

Single Phase Power Supply



Description

SPMA Modular switching power supplies are specifically designed to satisfy both the industrial automation and the building automation application requirements. The four DIN modules power supplies are capable of up to 100W of output power. Its high efficiency prevents excess of heat in the installation place. These power supplies meet CE, UL508 listed, UL 62368, UL1310 Class 2 (Output), UL 121201 Class1 Div 2, and the 4kVAC isolation voltage that is mandatory for automotive battery charger applications.

All specifications are at nominal values, full load, 25°C unless otherwise stated

Applications

The SPMA is extremely suitable for automotive battery chargers, high efficiency and applications requiring wide operating ambient temperature. Suitable for use in class 1, division 2, groups a, b, c and d hazardous locations, or nonhazardous locations only. This equipment is an open-type device and must be installed in an enclosure such that the equipment is only accessible with the use of a tool.

Warning: Explosion hazard - do not disconnect equipment while the circuit is live or unless the area is known to be free of ignitable concentrations.

Main functions

- Universal input voltage range: 85 VAC to 264 VAC; 120 VDC to 350 VDC
- Output options of 5 VDC, 12 VDC, 15 VDC or 24 VDC
- From 1 DIN to 4 DIN modules, from 12 W to 100.8 W
- Bi-colour LED for status indication
- Voltage output adjustment
- High efficiency up to 89%
- 4 kVAC isolation voltage

Benefits

- **Universal AC input range.** SPMA series can be powered with AC voltage (85 VAC to 264 VAC) or with DC voltage (120 VDC to 350 VDC).
- **CE and UL approvals.** These power supplies meet CE, UL508, UL 62368, UL 1310 Class 2 (Output), UL 121201 Class 1 Div 2 (hazardous location installations).
- **Isolation class II.** This series has the Isolation Class II and a Primary - Secondary withstand voltage of 4kVAC.
- **Reliable power in very compact dimensions.** SPMA has an ultra-slim body, from 15W in 17.5mm (1 DIN), up to 100W in only 70mm (4 DIN) of space.
- **High efficiency, long life and high reliability.** The SPMA has a very high efficiency of up to 89%.
- **Reliable critical output protections.** Safe operation is guaranteed by the various output protections: Over Current (OVC), Over Voltage (OVP), Short Circuit (SCP).
- **Wide operating ambient temperature.** The operating temperature range is from -30 °C to +70 °C (-22 °F to 158 °F), and a storage temperature range from -40 °C to +85 °C (-40 °F to 185 °F).
- **Conformal coating (option).** SPMA series are available with the protective coating in order to protect its electronic circuits from harsh environments as humidity and contaminants.

References

Order code



SPMA 1


Enter the code entering the corresponding option instead of

| Code | Option | Description | Notes |
|--------------------------|--------|---------------------------|-----------------------------------|
| S | - | Switching | Device typology |
| P | - | Power supply | |
| M | - | Modular | |
| A | - | Advanced | Series |
| <input type="checkbox"/> | 5 | 5VDC | Rated output voltage |
| | 12 | 12VDC | |
| | 15 | 15VDC | |
| | 24 | 24VDC | |
| <input type="checkbox"/> | 15 | 15W | Rated output power |
| | 30 | 30W | |
| | 60 | 60W | |
| | 100 | 100W | |
| 1 | - | Single phase input | Input type |
| <input type="checkbox"/> | - | Class 2 | Applies to SPMA241001 models only |
| | S | Non Class 2 | |
| <input type="checkbox"/> | - | | PCB coating |
| | SCC | Conformal coating version | |

Selection guide

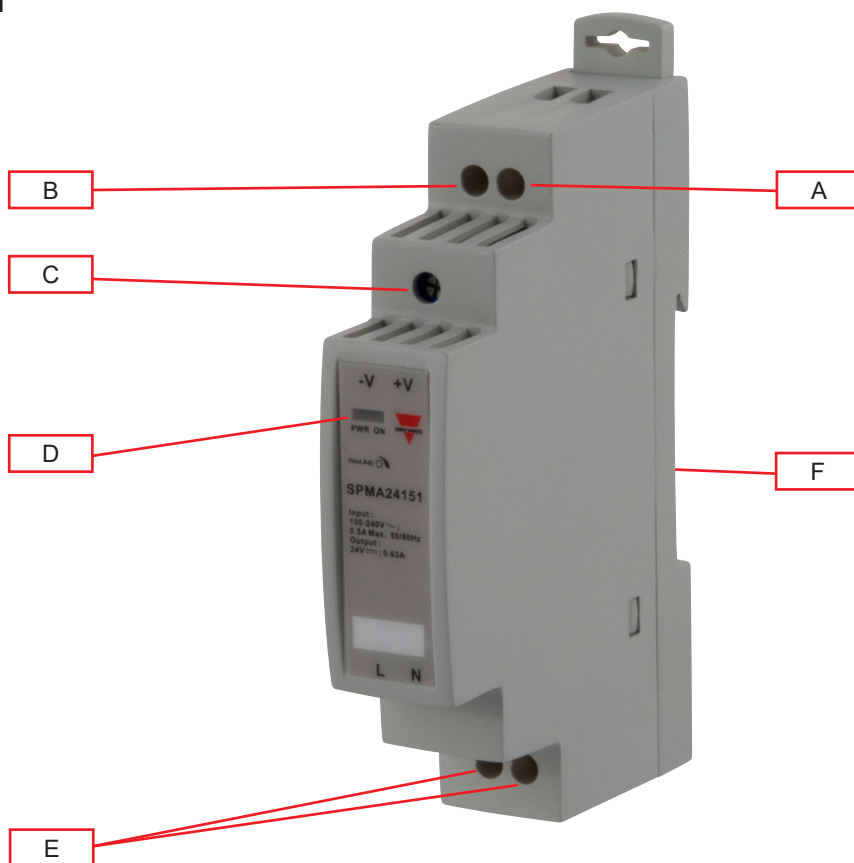
| Output Voltage | SPMA...151 | SPMA...301 | SPMA...601 | SPMA...1001 | |
|----------------|------------|------------|------------|-------------|-------------|
| 5 VDC | SPMA05151 | SPMA05301 | - | - | |
| 12 VDC | SPMA12151 | SPMA12301 | SPMA12601 | SPMA121001 | |
| 15 VDC | SPMA15151 | SPMA15301 | SPMA15601 | SPMA151001 | |
| 24 VDC | SPMA24151 | SPMA24301 | SPMA24601 | SPMA241001 | SPMA241001S |

Further reading

| Information | Where to find it | QR |
|-------------------------|---|---|
| SPMA Installation sheet | http://cga.pub/?52e71a |  |

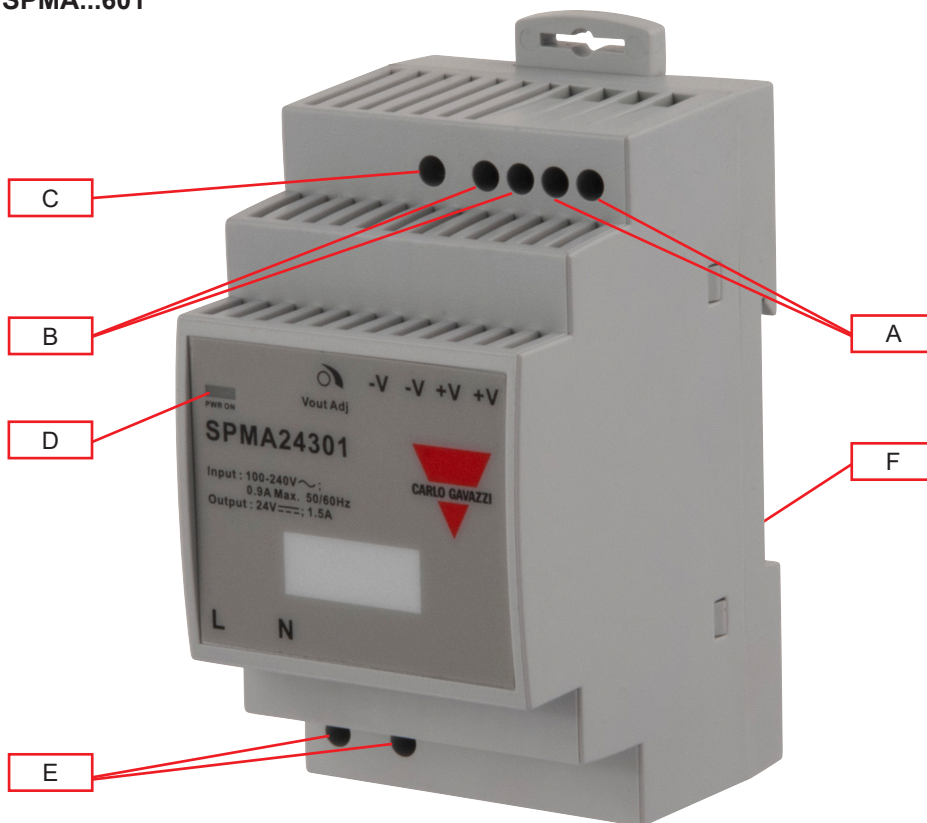
Structure

SPMA...151



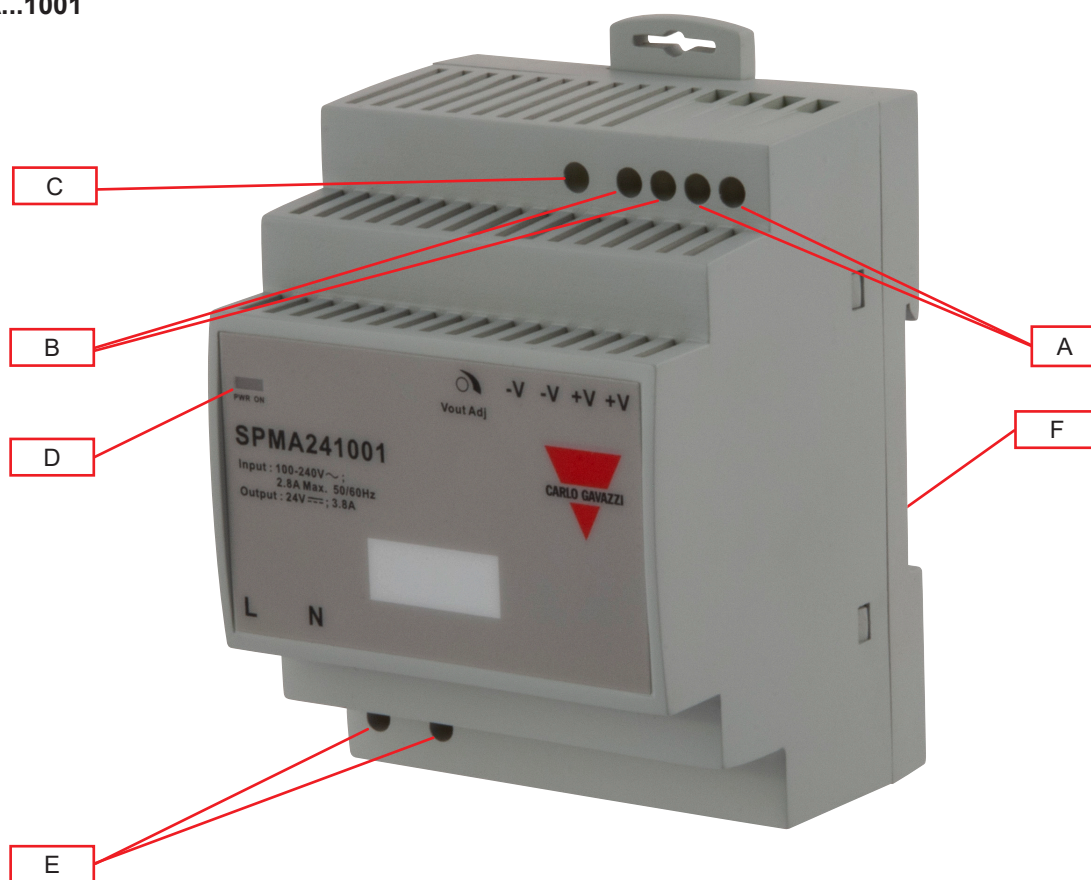
| Element | Component | Function |
|---------|------------------------|--|
| A | + V terminals | Positive DC output terminals |
| B | - V terminals | Negative DC output terminals |
| C | VADJ Trimmer | Output voltage adjustment |
| D | DC OK LED | Green: output voltage $\geq 90\%$ of rated output voltage Red: output voltage $\leq 80\%$ of rated output voltage or overload |
| E | Power supply terminals | L, N supply terminals + GND |
| F | DIN rail mounting clip | Clip present on back side |

SPMA...301 / SPMA...601



| Element | Component | Function |
|---------|------------------------|--|
| A | + V terminals | Positive DC output terminals |
| B | - V terminals | Negative DC output terminals |
| C | VADJ Trimmer | Output voltage adjustment |
| D | DC OK LED | Green: output voltage \geq 90% of rated output voltage Red: output voltage \leq 80% of rated output voltage or overload |
| E | Power supply terminals | L, N supply terminals + GND |
| F | DIN rail mounting clip | Clip present on back side |

SPMA...1001



| Element | Component | Function |
|---------|------------------------|--|
| A | + V terminals | Positive DC output terminals |
| B | - V terminals | Negative DC output terminals |
| C | VADJ Trimmer | Output voltage adjustment |
| D | DC OK LED | Green: output voltage $\geq 90\%$ of rated output voltage Red: output voltage $\leq 80\%$ of rated output voltage or overload |
| E | Power supply terminals | L, N supply terminals + GND |
| F | DIN rail mounting clip | Clip present on back side |

Features

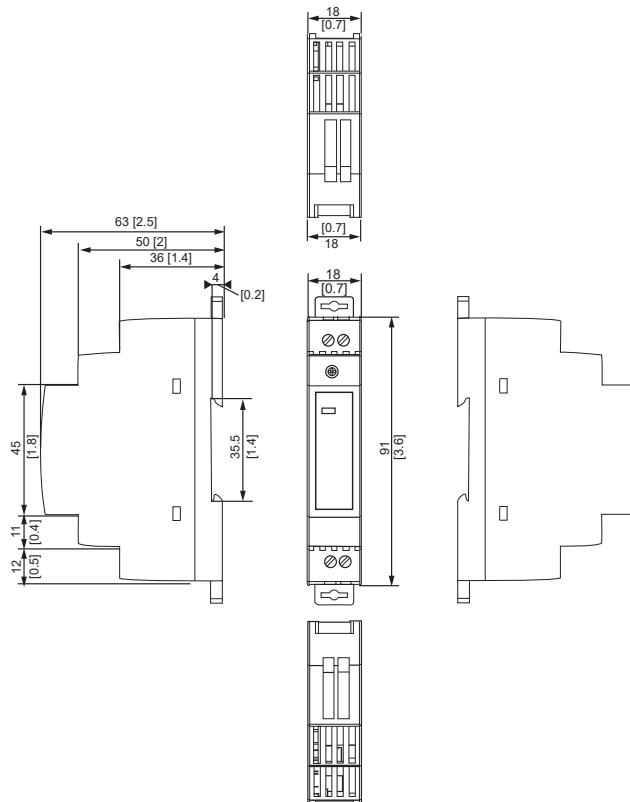
▶ General data

| | | SPMA...151 | SPMA...301 | SPMA...601 | SPMA...1001 |
|--|-------------|----------------------------|------------|------------|-------------|
| Leakage current (Input @240VAC, 63Hz) | | < 0.25 mA (input - output) | | | |
| Efficiency | 5 V | 77.5 % | 81 % | - | - |
| | 12 V | 83 % | 86 % | 86.5 % | 87 % |
| | 15 V | 84 % | 86.5 % | 87 % | 88 % |
| | 24 V | 85 % | 88 % | 89 % | 89 % |
| Power loss @ nominal load | | < 0.5 W | | | |
| Ingress protection | | IP 20 | | | |
| MTBF | | >300,000 Hrs | | | |
| Case material | | Plastic | | | |
| Weight | | 71 g | 201 g | | 267 g |
| Mounting | | DIN rail | | | |

Dimensions

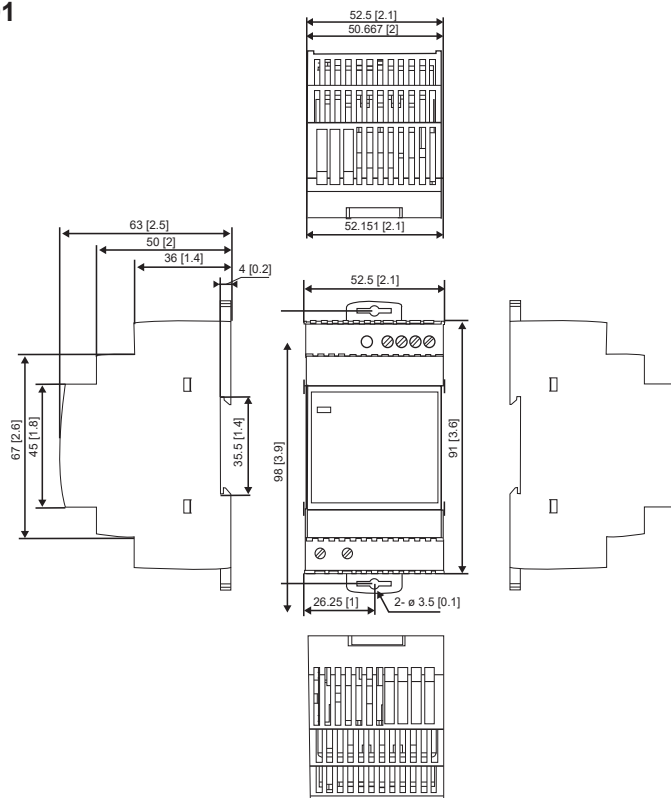
SPMA...151

Unit: mm [inches]

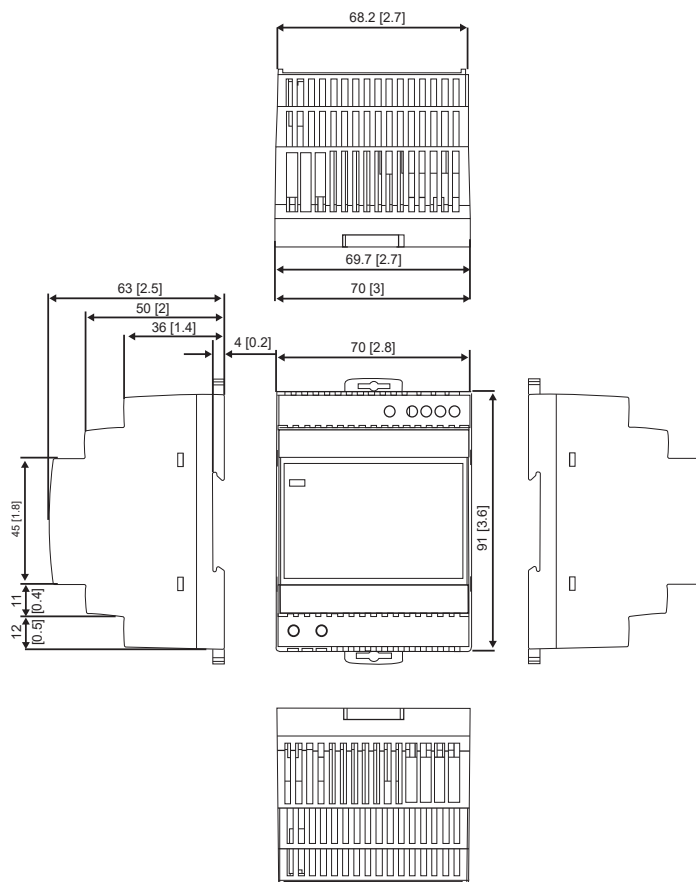


SPMA...301 / SPMA...601

Unit: mm [inches]



SPMA...1001
Unit: mm [inches]

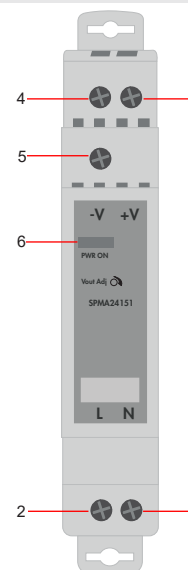


Connection diagram

Terminal markings

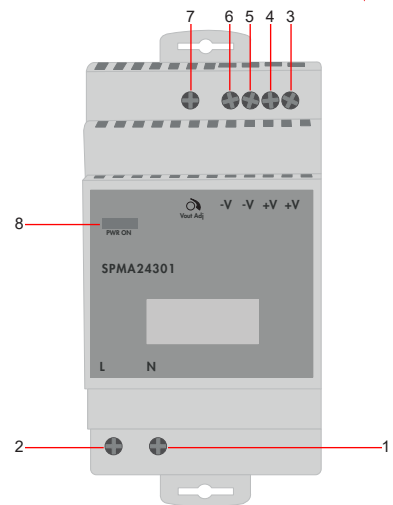
SPMA...151

| Terminal | Designation | Description |
|----------|-------------|--|
| 1 | N | Input terminals (neutral conductor, no polarity with DC input) |
| 2 | L | Input terminals (phase conductor, no polarity with DC input) |
| 3 | V+ | Positive output terminal |
| 4 | V- | Negative output terminal |
| 5 | Vout ADJ. | Potentiometer for output voltage adjustment |
| 6 | DC status | LED indication of power supply output status |



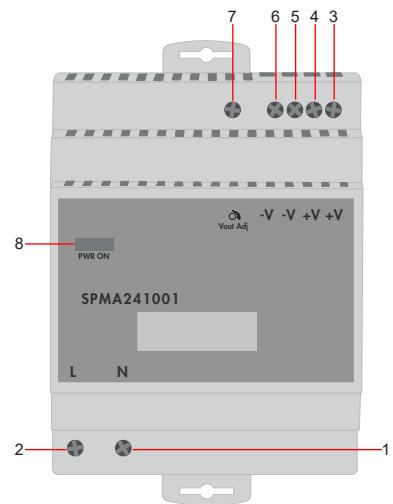
SPMA...301 / SPMA...601

| Terminal | Designation | Description |
|----------|-------------|--|
| 1 | N | Input terminals (neutral conductor, no polarity with DC input) |
| 2 | L | Input terminals (phase conductor, no polarity with DC input) |
| 3, 4 | V+ | Positive output terminal |
| 5, 6 | V- | Negative output terminal |
| 7 | Vout ADJ. | Potentiometer for output voltage adjustment |
| 8 | DC status | LED indication of power supply output status |



SPMA...1001

| Terminal | Designation | Description |
|----------|-------------|--|
| 1 | N | Input terminals (neutral conductor, no polarity with DC input) |
| 2 | L | Input terminals (phase conductor, no polarity with DC input) |
| 3, 4 | V+ | Positive output terminal |
| 5, 6 | V- | Negative output terminal |
| 7 | Vout ADJ. | Potentiometer for output voltage adjustment |
| 8 | DC status | LED indication of power supply output status |



Environmental

| | SPMA...151 | SPMA...301 | SPMA...601 | SPMA...1001 |
|-----------------------------|-------------------------------------|------------|------------|-------------|
| Temperature operating range | -30 °C to 70 °C (-22 °F to 158 °F) | | | |
| Temperature storage | -40 °C to 85 °C (-40 °F to 185 °F) | | | |
| Humidity | 10 % to 95 % RH non-condensing | | | |
| Temperature derating | Refer to derating diagram | | | |
| Temperature regulation | ±0.03 % / °C | | | |

Compatibility and conformity

| | |
|----------------------|--|
| Safety standards | UL/EN62368-1, UL508 |
| EMC emission | EN55032 |
| Harmonic current | EN61000-3-2, Class A (SPMA...1001S) |
| EMC immunity | EN55035 |
| CE | EMC 2014/30/EU LVD 2014/35/EU RoHS 2011/65EU + 2015/863 |
| UL certification | UL508 Listed UL62368 UL1310 Class 2 (output)* UL 121201 (Class 1 Div 2) |
| Vibration resistance | 10 ~ 500 Hz, 2G 10 min. / cycle, period for 60 min. each along X, Y, Z axes; Compliance to IEC60068-2-6 |
| Shock resistance | 15 G, 11 ms, 3 times along X, Y, Z axes; Compliance to IEC60068-2-27 |

* Except for SPMA05301, SPMA121001, SPMA151001, SPMA241001S, SPMA05301SCC, SPMA121001SCC, SPMA151001SCC, SPMA241001SSCC models



Insulation

| | |
|---|-------------------------------------|
| Insulation / Withstand Voltage (I / O) | Primary - Secondary 4.0kVAC / 10 mA |
| Insulation resistance | 100 MΩ |
| Overvoltage category | II |
| Pollution degree | 2 |

Input data

| | SPMA...151 | SPMA...301 | SPMA...601 | SPMA...101 |
|---|---|---------------------|--------------------|--------------------|
| Rated input voltage | 100 ~ 240 VAC | | | 115 ~ 240 VAC |
| Input voltage range | 85 VAC to 264 VAC 120 VDC to 350 VDC | | | |
| AC current (max) 115 VAC 230 VAC | < 0.45 A < 0.25 A | < 0.90 A < 0.5 A | < 1.8 A < 0.9 A | < 2.8 A < 1.4 A |
| Frequency range | 50 Hz to 60 Hz | | | |
| Inrush current 115 VAC 230 VAC | < 25 A < 50 A | < 30 A - | - < 60 A | |
| Internal input fuse (250 VAC) | 2 A | 3.15 A | | 5 A |
| Standby power consumption | < 0.5 W (Subject to load conditions) | | | |

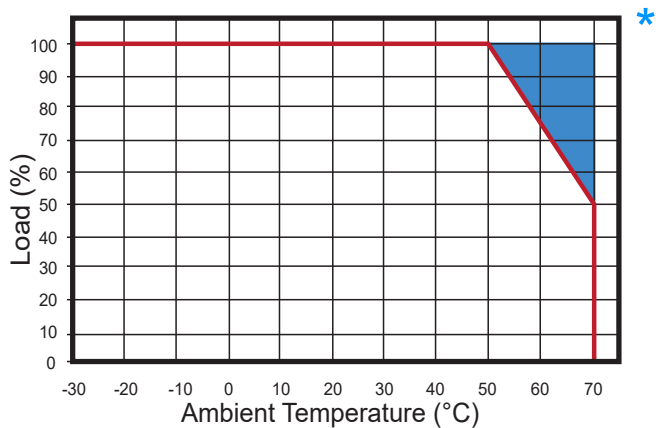
Output data

| | | SPMA...151 | SPMA...301 | SPMA...601 | SPMA...1001 | |
|------------------------------------|------|------------------------|------------|------------|------------------|-------------------------|
| Output power | 5 V | 12 W | 30 W | - | - | |
| | 12 V | 15 W | 25.2 W | 54 W | 85.2 W | |
| | 15 V | | 30 W | 60 W | 91.8 W | |
| | 24 V | 15.12 W | 36 W | 60 W | 91.92 W | 100.8 W (100W S) |
| Voltage accuracy | 5 V | ± 2.0 % | | - | - | |
| | 12 V | ± 1.0 % | | | ± 2.0 % | |
| | 15 V | | | | ± 1.0 % | |
| | 24 V | | | | | |
| Line regulation | | ±0.5 % | | | | |
| Load regulation | | ±1.0 % | | | | |
| Voltage regulation span (VDC) | 5 V | 5.0 V ~ 5.5 V | | - | - | |
| | 12 V | 10.8 V ~ 13.8 V | | | 12 ~ 13 V | |
| | 15 V | 13.5 V ~ 18 V | | | 15 ~ 17 V | |
| | 24 V | 21.6 V ~ 28 V | | | 23.6 ~ 25.8 V | 21.6 ~ 29 V (100W S) |
| Rated output current | 5 V | 2.4 A | 6 A | - | - | |
| | 12 V | 1.25 A | 2.1 A | 4.5 A | 7.1 A | |
| | 15 V | 1 A | 2 A | 4 A | 6.1 A | |
| | 24 V | 0.63 A | 1.5 A | 2.5 A | 3.8 A | 4.2 A (100W S) |
| Rated continuous loading | 5 V | 0 ~ 2.4 A | 0 ~ 6.0 A | - | - | |
| | 12 V | 0 ~ 1.25 A | 0 ~ 2.1 A | 0 ~ 4.5 A | 0 ~ 7.1 A | |
| | 15 V | 0 ~ 1 A | 0 ~ 2 A | 0 ~ 2.5 A | 0 ~ 6.13 A | |
| | 24 V | 0 ~ 0.63 A | 0 ~ 1.5 A | 0 ~ 2.5 A | 0 ~ 3.83 A | 0 ~ 4.2 A (100W S) |
| Ripple and noise (at 25°C) | 5 V | ≤ 80 mV | ≤ 100 mV | | - | |
| | 12 V | ≤ 120 mV | | | | |
| | 15 V | | | | | |
| | 24 V | ≤ 150 mV | | | | |
| Hold up time 115 VAC 230 VAC | | ≤ 10 ms ≤ 20 ms | | | | |
| Set-up time 115 VAC 230 VAC | | ≤ 2000 ms ≤ 1000 ms | | | | |
| Rise time | | ≤ 100 ms | | | | |
| Turn-on overshoot | | < 5 % | | | | |
| Overshoot and undershoot | | < 5 % | | | | |
| Series operation | | Yes | | | | |
| Parallel operation | | No | | | | |
| Power boost | | No | | | | |

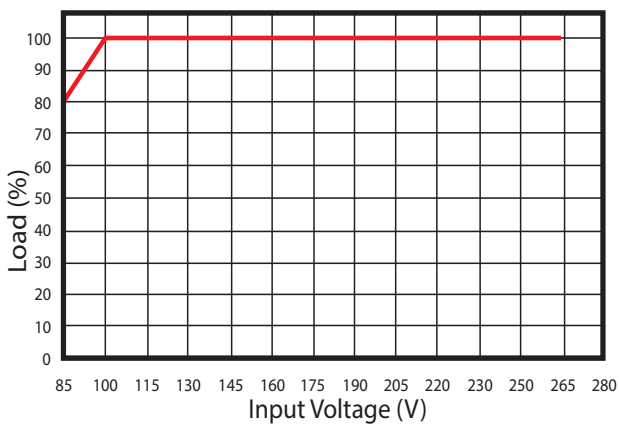
Performance

▶ Current derating

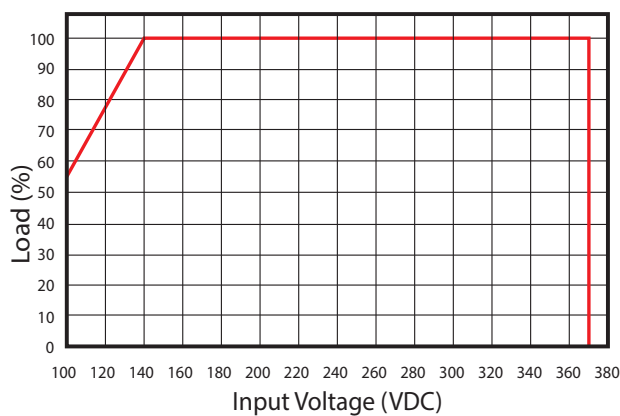
SPMA...151



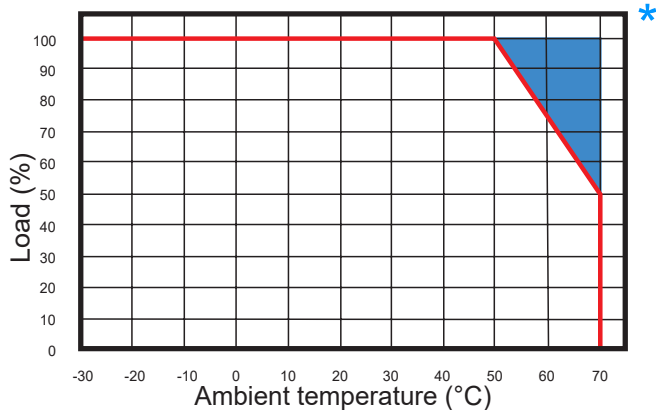
SPMA...5/12/15...151



SPMA24151

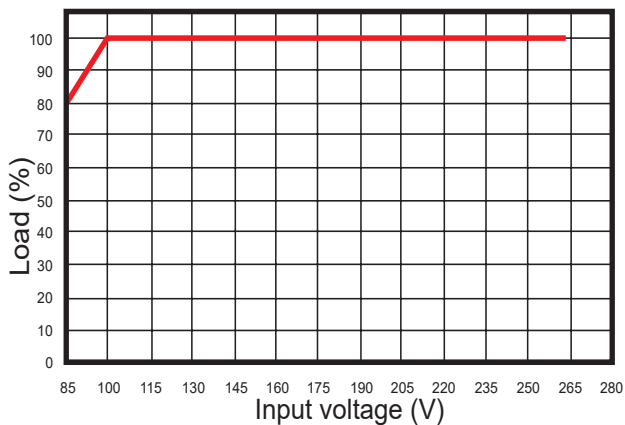


SPMA...301

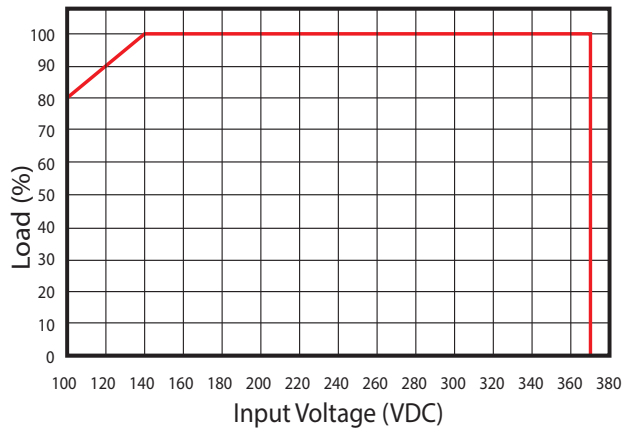


Current derating

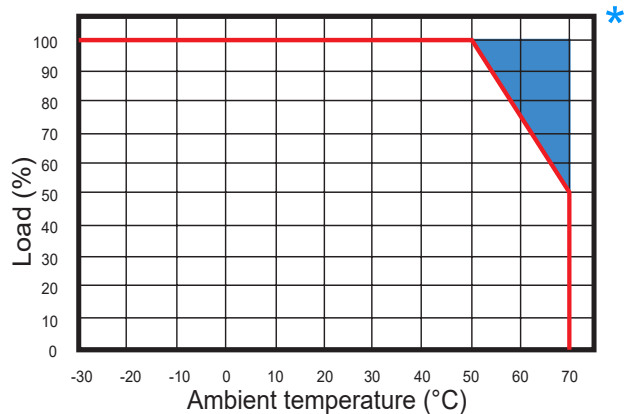
SPMA...5/12/15...301



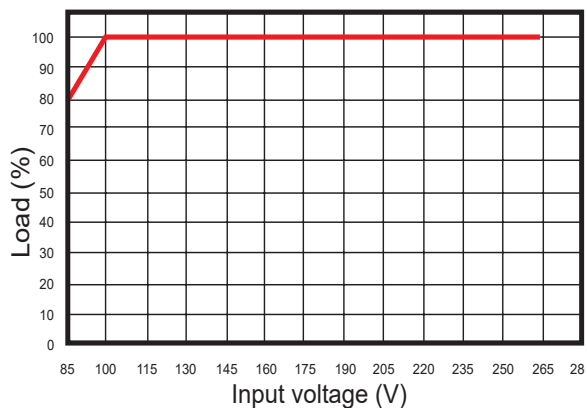
SPMA24301



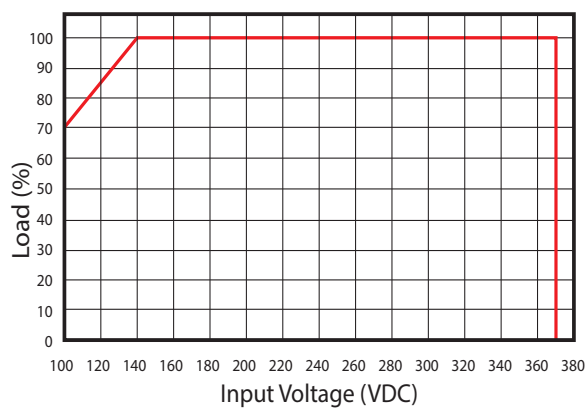
SPMA...601



SPMA...12/15...601

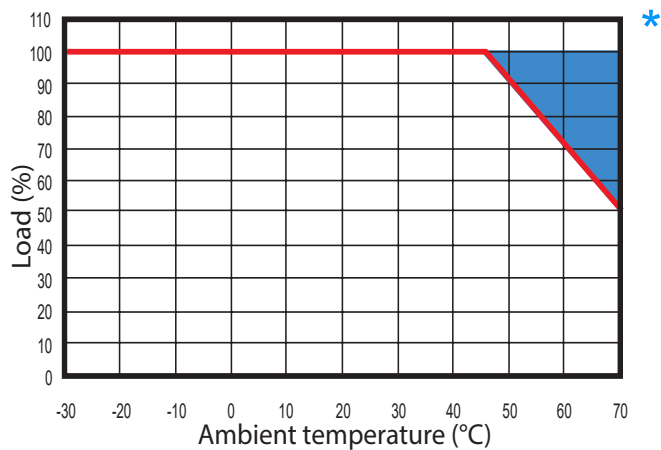


SPMA24601

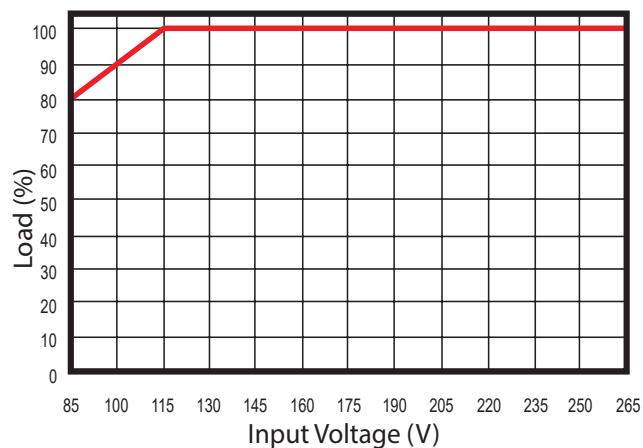


Current derating

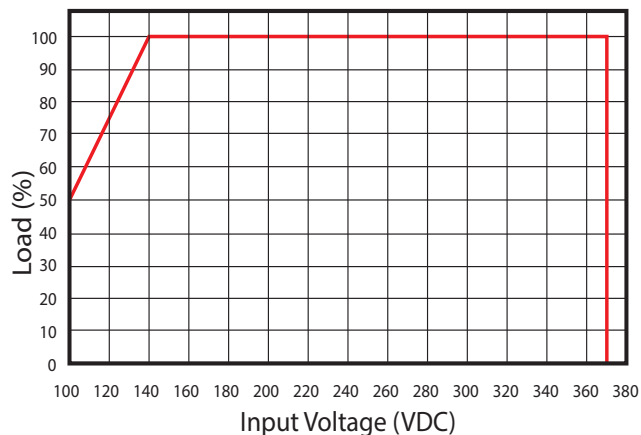
SPMA...1001 / SPMA...1001S



SPMA...12/15...1001



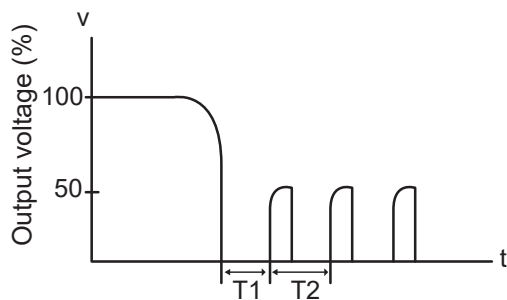
SPMA241001 / SPMA241001S



* Power supply components may degrade, or be damaged, when the power supply is continuously used within the shaded region, refer to the graph.

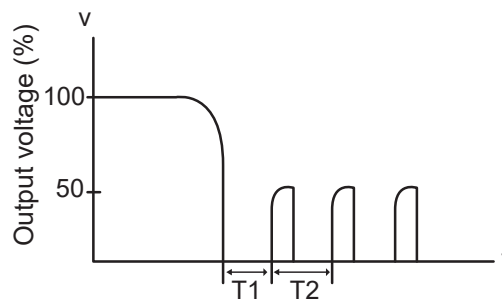
Typical current limited curves

SPMA...151 @ 110 VAC



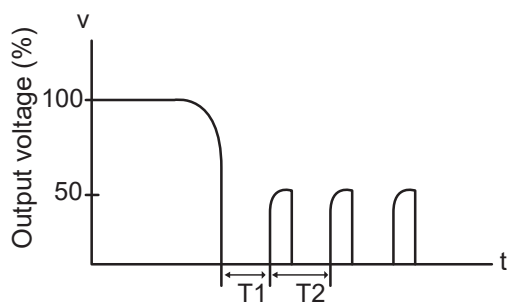
Typ T1: 480 ms, Typ T2: 520 ms

SPMA...151 @ 230 VAC



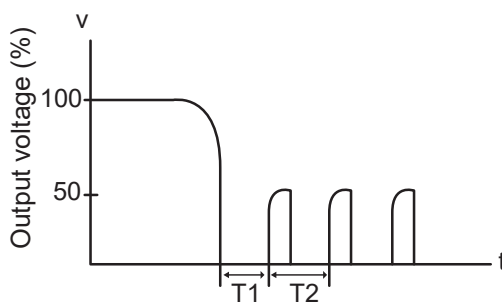
Typ T1: 480 ms, Typ T2: 520 ms

SPMA...301 / SPMA...601 / SPMA...1001 @ 110 VAC



Typ T1: 1100 ms, Typ T2: 1200 ms

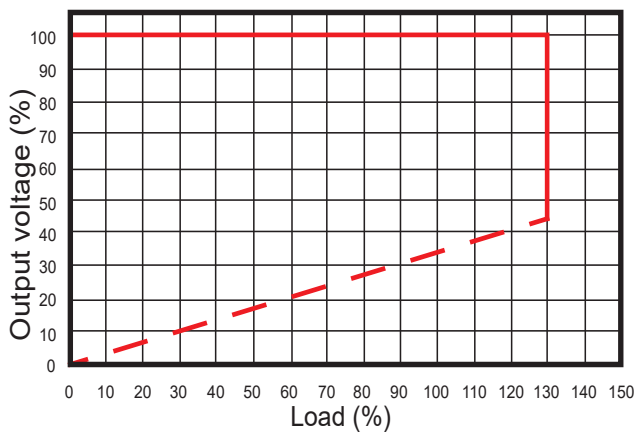
SPMA...301 / SPMA...601 / SPMA...1001 @ 230 VAC



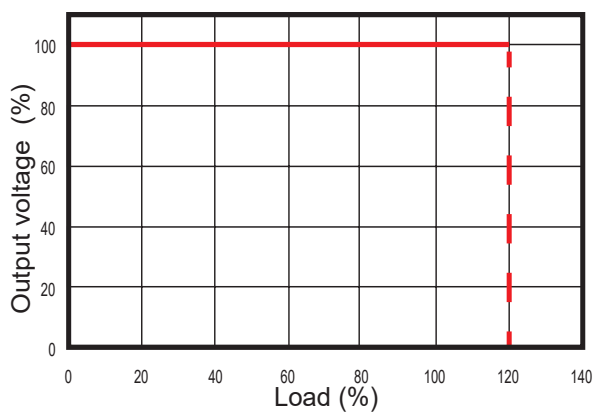
Typ T1: 1100 ms, Typ T2: 1200 ms

Output characteristics

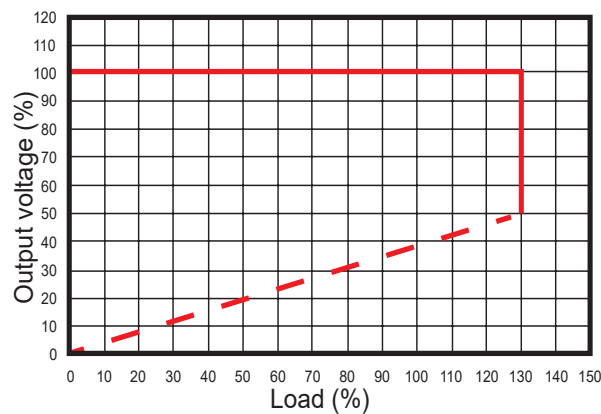
SPMA...151



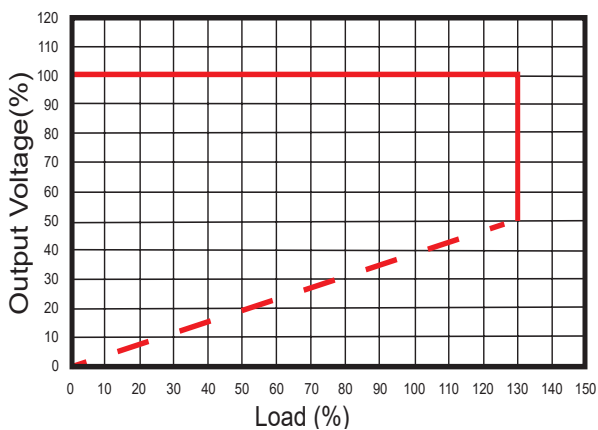
SPMA...301 @ 5 VDC



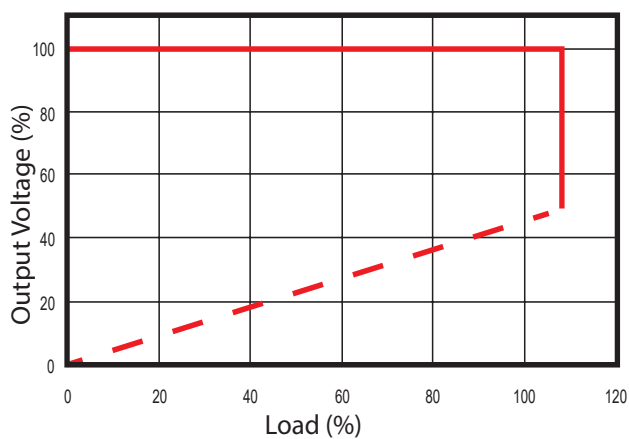
SPMA...301 @ 12 VDC, 15 VDC, 24 VDC



SPMA...601

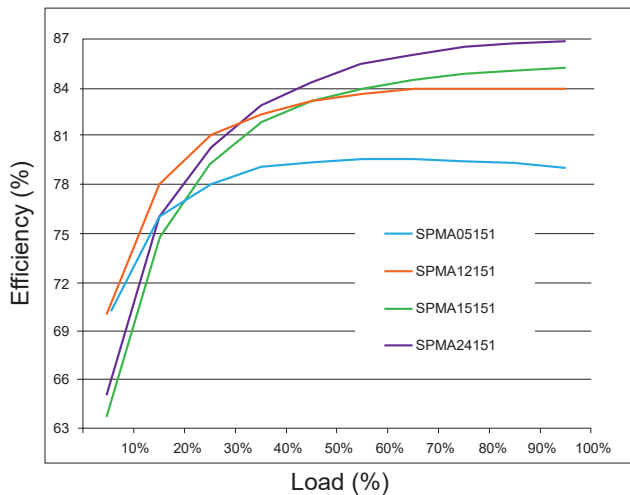


SPMA...1001

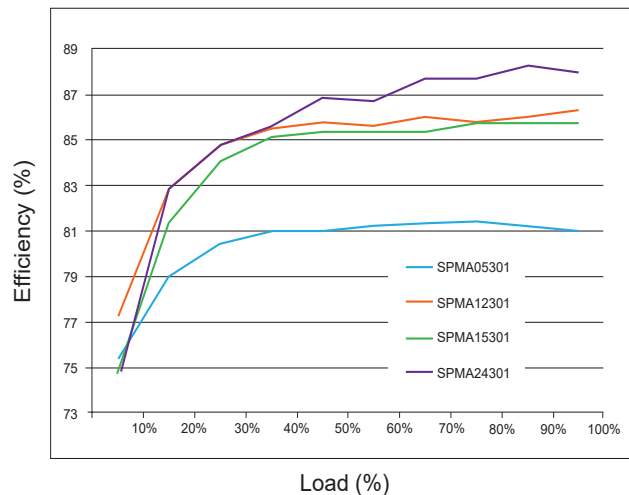


Typical efficiency curves

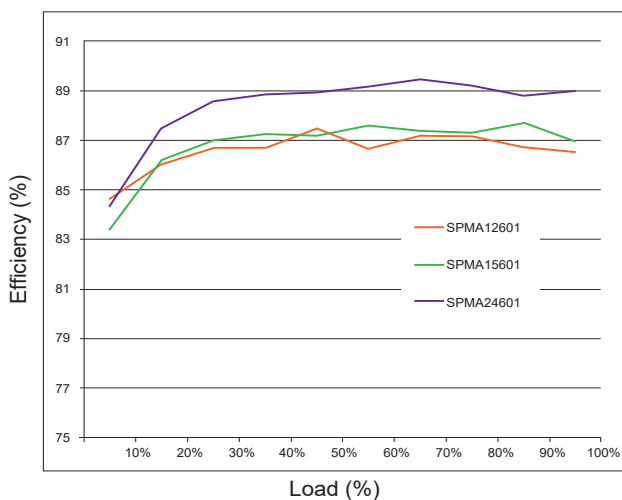
SPMA...151



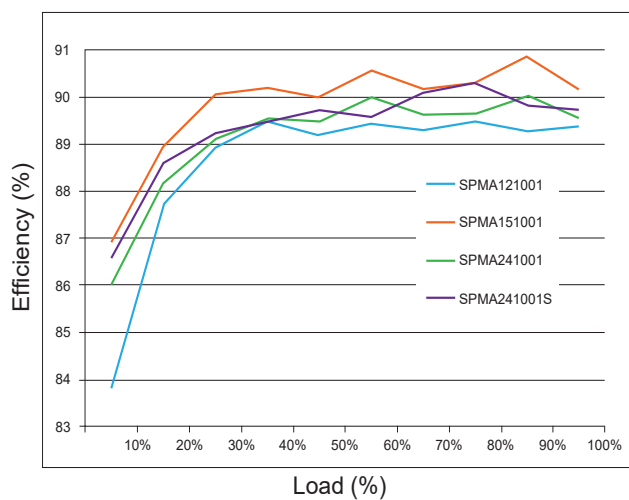
SPMA...301



SPMA...601



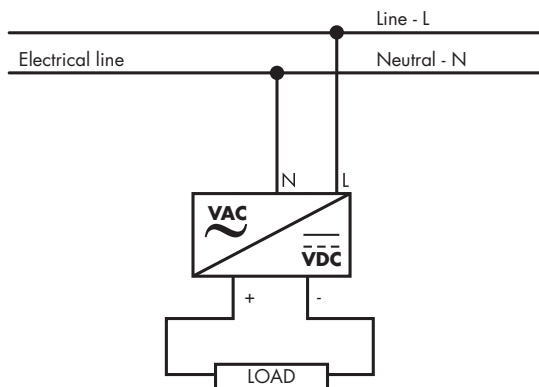
SPMA...1001



Installation

| | |
|--------------------------------|---------------------------------------|
| Ventilation and cooling | Cooling by free air convection |
|--------------------------------|---------------------------------------|

Wiring diagram

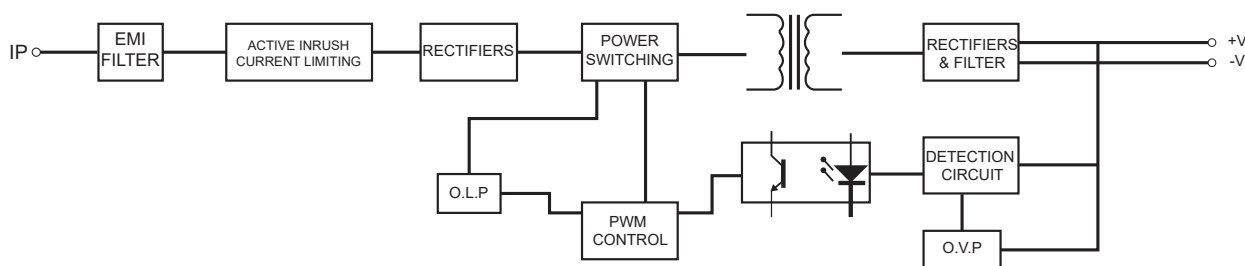


Connection specification

| | | SPMA...151 | SPMA...301 | SPMA...601 | SPMA...1001 |
|--|--------|---------------------------|------------|------------|-------------|
| Terminal type | Input | screw terminals | | | |
| | Output | | | | |
| Screw driver blade | | 3.5 mm slotted or Philips | | | |
| Tightening torque (recommended) | | 0.4 Nm | | | |
| Flexible conductor cross section max - min | | 0.5 - 2.5 mm ² | | | |
| Conductor cross section AWG min - max | | 22 - 12 AWG | | | |
| Rigid conductor cross-section min - max | | 0.5 - 2.5 mm ² | | | |
| Max wire diameter | | 2.05 mm | | | |

Block diagram

SPMA...151, SPMA...301, SPMA...601, SPMA...1001



Troubleshooting

▶ Signaling and controls

| | | |
|---------------------------------------|------|--|
| DC OK LED | | Yes |
| DC OK output type | | LED (green) |
| DC OK threshold (green colour) | 5 V | Output voltage \geq 90% of rated output voltage |
| | 12 V | |
| | 15 V | |
| | 24 V | |
| Alarm threshold (red colour) | | Output voltage \leq 80% of rated output voltage, or overload |

Operating description

▶ Control and protection

| | | SPMA...151 | SPMA...301 | SPMA...601 | SPMA...1001 | |
|--|------|--|--|---|--|--------------------|
| Overvoltage protection | 5 V | 5.8 ~ 7.5 V | | | - | - |
| | 12 V | 14.2 ~ 16.5 V | 15 ~ 18 V | 14.5 ~ 17.5 V | 14.2 ~ 16.2 V | |
| | 15 V | 18 ~ 20 V | 18.8 ~ 22.5 V | 18.8 ~ 22.5 V | 18.8 ~ 22.5 V | |
| | 24 V | 29 ~ 33 V | 30 ~ 36 V | | 30 ~ 36 V | 30 ~ 36 V (100W S) |
| Overvoltage protection type | | Shut off o/p voltage, re-power on | | | | |
| Overload protection and protection type | | 110% ~ 150% of rated output current, constant current, auto recovery | 110% ~ 150% of rated output current, constant current, auto recovery (12 V / 15 V / 24 V) 110% ~ 150% of rated output current, hiccup mode, auto recovery (5 V) | 110% ~ 160% of rated output current, constant current, auto recovery (12 V / 15 V / 24 V) 110% ~ 160% of rated output current, hiccup mode, autor recovery (5 V) | 110% ~ 150% (100W S) 102% ~ 110% of rated output current, constant current, auto recovery | |
| Short circuit protection | | Long-term mode, auto recovery | | | | |