

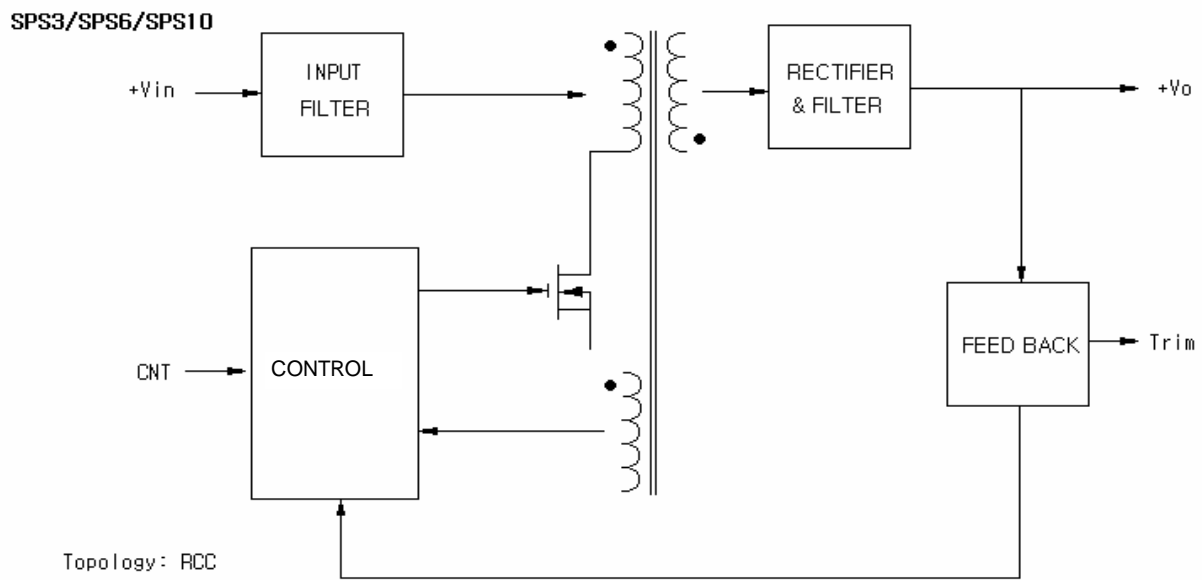
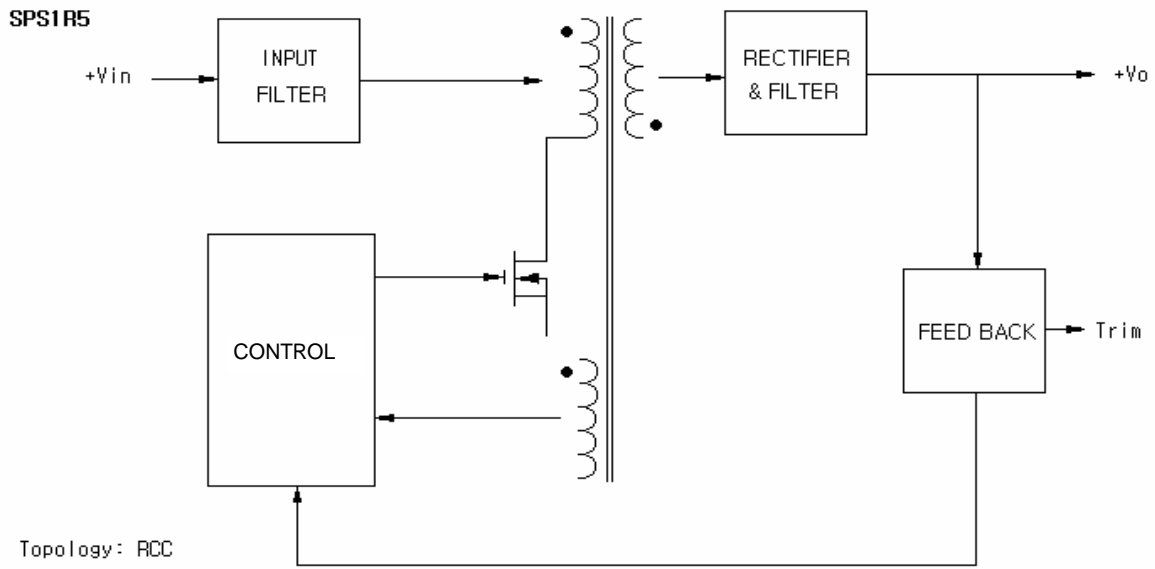
Instruction Manual

SPS/SPD series

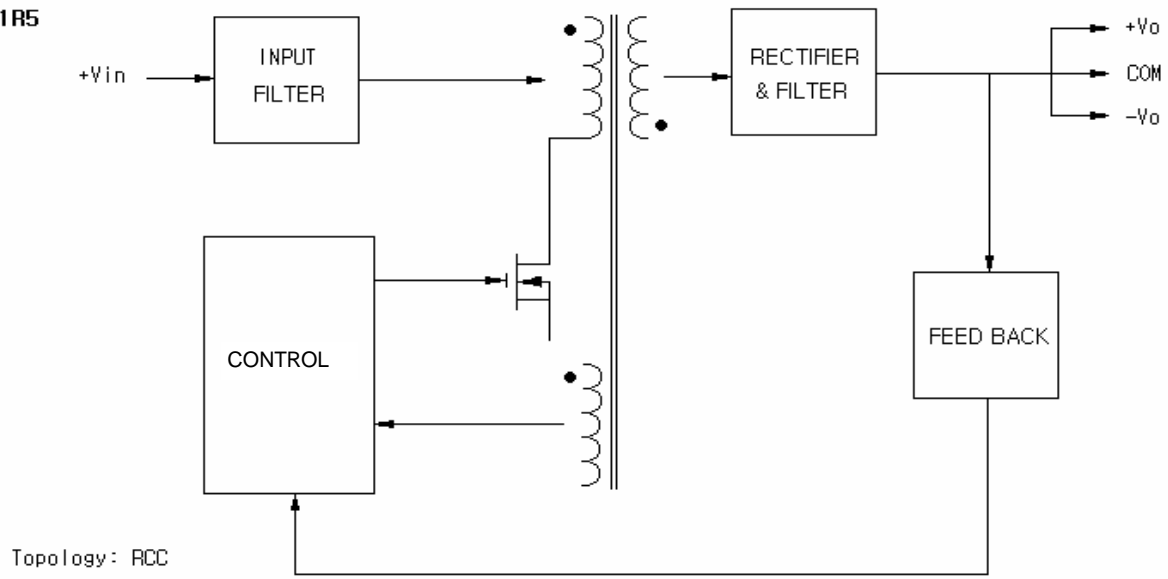
POWER PLAZA CO., LTD



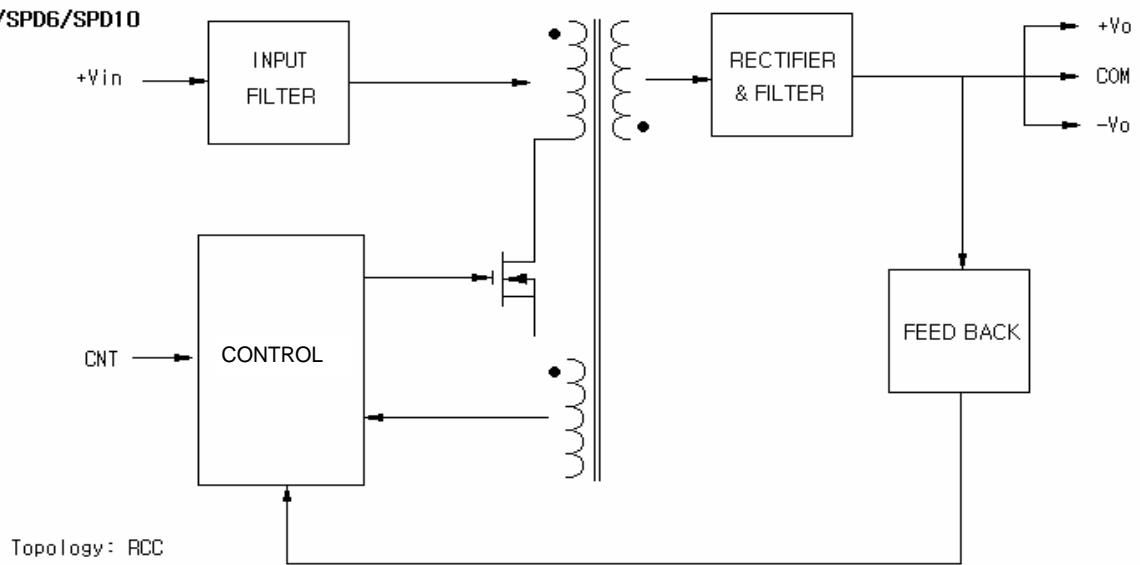
1. Block Diagram



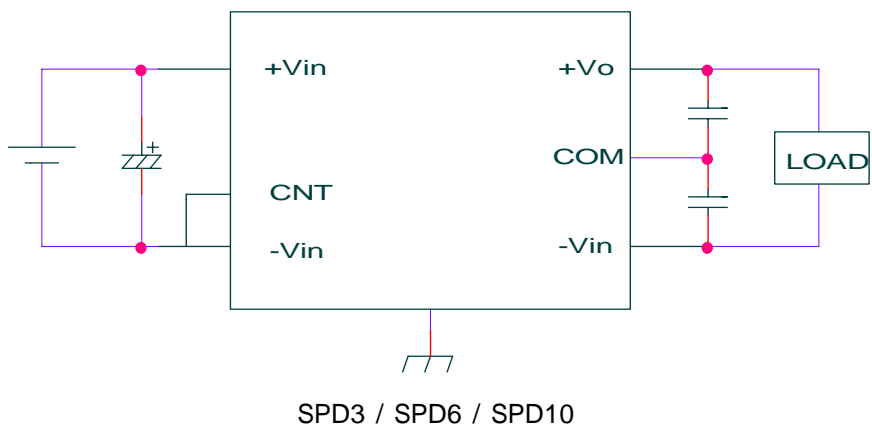
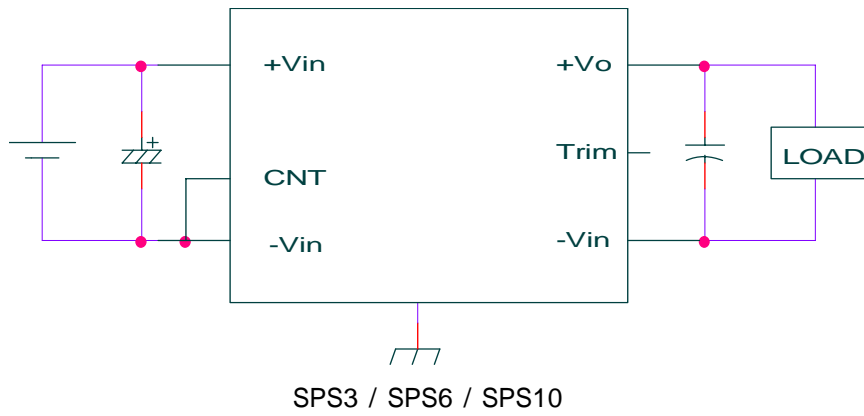
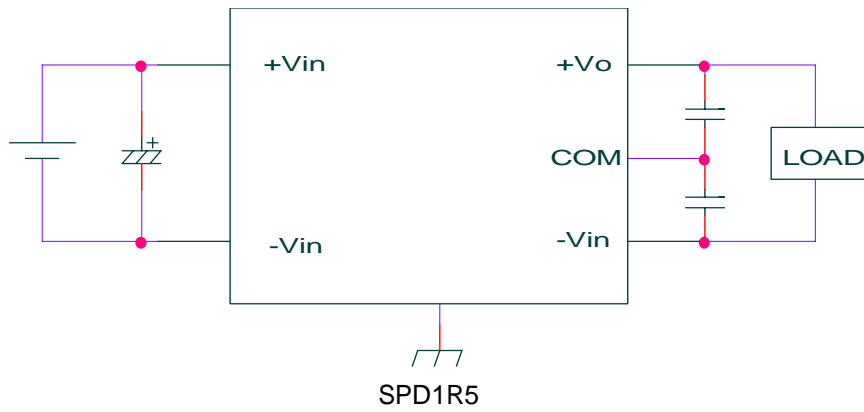
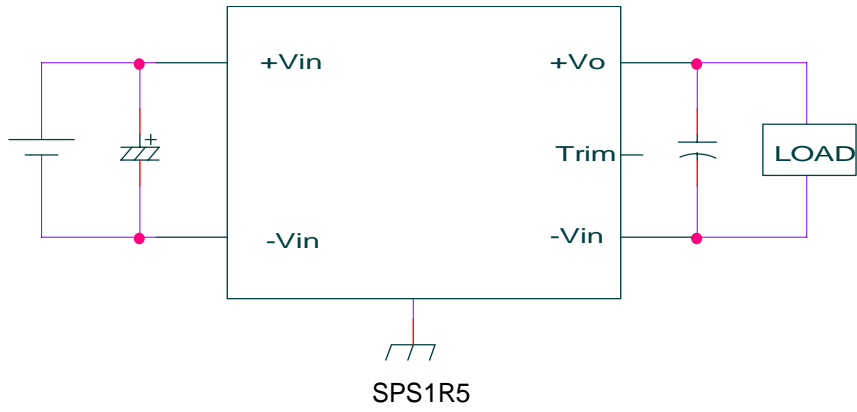
SPD1R5



SPD3/SPD6/SPD10

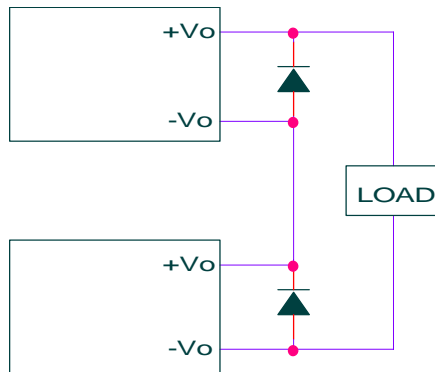


2. Basic connection



3. Series / Parallel Operation

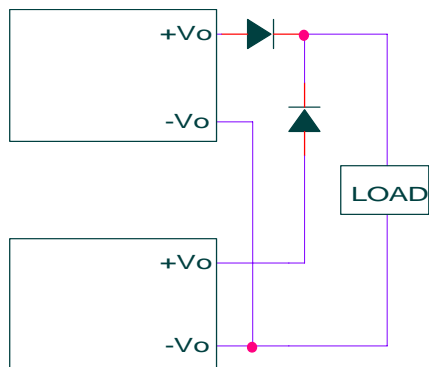
1) Series Operation



Choose a diode in accordance with voltage, current, power dissipation and heat radiation

- Voltage : $V > V_o$
- Current : Sufficiently large current of output current
- Use a schottky or fast recovery diode which has a low V_F

2) Parallel Operation

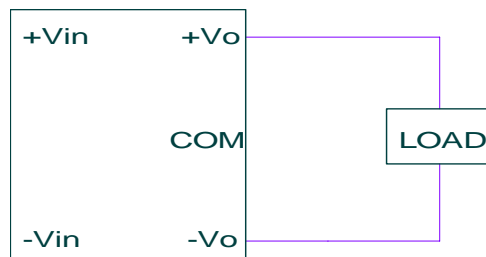


Load current should be less than rated output current of converter

3) SPD Series Application Operation

SPD series can be used as a single output.

+12V/ -12V dual output can be used as a +24V single output.



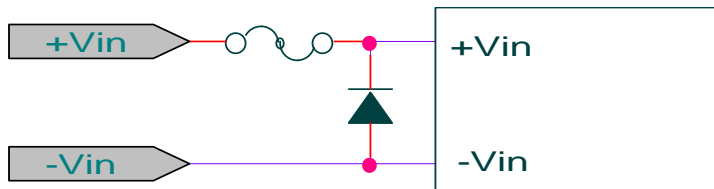
4. Input Fuse

In order to comply with safety requirements, SPS series has a fuse built in.

	5V	12V	24V	48V
SPS1R5	2A	1A	0.75A	0.75A
SPS3	3A	2.5A	1A	1A
SPS6	5A	2.5A	2A	1.5A
SPS10	6A	4A	2.5A	2A

5. Input Reverse-polarity voltage protection

Input reverse voltage protection has not built in this product.
So, you can set up a circuit externally as described below if necessary



6. Input Output Filter

SPS series have an internal input filter. To minimize the ripple and noise of the input voltage, additional external capacitor is required (10uF ~ 680uF)
To reduce a output ripple and noise, external capacitor is required at the output of the device.

7. Over current protection

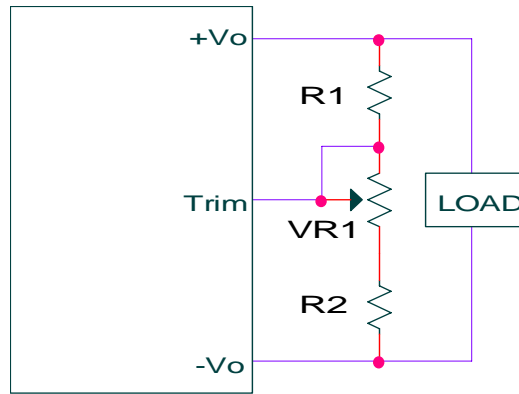
SPS series built in over current protection circuit which operates when the output current is over 105% of rating and automatically recovers when over current condition is removed.
If load is connected to a inductive or constant current load such as lamp or motor, output may not start up.

8. Over voltage protection

SPS series has not built in overvoltage protection circuit. So, you need to set up a circuit externally which can protect the over voltage if necessary.

9. Output voltage variation (Trim)

Output voltage adjusted by using trim pin within $\pm 10\%$ of output voltage.
 Use of trim function can cause the output power to increase, so you should not use beyond the SPS's specified output power rating.



Trim metode

Output voltage	VR	R1	R2
3.3V	500	1k Ω	560
5V	1k Ω	1k Ω	680
12V	1k Ω	3.9k Ω	680
15V	1k Ω	5.6k Ω	750

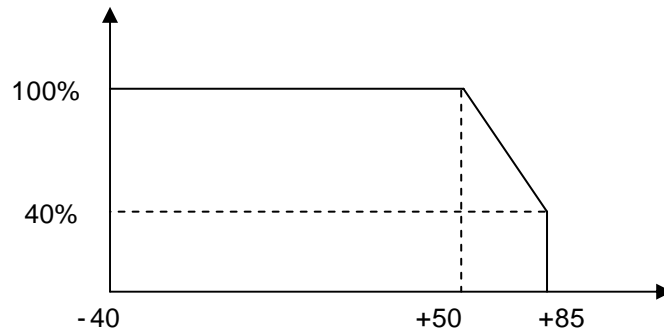
10. Remote ON/OFF Control (CNT)

By using CNT pin you can control the output without turning the input power on or off.
 If you need not this function short CNT pin to -Vin (Except 1.5W)

CNT Level for -Vin	Output
OPEN	OFF
SHORT	ON

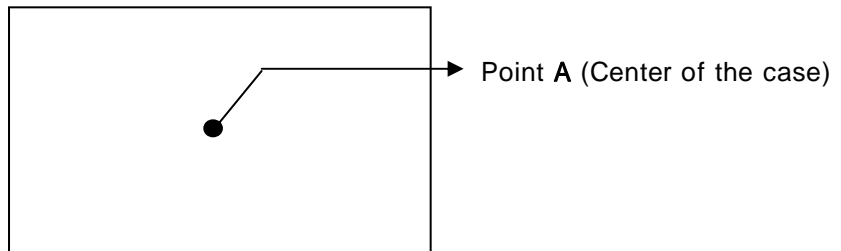
11. Thermal consideration

SPS series has wide operating temperature range from -40 to +85 .
 However, it should be required a enough air flow for more reliable operation. Output derating curve provide designers with a quantity of a current under the desired ambient temperature and velocity of a airflow.



If the device is installed in a system, the device's temperature of point A should be checked it does not exceed specified temperature as below.

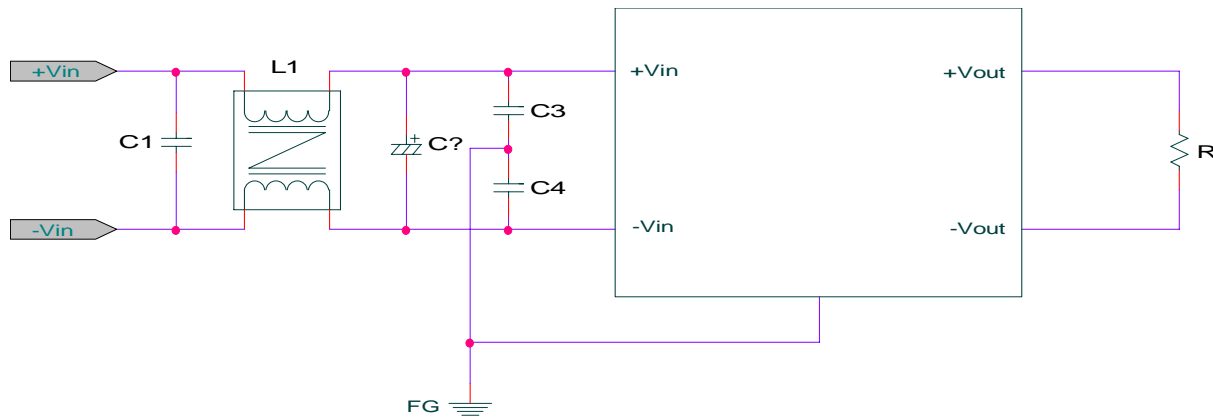
Please make sure that the ambient temperature does not exceed 85 .



Output	1.5W	3W	6W	10W
Temp	90	90	95	100

12. EMI Characteristic (Conducted Emission)

In order to reduce conducted noise install an external input filter as shown in below.



	L1	C1	C2	C3 ,C4
SPS1R5-5-5	0.5mH	22uF	220uF	472
SPS1R5-12-5	0.5mH	100uF	220uF	472
SPS1R5-24-5	1mH	22uF	220uF	472
SPS1R5-48-5	1mH	22uF	220uF	472
SPS3-5-5	1mH	22uF(MLCC)	220uF	472
SPS3-12-5	1mH	10uF(MLCC)	220uF	472
SPS3-24-5	2mH	22uF	100uF	472
SPS3-48-5	2mH	22uF	47uF	472
SPS6-5-5	0.5mH	10uF(MLCC)	220uF	472
SPS6-12-5	0.5mH	10uF(MLCC)	100uF	472
SPS6-24-5	1mH	22uF	220uF	472
SPS6-48-5	1mH	22uF	47uF	472
SPS6-5-5	0.5mH	22uF(MLCC)	470uF	472
SPS6-12-5	0.3mH	22uF(MLCC)	100uF	472
SPS6-24-5	1mH	47uF	100uF	472
SPS6-48-5	1mH	10uF	100uF	472

Complies with CISPR 22 CLASS B

SPS1R5 SERIES SPECIFICATIONS

Items	Model	SPS1R5-5-3R3	SPS1R5-5-5	SPS1R5-5-12	SPS1R5-5-15	SPS1R5-12-3R3	SPS1R5-12-5	SPS1R5-12-12	SPS1R5-12-15	SPS1R5-24-3R3	SPS1R5-24-5	SPS1R5-24-12	SPS1R5-24-15	SPS1R5-48-3R3	SPS1R5-48-5	SPS1R5-48-12	SPS1R5-48-15	unit
Nominal Output Voltage		3.3	5	12	15	3.3	5	12	15	3.3	5	12	15	3.3	5	12	15	V
Maximum Output Current		0.4	0.3	0.13	0.1	0.4	0.3	0.13	0.1	0.4	0.3	0.13	0.1	0.4	0.3	0.13	0.1	A
Maximum Output Power		1.32	1.5	1.56	1.5	1.32	1.5	1.56	1.5	1.32	1.5	1.56	1.5	1.32	1.5	1.56	1.5	W
Efficiency (Typ) (1)		73	78	81	81	73	78	81	81	73	78	81	81	73	78	81	81	%
Input Voltage Range		4.5 -9.0 VDC				9.0 -18.0 VDC				18.0 -36.0 VDC				36.0 -76.0 VDC				V
Input Current (Typ) (1)		0.36	0.38	0.39	0.39	0.15	0.16	0.16	0.15	0.08	0.08	0.08	0.08	0.04	0.04	0.04	0.04	A
Maximum Ripple & Noise(2)		50	50	120	150	50	50	120	150	50	50	120	150	70	70	120	150	mV
Output Voltage trim range		±10%																
Output Voltage set point accuracy		±2%																
Maximum Line Regulation (3)		±0.5%																
Maximum Load Regulation (4)		±1%																
Over Current Protection		Current limited output (Operate Over 105% of Rating, automatic recovery)																
Over Voltage Protection		NONE																
Remote on/off control		NONE																
Parallel Operation		Possible																
Series Operation		Possible																
Operating Temperature		-40 ~ +85 (Refer to output derating curve)																
Operating Humidity		5~95%																
Storage Temperature		-40~105																
Storage Humidity		5~95%																
Cooling		Convection Cooling																
Withstand Voltage		Input-Output: 500VAC , Input-CASE: 500VAC , Output-CASE: 500VAC (20mA)																
Isolation Resistance (5)		More than 100MΩ at DC 500V at 25 and 70% RH for 1 min.																
Weight		3.3g or less																g
Size(W.H.L)		16×12.5×18.5																mm

NOTES

- (1) At rated input voltage and Maximum Output Power (5V,12V,24V,48V)
- (2) Bandwidth 20MHz Oscilloscope.(1uF Ceramic capacitor)
- (3) From minimum input voltage to maximum input voltage, constant load.
- (4) From no load to maximum load, constant input voltage.
- (5) Output-Case

SPS3 SERIES SPECIFICATIONS

Items	Model	SPS3-5-3R3	SPS3-5-5	SPS3-5-12	SPS3-5-15	SPS3-12-3R3	SPS3-12-5	SPS3-12-12	SPS3-12-15	SPS3-24-3R3	SPS3-24-5	SPS3-24-12	SPS3-24-15	SPS3-48-3R3	SPS3-48-5	SPS3-48-12	SPS3-48-15	unit	
Nominal Output Voltage		3.3	5	12	15	3.3	5	12	15	3.3	5	12	15	3.3	5	12	15	V	
Maximum Output Current		0.6	0.6	0.25	0.2	0.6	0.6	0.25	0.2	0.6	0.6	0.25	0.2	0.6	0.6	0.25	0.2	A	
Maximum Output Power		1.98	3	3	3	1.98	3	3	3	1.98	3	3	3	1.98	3	3	3	W	
Efficiency (Typ) (1)		73	78	80	80	74	81	83	83	73	79	82	82	73	81	83	83	%	
Input Voltage Range		4.5 -9.0 VDC				9.0 -18.0 VDC				18.0 -36.0 VDC				36.0 -76.0 VDC				V	
Input Current (Typ) (1)		0.52	0.75	0.73	0.72	0.22	0.3	0.3	0.29	0.11	0.15	0.15	0.15	0.06	0.08	0.08	0.08	A	
Maximum Ripple & Noise(2)		50	50	120	150	50	50	120	150	50	50	120	150	50	50	120	150	mV	
Output Voltage trim range		±10%																	
Output Voltage set point accuracy		±2%																	
Maximum Line Regulation (3)		±0.5%																	
Maximum Load Regulation (4)		±1%																	
Over Current Protection		Current limited output (Operate Over 105% of Rating, automatic recovery)																	
Over Voltage Protection		NONE																	
Remote on/off control		Possible																	
Parallel Operation		Possible																	
Series Operation		Possible																	
Operating Temperature		-40 ~ +85 (Refer to output derating curve)																	
Operating Humidity		5~95%																	
Storage Temperature		-40~105																	
Storage Humidity		5~95%																	
Cooling		Convection Cooling																	
Withstand Voltage		Input-Output: 500VAC , Input-CASE: 500VAC , Output-CASE: 500VAC (20mA)																	
Isolation Resistance (5)		More than 100MΩ at DC 500V at 25 and 70% RH for 1 min.																	
Weight		4g or less																	g
Size(W.H.L)		16×12.5×23.4																	mm

NOTES

- (1) At rated input voltage and Maximum Output Power
- (2) Bandwidth 20MHz Oscilloscope.(1uF Ceramic capacitor)
- (3) From minimum input voltage to maximum input voltage, constant load.
- (4) From no load to maximum load, constant input voltage.
- (5) Output-Case

SPS6 SERIES SPECIFICATIONS

Items	Model	SPS6-5-3R3	SPS6-5-5	SPS6-5-12	SPS6-5-15	SPS6-12-3R3	SPS6-12-5	SPS6-12-12	SPS6-12-15	SPS6-24-3R3	SPS6-24-5	SPS6-24-12	SPS6-24-15	SPS6-48-3R3	SPS6-48-5	SPS6-48-12	SPS6-48-15	unit	
Nominal Output Voltage		3.3	5	12	15	3.3	5	12	15	3.3	5	12	15	3.3	5	12	15	V	
Maximum Output Current		1.2	1	0.5	0.4	1.5	1.2	0.5	0.4	1.5	1.2	0.5	0.4	1.5	1.2	0.5	0.4	A	
Maximum Output Power		3.96	5	6	6	4.95	6	6	6	4.95	6	6	6	4.95	6	6	6	W	
Efficiency (Typ) (1)		72	78	80	80	77	81	86	86	75	80	84	84	75	81	85	85	%	
Input Voltage Range		4.5 -9.0 VDC				9.0 -18.0 VDC				18.0 -36.0 VDC				36.0 -76.0 VDC				V	
Input Current (Typ) (1)		1.07	1.29	1.48	1.45	0.54	0.62	0.6	0.59	0.28	0.32	0.31	0.30	0.13	0.15	0.15	0.15	A	
Maximum Ripple & Noise(2)		50	50	120	150	50	50	120	150	50	50	120	150	50	50	120	150	mV	
Output Voltage trim range		±10%																	
Output Voltage set point accuracy		±2%																	
Maximum Line Regulation (3)		±0.5%																	
Maximum Load Regulation (4)		±1%																	
Over Current Protection		Current limited output (Operate Over 105% of Rating, automatic recovery)																	
Over Voltage Protection		NONE																	
Remote on/off control		Possible																	
Parallel Operation		Possible																	
Series Operation		Possible																	
Operating Temperature		-40 ~ +85 (Refer to output derating curve)																	
Operating Humidity		5~95%																	
Storage Temperature		-40~105																	
Storage Humidity		5~95%																	
Cooling		Convection Cooling																	
Withstand Voltage		Input-Output: 500VAC , Input-CASE: 500VAC , Output-CASE: 500VAC (20mA)																	
Isolation Resistance (5)		More than 100MΩ at DC 500V at 25 and 70% RH for 1 min.																	
Weight		5.8g or less																	g
Size(W.H.L)		20×12.5×27.5																	mm

NOTES

- (1) At rated input voltage and Maximum Output Power
- (2) Bandwidth 20MHz Oscilloscope.(1uF Ceramic capacitor)
- (3) From minimum input voltage to maximum input voltage, constant load.
- (4) From no load to maximum load, constant input voltage.
- (5) Output-Case

SPS10 SERIES SPECIFICATIONS

Items	Model	SPS10-5-3R3	SPS10-5-5	SPS10-5-12	SPS10-5-15	SPS10-12-3R3	SPS10-12-5	SPS10-12-12	SPS10-12-15	SPS10-24-3R3	SPS10-24-5	SPS10-24-12	SPS10-24-15	SPS10-48-3R3	SPS10-48-5	SPS10-48-12	SPS10-48-15	unit	
Nominal Output Voltage		3.3	5	12	15	3.3	5	12	15	3.3	5	12	15	3.3	5	12	15	V	
Maximum Output Current		1.6	1.6	0.7	0.6	2.0	2.0	0.9	0.7	2.0	2.0	0.9	0.7	2.0	2.0	0.9	0.7	A	
Maximum Output Power		5.28	8	8.4	9	6.6	10	10.8	10.5	6.6	10	10.8	10.5	6.6	10	10.8	10.5	W	
Efficiency (Typ) (1)		74	78	81	82	77	81	84	86	75	80	85	85	74	80	85	85	%	
Input Voltage Range		4.5 -9.0 VDC				9.0 -18.0 VDC				18.0 -36.0 VDC				36.0 -76.0 VDC				V	
Input Current (Typ) (1)		1.44	2.03	2.07	2.13	0.71	1.02	1.06	0.99	0.36	0.51	0.53	0.51	0.18	0.26	0.27	0.25	A	
Maximum Ripple & Noise(2)		50	50	120	150	50	50	120	150	50	50	120	150	50	50	120	150	mV	
Output Voltage trim range		±10%																	
Output Voltage set point accuracy		±2%																	
Maximum Line Regulation (3)		±0.5%																	
Maximum Load Regulation (4)		±1%																	
Over Current Protection		Current limited output (Over 105% of Rating)																	
Over Voltage Protection		NONE																	
Remote on/off control		NONE																	
Parallel Operation		Possible																	
Series Operation		Possible																	
Operating Temperature		-40 ~ +85 (Refer to output derating curve)																	
Operating Humidity		5~95%																	
Storage Temperature		-40~105																	
Storage Humidity		5~95%																	
Cooling		Convection Cooling																	
Withstand Voltage		Input-Output: 500VAC , Input-CASE: 500VAC , Output-CASE: 500VAC (20mA)																	
Isolation Resistance (5)		More than 100MΩ at DC 500V at 25 and 70% RH for 1 min.																	
Weight		10.8g or less																	g
Size(W.H.L)		26×12.5×35.6																	mm

NOTES

- (1) At rated input voltage and Maximum Output Power
- (2) Bandwidth 20MHz Oscilloscope.(1uF Ceramic capacitor)
- (3) From minimum input voltage to maximum input voltage, constant load.
- (4) From no load to maximum load, constant input voltage.
- (5) Output-Case

SPD1R5 SERIES SPECIFICATIONS

Items	Model	SPS1R5-5-1212	SPS1R5-5-1515	SPS1R5-12-1212	SPS1R5-12-1515	SPS1R5-24-1212	SPS1R5-24-1515	SPS1R5-48-1212	SPS1R5-48-1515	unit	
Nominal Output Voltage		±12	±15	±12	±15	±12	±15	±12	±15	V	
Maximum Output Current		0.4	0.3	0.13	0.1	0.4	0.3	0.13	0.1	A	
Maximum Output Power		1.56	1.5	1.56	1.5	1.56	1.5	1.56	1.5	W	
Efficiency (Typ) (1)		81	81	81	81	81	81	81	81	%	
Input Voltage Range		4.5 -9.0 VDC		9.0 -18.0 VDC		18.0 -36.0 VDC		36.0 -76.0 VDC		V	
Input Current (Typ) (1)		0.39	0.39	0.16	0.16	0.09	0.09	0.04	0.04	A	
Maximum Ripple & Noise(2)		120	150	120	150	120	150	120	150	mV	
Output Voltage trim range		±10%									
Output Voltage set point accuracy		±2%									
Maximum Line Regulation (3)		±0.5%									
Maximum Load Regulation (4)		±1%									
Over Current Protection		Current limited output (Operate Over 105% of Rating, automatic recovery)									
Over Voltage Protection		NONE									
Remote on/off control		NONE									
Parallel Operation		Possible									
Series Operation		Possible									
Operating Temperature		-40 ~ +85 (Refer to output derating curve)									
Operating Humidity		5~95%									
Storage Temperature		-40~105									
Storage Humidity		5~95%									
Cooling		Convection Cooling									
Withstand Voltage		Input-Output: 500VAC, Input-CASE: 500VAC, Output-CASE: 500VAC (20mA)									
Isolation Resistance (5)		More than 100MΩ at DC 500V at 25 and 70% RH for 1 min.									
Weight		3.3g or less									g
Size(W.H.L)		16×12.5×18.5									mm

NOTES

- (1) At rated input voltage and Maximum Output Power (5V,12V,24V,48V)
- (2) Bandwidth 20MHz Oscilloscope.(1uF Ceramic capacitor)
- (3) From minimum input voltage to maximum input voltage, constant load.
- (4) From no load to maximum load, constant input voltage.
- (5) Output-Case

SPD3 SERIES SPECIFICATIONS

Items	Model	SPS3-5-1212	SPS3-5-1515	SPS3-12-1212	SPS3-12-1515	SPS3-24-1212	SPS3-24-1515	SPS3-48-1212	SPS3-48-1515	unit
Nominal Output Voltage		±12	±15	±12	±15	±12	±15	±12	±15	V
Maximum Output Current		0.4	0.3	0.13	0.1	0.4	0.3	0.13	0.1	A
Maximum Output Power		3.12	3	3.12	3	3.12	3	3.12	3	W
Efficiency (Typ) (1)		81	81	83	83	83	83	83	83	%
Input Voltage Range		4.5 -9.0 VDC		9.0 -18.0 VDC		18.0 -36.0 VDC		36.0 -76.0 VDC		V
Input Current (Typ) (1)		0.76	0.74	0.31	0.3	0.16	0.15	0.08	0.08	A
Maximum Ripple & Noise(2)		120	150	120	150	120	150	120	150	mV
Output Voltage trim range		±10%								
Output Voltage set point accuracy		±2%								
Maximum Line Regulation (3)		±0.5%								
Maximum Load Regulation (4)		±1%								
Over Current Protection		Current limited output (Operate Over 105% of Rating, automatic recovery)								
Over Voltage Protection		NONE								
Remote on/off control		Possible								
Parallel Operation		Possible								
Series Operation		Possible								
Operating Temperature		-40 ~ +85 (Refer to output derating curve)								
Operating Humidity		5~95%								
Storage Temperature		-40~105								
Storage Humidity		5~95%								
Cooling		Convection Cooling								
Withstand Voltage		Input-Output: 500VAC, Input-CASE: 500VAC, Output-CASE: 500VAC (20mA)								
Isolation Resistance (5)		More than 100MΩ at DC 500V at 25 and 70% RH for 1 min.								
Weight		4g or less								
Size(W.H.L)		16×12.5×23.4								

NOTES

- (1) At rated input voltage and Maximum Output Power (5V,12V,24V,48V)
- (2) Bandwidth 20MHz Oscilloscope.(1uF Ceramic capacitor)
- (3) From mimum input voltage to maximum input voltage, constant load.
- (4) From no load to maximum load, constant input voltage.
- (5) Output-Case

SPD6 SERIES SPECIFICATIONS

Items	Model	SPS6-5-1212	SPS6-5-1515	SPS6-12-1212	SPS6-12-1515	SPS6-24-1212	SPS6-24-1515	SPS6-48-1212	SPS6-48-1515	unit
Nominal Output Voltage		±12	±15	±12	±15	±12	±15	±12	±15	V
Maximum Output Current		0.4	0.3	0.13	0.1	0.4	0.3	0.13	0.1	A
Maximum Output Power		6	6	6	6	6	6	6	6	W
Efficiency (Typ) (1)		82	82	85	85	84	84	85	85	%
Input Voltage Range		4.5 -9.0 VDC		9.0 -18.0 VDC		18.0 -36.0 VDC		36.0 -76.0 VDC		V
Input Current (Typ) (1)		1.49	1.44	0.59	0.59	0.29	0.30	0.15	0.15	A
Maximum Ripple & Noise(2)		120	150	120	150	120	150	120	150	mV
Output Voltage trim range		±10%								
Output Voltage set point accuracy		±2%								
Maximum Line Regulation (3)		±0.5%								
Maximum Load Regulation (4)		±1%								
Over Current Protection		Current limited output (Operate Over 105% of Rating, automatic recovery)								
Over Voltage Protection		NONE								
Remote on/off control		Possible								
Parallel Operation		Possible								
Series Operation		Possible								
Operating Temperature		-40 ~ +85 (Refer to output derating curve)								
Operating Humidity		5~95%								
Storage Temperature		-40~105								
Storage Humidity		5~95%								
Cooling		Convection Cooling								
Withstand Voltage		Input-Output: 500VAC, Input-CASE: 500VAC, Output-CASE: 500VAC (20mA)								
Isolation Resistance (5)		More than 100MΩ at DC 500V at 25 and 70% RH for 1 min.								
Weight		5.8g or less								
Size(W.H.L)		20×12.5×27.5								

NOTES

- (1) At rated input voltage and Maximum Output Power (5V,12V,24V,48V)
- (2) Bandwidth 20MHz Oscilloscope.(1uF Ceramic capacitor)
- (3) From mimum input voltage to maximum input voltage, constant load.
- (4) From no load to maximum load, constant input voltage.
- (5) Output-Case

SPD10 SERIES SPECIFICATIONS

Items	Model	SPS10-5-1212	SPS10-5-1515	SPS10-12-1212	SPS10-12-1515	SPS10-24-1212	SPS10-24-1515	SPS10-48-1212	SPS10-48-1515	unit	
Nominal Output Voltage		±12	±15	±12	±15	±12	±15	±12	±15	V	
Maximum Output Current		0.35	0.3	0.45	0.35	0.45	0.35	0.45	0.35	A	
Maximum Output Power		8.4	9	10.8	10.5	10.8	10.5	10.8	10.5	W	
Efficiency (Typ) (1)		83	84	86	86	85	85	84	84	%	
Input Voltage Range		4.5 -9.0 VDC		9.0 -18.0 VDC		18.0 -36.0 VDC		36.0 -76.0 VDC		V	
Input Current (Typ) (1)		2.02	2.11	1.04	1.00	0.53	0.51	0.27	0.26	A	
Maximum Ripple & Noise(2)		120	150	120	150	120	150	120	150	mV	
Output Voltage trim range		±10%									
Output Voltage set point accuracy		±2%									
Maximum Line Regulation (3)		±0.5%									
Maximum Load Regulation (4)		±1%									
Over Current Protection		Current limited output (Operate Over 105% of Rating, automatic recovery)									
Over Voltage Protection		NONE									
Remote on/off control		Possible									
Parallel Operation		Possible									
Series Operation		Possible									
Operating Temperature		-40 ~ +85 (Refer to output derating curve)									
Operating Humidity		5~95%									
Storage Temperature		-40~105									
Storage Humidity		5~95%									
Cooling		Convection Cooling									
Withstand Voltage		Input-Output: 500VAC, Input-CASE: 500VAC, Output-CASE: 500VAC (20mA)									KV
Isolation Resistance (5)		More than 100MΩ at DC 500V at 25 and 70% RH for 1 min.									
Weight		10.8g or less									g
Size(W.H.L)		26×12.5×35.6									mm

NOTES

- (1) At rated input voltage and Maximum Output Power (5V,12V,24V,48V)
- (2) Bandwidth 20MHz Oscilloscope.(1uF Ceramic capacitor)
- (3) From minimum input voltage to maximum input voltage, constant load.
- (4) From no load to maximum load, constant input voltage.
- (5) Output-Case