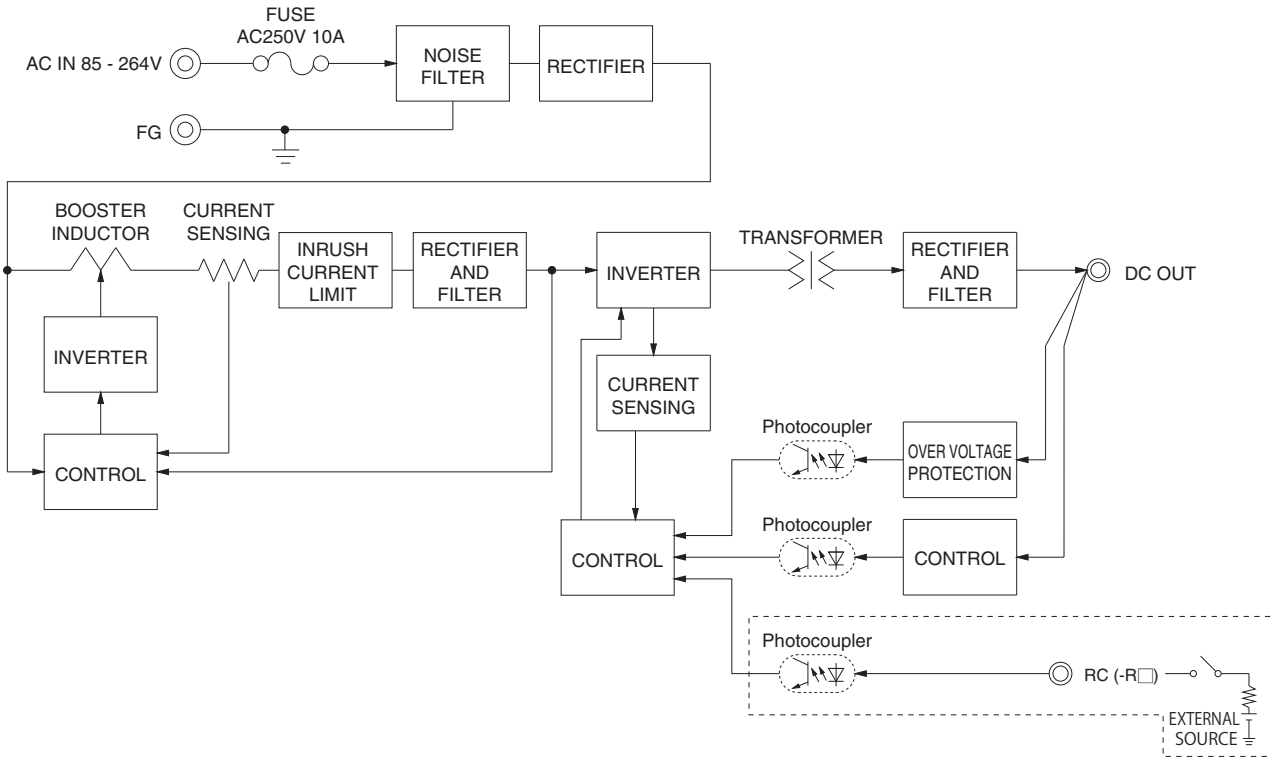
MODEL		LHP300F-24-Y	LHP300F-30-Y	LHP300F-36-Y	LHP300F-42-Y	LHP300F-48-Y
MAX OUTPUT WATTAGE[W]	＊2	300.0 (600.0)	300.0 (600.0)	302.4 (604.8)	302.4 (604.8)	302.4 (604.8)
DC OUTPUT	＊2	24V12.5A (25.0A)	30V10.0A (20.0A)	36V8.4A (16.8A)	42V7.2A (14.4A)	48V6.3A (12.6A)

SPECIFICATIONS

	MODEL		LHP300F-24-Y	LHP300F-30-Y	LHP300F-36-Y	LHP300F-42-Y	LHP300F-48-Y
INPUT	VOLTAGE[VAC]		85 - 264 ϕ 1f (Refer to “Derating” and Instruction Manual 1.1) ＊8				
	CURRENT[A]	ACIN 100V	3.50typ				
		ACIN 230V	1.60typ				
	FREQUENCY[Hz]		50 / 60 (45 - 66)				
	EFFICIENCY[%]	ACIN 100V	91.5typ	91.5typ	91.5typ	91.5typ	92.0typ
		ACIN 230V	93.5typ	93.5typ	93.5typ	93.5typ	94.0typ
	POWER FACTOR (Io=100%)	ACIN 100V	0.99typ				
		ACIN 230V	0.93typ				
	INRUSH CURRENT[A] ＊3	ACIN 100V	15typ (Io=100%) Ta=25℃at cold start				
		ACIN 230V	35typ (Io=100%) Ta=25℃at cold start				
	LEAKAGE CURRENT[mA]		0.40/0.75max (ACIN 100 / 240V, 60Hz, Io=100%, According to IEC62368-1, and DEN-AN)				
OUTPUT	VOLTAGE[V]		24	30	36	42	48
	CURRENT[A]	＊2＊8	12.5 (peak 25.0)	10.0 (peak 20.0)	8.4 (peak 16.8)	7.2 (peak 14.4)	6.3 (peak 12.6)
	LINE REGULATION[mV]	＊4	96max	120max	144max	168max	192max
	LOAD REGULATION[mV]	＊4	150max	195max	240max	240max	240max
	RIPPLE[mVp-p] ＊5	0 to +50℃	300max	300max	300max	300max	300max
		-10 to 0℃	380max	420max	420max	420max	420max
		Io=0 to 10%	380max	420max	420max	420max	420max
	RIPPLE NOISE[mVp-p] ＊5	0 to +50℃	390max	390max	390max	390max	390max
		-10 to 0℃	500max	500max	500max	500max	500max
		Io=0 to 10%	500max	500max	500max	500max	500max
	TEMPERATURE REGULATION[mV]	0 to +50℃	240max	300max	360max	420max	480max
		-10 to +50℃	290max	370max	450max	530max	600max
	DRIFT[mV]	＊6	96max	120max	144max	168max	192max
	START-UP TIME[ms]		350typ (ACIN 100V, Io=100%)				
	HOLD-UP TIME[ms]		20typ (ACIN 100V, Io=100%)				
	OUTPUT VOLTAGE ADJUSTMENT RANGE[V]		22.80 to 26.40	28.50 to 33.00	34.20 to 39.60	39.90 to 46.20	45.60 to 52.80
	OUTPUT VOLTAGE SETTING[V]		24.00 to 24.96	30.00 to 31.20	36.00 to 37.44	42.00 to 43.68	48.00 to 49.92
PROTECTION CIRCUIT AND OTHERS	OVERCURRENT PROTECTION		Works over 101% of rating and recovers automatically				
	OVERVOLTAGE PROTECTION [V]		27.6 to 33.6	34.5 to 42.0	41.4 to 50.4	48.3 to 58.8	55.2 to 67.2
	OPERATING INDICATION		Not provided				
	REMOTE SENSING		Not provided				
	REMOTE ON/OFF (-R□)		Option (Refer to Instruction Manual 7.1)				
ISOLATION	INPUT-OUTPUT・RC	＊7	AC3,000V 1minute Cutoff crrent = 10mA, DC500V 100MΩ min (At Room Temperature)				
	INPUT-FG		AC2,000V 1minute Cutoff crrent = 10mA, DC500V 100MΩ min (At Room Temperature)				
	OUTPUT-FG	＊7	AC500V 1minute Cutoff crrent = 25mA, DC500V 100MΩ min (At Room Temperature)				
	OUTPUT-RC	＊7	AC100V 1minute Cutoff crrent = 25mA, DC100V 100MΩ min (At Room Temperature)				
ENVIRONMENT	OPERATING TEMP.,HUMID.AND ALTITUDE	＊8	-10 to +70℃, 20 - 90%RH (Non condensing), 5,000m (16,000 feet) max, (EN62477-1 (OVC Ⅲ):2,000m (6,600 feet) max)				
	STORAGE TEMP.,HUMID.AND ALTITUDE		-20 to +75℃, 20 - 90%RH (Non condensing), 9,000m (30,000 feet) max				
	VIBRATION		10 - 55Hz 19.6m/s² (2G) 3minutes period, 60minutes each along X,Y and Z axis				
	IMPACT		196.1m/s² (20G), 11ms, once each X, Y and Z axis				
SAFETY AND NOISE REGULATIONS	AGENCY APPROVALS		UL62368-1, C-UL (equivalent to CAN / CSA-C22.2No.62368-1), EN62368-1, EN62477-1 (OVC Ⅲ) Complies with DEN-AN				
	CONDUCTED NOISE		Complies with FCC-B, VCCI-B, CISPR32-B, EN55011-B, EN55032-B				
	HARMONIC ATTENUATOR	＊9	Complies with IEC61000-3-2 (Class A)				
OTHERS	CASE SIZE/WEIGHT		84X37X180mm [3.31×1.46×7.09 inches] (W×H×D) / 580g max (with chassis & cover : 890g max)				
	COOLING METHOD	＊8	Convection / Forced air (Requires external fan) (Refer to “Derating”)				

＊1 The listed optios may affect the published standard specifications. Please contact us for detailed product specifications and safety approvals.
＊2 Peak loading for 10sec. And Duty 40% max, refer to Instruction Manual 6. In detail. ( ) means peak current. There is a possibility that an internal device is damaged when the specification is exceeded.
＊3 The current of input surge to a built-in EMI/EMS Filter (0.2ms or less) is excluded.
＊4 In the case of dynamic fluctuations, the specifications may not be met.
＊5 Measured by 20MHz oscilloscope or Ripple-Noise meter (Equivalent to KEISOKU-GIKEN : RM104). Please refer to the instruction manual 1.7.
＊6 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25℃, with the input voltage held constant at the rated input/output.
＊7 Applicable when Remote ON/OFF (optional) is added.
＊8 Derating required.For use with DC input is Refer to Instruction Manual 1.1 and 7.1.
＊9 Please contact us about another class.
＊ To meet the specification, do not operate overload conditon.
＊ Parallel operation is not possible.
＊ Sound noise may be generated by power supply in case of pulse load.
＊ Burst operation may occur when the load factor is 10% or less.

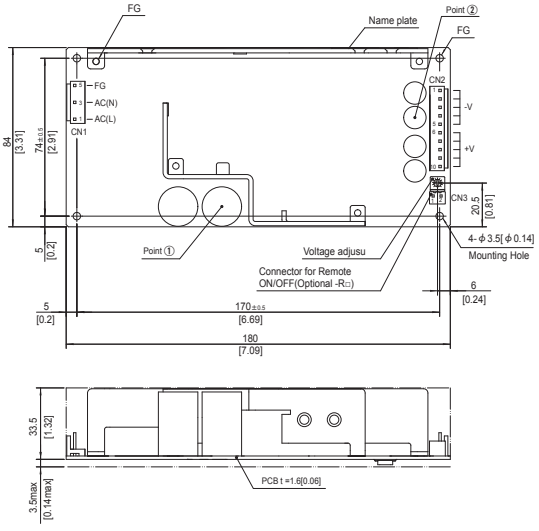
Block diagram



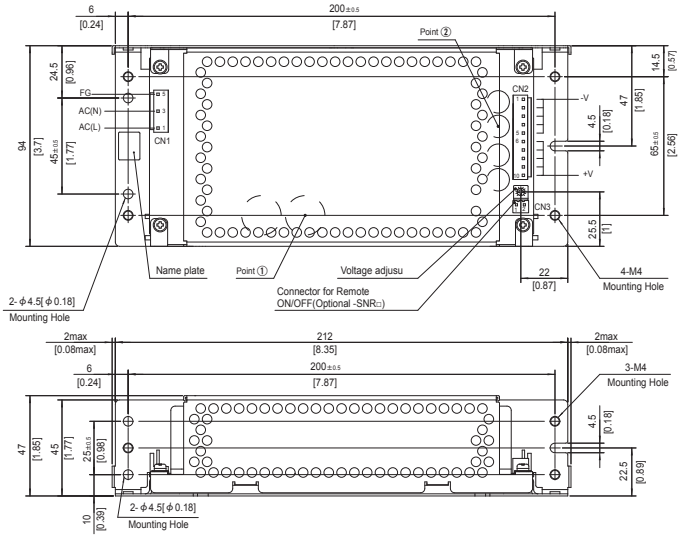
External view

※ External size of option is different from standard type.

Standard type



Chassis and cover type



※ Use the spacer of 8mm [0.31] length or more for isolation.
And do not use press-fitting bush.
※ The back side of PCB of the power supply is assembled some SMDs.
Be careful not to bump against the attached area by vibration.
※ Point ①, Point ② are thermometry points. Please refer to Instruction Manual 3. and 7.1.

※ Dimensions in mm, [ ]=inches
※ Tolerance : ±1 [±0.04]
※ Weight : 580g max (with chassis and cover : 890g max)
※ PCB Material / thickness : FR-4 / 1.6mm [0.06]
※ Optional chassis and cover material : Hot-dip galvanizing steel board
※ Mounting torque (Mounting hole of chassis) : 1.5N·m max

< Mating connector and terminal >

I/O Connector		Mating connector	Terminal		Mfr.
CN1	B3P5-VH	VHR-5N	Chain	SVH-21T-P1.1	J.S.T.
			Loose	BVH-21T-P1.1	
CN2	B10P-VH	VHR-10N	Chain	SVH-21T-P1.1	
			Loose	BVH-21T-P1.1	

※ Option:-J4:EP (TE Connectivity) connector type.
※ Option:-J5:Output connector as 8 pin type.

Connector		Mating connector	Terminal		Mfr.
CN3	B2B-XH-A	XHP-2	Chain	SXH-001T-P0.6	J.S.T.
			Loose	BXH-001T-P0.6	

< Pin assignments >

CN1

Pin No.	Input
1	AC(L)
2	
3	AC(N)
4	
5	FG

CN2

Pin No.	Output
1 to 5	-V
6 to 10	+V

CN3 Option

PIN No.	Contents
1	RC(+)
2	RC(-)

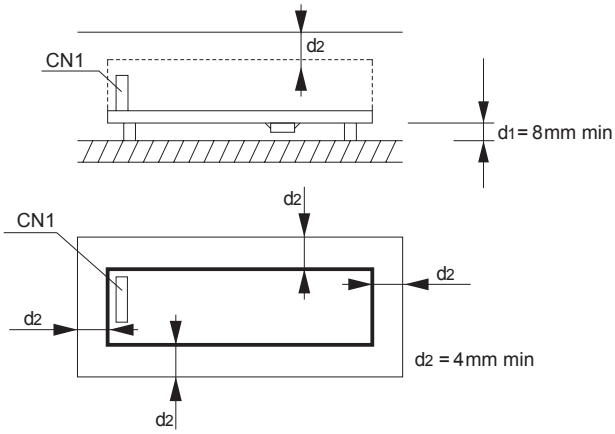
※ Pin No.2 and 4 is NC at CN1.
※ Keep drawing current per pin below 5A for CN2.

Assembling and Installation Method

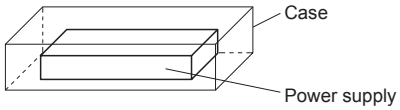
Installation method

■This power supply is manufactured by SMD technology. Do not touch any SMD components on the unit. Be especially careful when handling.

■If using a metal chassis, keep proper insulation between the component and metal chassis, use the spacer of 8mm or more between bottom of power supply and metal chassis.
If d1 and/or d2 are less than the value mentioned in right figure, insert an insulating sheet with reinforced insulation between the power supply unit and metal chassis.
The following distance is not satisfactory for cooling condition. Please refer to “Derating” and Instruction Manual 3 for cooling method.

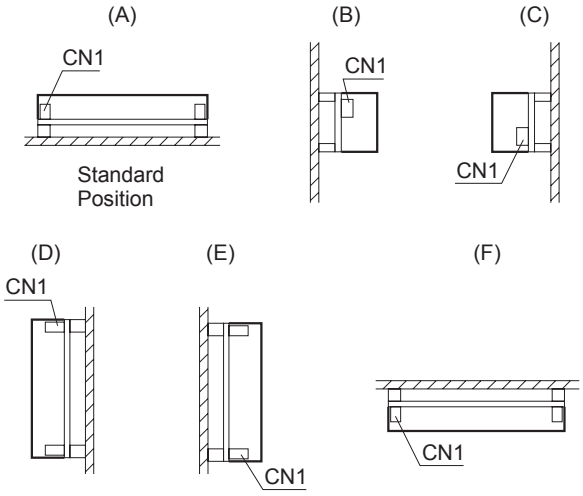


■When used in a sealed case there is the possibility of insufficient cooling of the power supply – see right figure.
Please check and confirm that temperature of point ① and point ② stay below the limits given in the Instruction Manual 3.



■Installation method shown right is possible.

■In optional -SN, Method (F) is not available with convection cooling. If method (F) is used, use with forced air cooling or derate temperature / load. For more details, please contact us.



Mounting screw

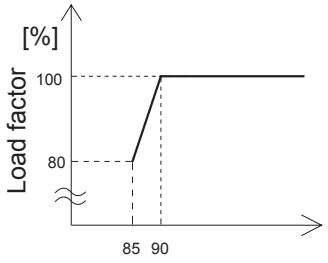
■The mounting screw should be ϕ3mm. The hatched area shows the allowance of metal parts for mounting.

■If mounting metallic fittings on the board surface, ensure there is no contact with components.

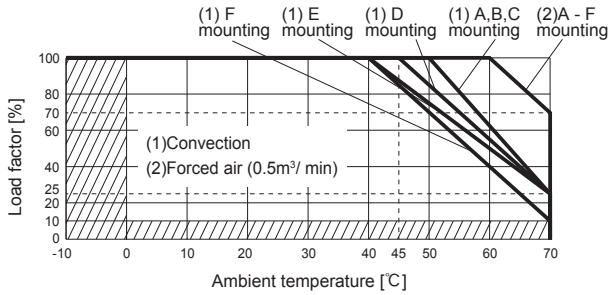
■This product uses SMD technology. Please avoid the PCB installation method which includes the twisting stress or the bending stress.

Derating

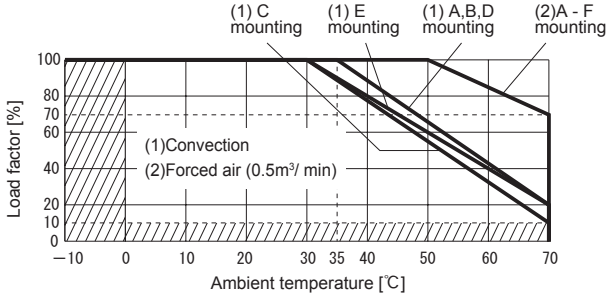
● Derating curve for input voltage



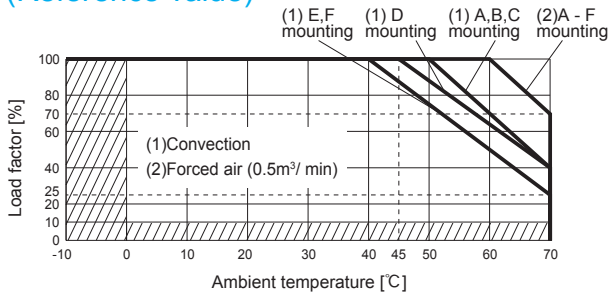
● LHP150F
Ambient temperature derating curve
(Reference value)



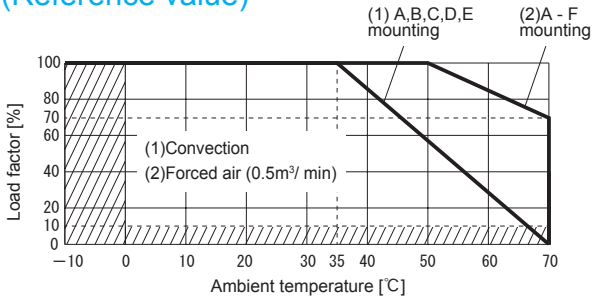
● LHP150F- □ -SNY
Ambient temperature derating curve
(Reference value)



● LHP300F
Ambient temperature derating curve
(Reference value)



● LHP300F- □ -SNY
Ambient temperature derating curve
(Reference value)



■In the hatched area, the specification of Ripple, Ripple Noise is different from other area.

Instruction Manuals

◆ Please see catalog and instructionmanual before you use.

Instruction Manuals	https://en.cosel.co.jp/product/powersupply/LHP/
Before using our product	https://en.cosel.co.jp/technical/caution/index.html

LHP

NOTICE

Basic Characteristics Data

Model	Circuit method	Switching frequency [kHz] ∗1 ∗2	Input current [A] ∗3	Inrush current protection	PCB/Pattern			Series / Parallel operation availability	
					Material	Single sided	Double sided	Series operation	Parallel operation
LHP150F	Active filter	30 to 120	1.8	Thermistor	FR-4	-	Yes	Yes	No
	LLC resonant converter	90 to 350							
LHP300F	Active filter	30 to 120	3.5	Thermistor	FR-4	-	Yes	Yes	No
	LLC resonant converter	70 to 200							

∗1 The value changes depending on input and load.
∗2 At light load, burst operation is performed to reduce input power. The switching frequency is changed by using condition. Please contact us for more details.
∗3 The value of input current is at ACIN 100V and rated load.