

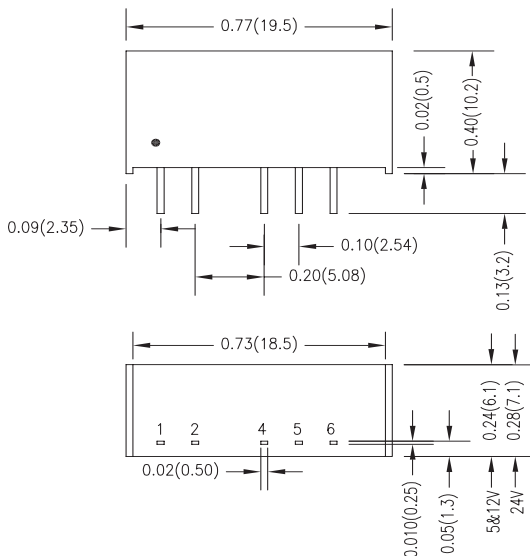
- Efficiency up to 88%
- 1000VDC Isolation
- MTBF > 2,000,000 Hours
- RoHS Compliant



# 1 Watt SPX Single and Dual Series



| Model Number | Voltage       |                |        | Current              |                       |             |             | Load Regulation<br>% (Max) | Input<br>Overvoltage<br>(1000ms)<br>Max (VDC) | Efficiency<br>@ Max<br>Load (%)<br>Typ) | Capacitive<br>Load<br>Max<br>(Dual each<br>output) |
|--------------|---------------|----------------|--------|----------------------|-----------------------|-------------|-------------|----------------------------|---|---|--|
|              | Input         |                | Output | Input                |                       | Output      |             |                            |   |   |  |
|              | Nom.<br>(VDC) | Range<br>(VDC) | (VDC)  | @ No<br>Load<br>(mA) | @ Max<br>Load<br>(mA) | Min<br>(mA) | Max<br>(mA) |                            |   |   |  |
| SPX1F5S5     | 5             | 4.5 - 5.5      | 5      | 30                   | 238                   | 4           | 200         | 6.5                        | 9   | 84                                      | 220 µF   |
| SPX1F5S9     | 5             | 4.5 - 5.5      | 9      | 30                   | 228                   | 2           | 110         | 5                          | 9   | 87                                      | 220 µF   |
| SPX1F5S12    | 5             | 4.5 - 5.5      | 12     | 30                   | 232                   | 1.5         | 84          | 5.2                        | 9   | 87                                      | 220 µF   |
| SPX1F5S15    | 5             | 4.5 - 5.5      | 15     | 30                   | 230                   | 1           | 67          | 5                          | 9   | 87.5                                    | 220 µF   |
| SPX1F5D5     | 5             | 4.5 - 5.5      | ±5     | 30                   | 237                   | ±2          | ±100        | 5.2                        | 9   | 84.5                                    | 100 µF   |
| SPX1F5D9     | 5             | 4.5 - 5.5      | ±9     | 30                   | 234                   | ±1          | ±56         | 4.2                        | 9   | 86                                      | 100 µF   |
| SPX1F5D12    | 5             | 4.5 - 5.5      | ±12    | 30                   | 233                   | ±0.8        | ±42         | 4.6                        | 9   | 86.5                                    | 100 µF   |
| SPX1F5D15    | 5             | 4.5 - 5.5      | ±15    | 30                   | 236                   | ±0.7        | ±34         | 4.5                        | 9   | 86.5                                    | 100 µF   |
| SPX1F12S5    | 12            | 10.8 - 13.2    | 5      | 12                   | 99                    | 4           | 200         | 5                          | 18  | 84                                      | 220 µF   |
| SPX1F12S9    | 12            | 10.8 - 13.2    | 9      | 12                   | 95                    | 2           | 110         | 3.4                        | 18  | 86.5                                    | 220 µF   |
| SPX1F12S12   | 12            | 10.8 - 13.2    | 12     | 12                   | 95                    | 1.5         | 84          | 3.4                        | 18  | 88.5                                    | 220 µF   |
| SPX1F12S15   | 12            | 10.8 - 13.2    | 15     | 12                   | 95                    | 1           | 67          | 2.7                        | 18  | 88                                      | 220 µF   |
| SPX1F12D5    | 12            | 10.8 - 13.2    | ±5     | 12                   | 99                    | ±2          | ±100        | 3.9                        | 18  | 84.5                                    | 100 µF   |
| SPX1F12D9    | 12            | 10.8 - 13.2    | ±9     | 12                   | 98                    | ±1          | ±56         | 2.8                        | 18  | 86                                      | 100 µF   |
| SPX1F12D12   | 12            | 10.8 - 13.2    | ±12    | 12                   | 95                    | ±0.8        | ±42         | 2.9                        | 18  | 88.5                                    | 100 µF   |
| SPX1F12D15   | 12            | 10.8 - 13.2    | ±15    | 12                   | 94                    | ±0.7        | ±34         | 2.6                        | 18  | 87.5                                    | 100 µF   |
| SPX1F24S5    | 24            | 21.6 - 26.4    | 5      | 11                   | 50                    | 4           | 200         | 3.7                        | 30  | 84                                      | 220 µF   |
| SPX1F24S9    | 24            | 21.6 - 26.4    | 9      | 11                   | 48                    | 2           | 110         | 2.5                        | 30  | 86.5                                    | 220 µF   |
| SPX1F24S12   | 24            | 21.6 - 26.4    | 12     | 11                   | 48                    | 1.5         | 84          | 2.4                        | 30  | 87.5                                    | 220 µF   |
| SPX1F24S15   | 24            | 21.6 - 26.4    | 15     | 11                   | 48                    | 1           | 67          | 2.3                        | 30  | 87.5                                    | 220 µF   |
| SPX1F24D5    | 24            | 21.6 - 26.4    | ±5     | 11                   | 50                    | ±2          | ±100        | 3.7                        | 30  | 83.5                                    | 100 µF   |
| SPX1F24D9    | 24            | 21.6 - 26.4    | ±9     | 11                   | 49                    | ±1          | ±56         | 2.5                        | 30  | 86                                      | 100 µF   |
| SPX1F24D12   | 24            | 21.6 - 26.4    | ±12    | 11                   | 48                    | ±0.8        | ±42         | 2.4                        | 30  | 87                                      | 100 µF   |
| SPX1F24D15   | 24            | 21.6 - 26.4    | ±15    | 11                   | 49                    | ±0.7        | ±34         | 2.3                        | 30  | 87                                      | 100 µF   |



| Pin Connections |        |        |
|-----------------|--------|--------|
| Pin             | Single | Dual   |
| 1               | +Vin   | +Vin   |
| 2               | -Vin   | -Vin   |
| 4               | -Vout  | -Vout  |
| 5               | No Pin | Common |
| 6               | +Vout  | +Vout  |

Dimensions are inches (mm) unless noted

Tolerance: Inches      Millimeters

X.XX ±0.01      X.X ±0.25

X.XXX ±0.005      X.XX ±0.13

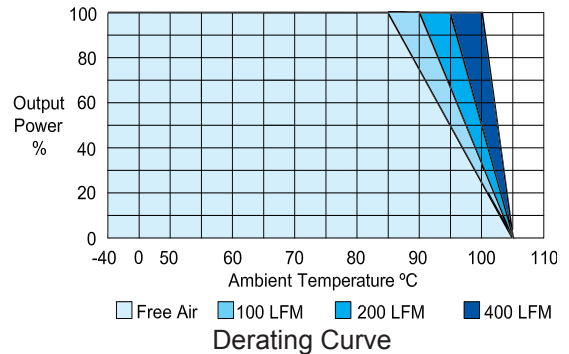
Pin      ±0.002      ±0.05

See Model Selection Table for Model Specific Parameters

| Input Parameters                                      | Min                                    | Typ   | Max   | Units   |
|---|--|---|-------|---------|
| Reverse Polarity Input Current                        |  |   | 0.3   | A       |
| Switching Frequency                                   | 50                                     | 100   | 120   | kHz     |
| Input Filter  | Internal Capacitor                     |   |       |         |
| Output Parameters                                     | Min                                    | Typ   | Max   | Units   |
| Output Voltage Balance<br>Dual Output, Balanced Loads |  | ±0.1  | ±1.0  | %       |
| Load Regulation<br>I <sub>o</sub> = 20% to 100%       | See Model Selection Guide              |   |       | %       |
| Line Regulation<br>for V <sub>in</sub> Change of 1%   |  | ±1.05   | ±1.2  | %       |
| Ripple & Noise (20MHz)                                |  | 30  | 60    | mV P-P  |
| Temperature Coefficient                               |  | ±0.01   | ±0.02 | % / °C  |
| Short Circuit Protection                              | 0.5 Second Max                         |   |       |         |
| General Specifications                                | Min                                    | Typ   | Max   | Units   |
| Isolation Voltage,<br>60 seconds                      | 1000                                   |   |       | VDC     |
| Isolation Resistance<br>500VDC                        | 1000                                   |   |       | Mohms   |
| Isolation Capacitance,<br>100kHz, 1V                  | 40                                     | 60  | 120   | pF      |
| Operating Temperature (Ambient)                       | -40                                    |   | +85   | °C      |
| Operating Temperature (Case)                          | -40                                    |   | +90   | °C      |
| Storage Temperature                                   | -50                                    |   | +125  | °C      |
| Humidity  |  |   | 95    | %       |
| MTBF MIL-HDBK-217F @25°C,<br>Ground Benign            | 2000                                   |   |       | K Hours |
| Cooling   | Free-Air Convection                    |   |       |         |
| Case Size   | 5V & 12V                               | 0.77 x 0.24 x 0.40 inches<br>19.5 x 6.1 x 10.2 mm |       |         |
|   | 24V                                    | 0.77 x 0.28 x 0.40 inches<br>19.5 x 7.1 x 10.2 mm |       |         |
| Case Material   | Non Conductive Black Plastic (UL94V-0) |   |       |         |
| Weight  | 5V & 12V                               | 2.2g  |       |         |
|   | 24V                                    | 2.6g  |       |         |

Notes:

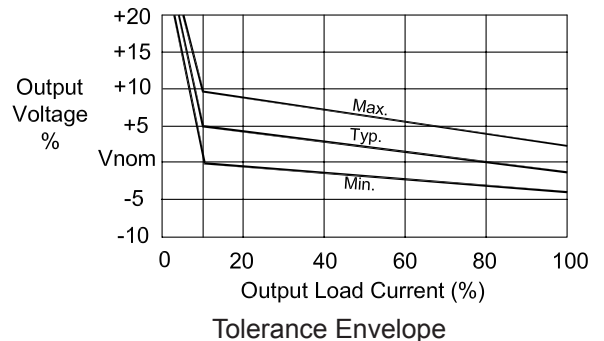
- Specifications typical at Ta=+25°C, resistive load, nominal input voltage, full rated output current unless otherwise noted.
- ConTech power converters require a minimum output loading to maintain specified regulation. Operation under no-load conditions will not damage these modules; however, they may not meet all specifications listed.
- The series has a limitation of a maximum connected capacitance at the output. The power module may be operated in current limiting mode during start-up, affecting the ramp-up and the startup time.
- When measuring peak-to-peak output noise, use a Cout 0.33µF ceramic capacitor. Scope measurement should be made by using a BNC socket, measurement bandwidth is 0-20MHz. Position the load between 2" and 2.5" from the converter.
- Water washability - ConTech DC/DC converters are designed to withstand most solder/wash processes. Careful attention should be used when assessing the applicability in your specific manufacturing process. Converters are not hermetically sealed.
- See ConTech website for Definition of Terms, Application Notes, and Test Setups and Parameters. [www.ConTech-us.com/appnotes.html](http://www.ConTech-us.com/appnotes.html).
- Specifications subject to change without notice.
- See ConTech website [www.ConTech-us.com/pdf/rohs.pdf](http://www.ConTech-us.com/pdf/rohs.pdf) for RoHS Statement.



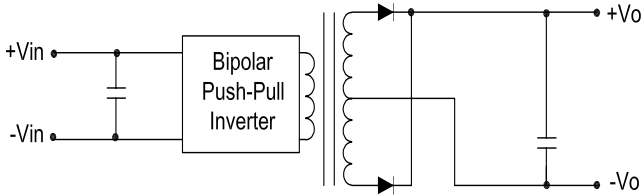
To avoid exceeding the maximum temperature rating of the components inside the power module, the case temperature must be kept below 90°C.

| Input Fuse Selection Table |                  |
|----------------------------|------------------|
| 5V Input                   | 500 mA Slow-Blow |
| 12V Input                  | 200 mA Slow-Blow |
| 24V Input                  | 100 mA Slow-Blow |

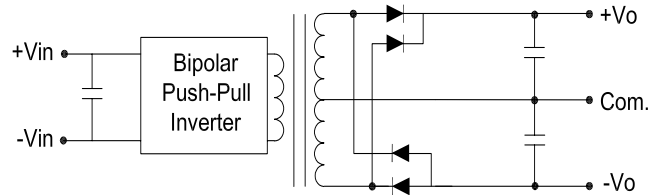
External fusing should be used for system protection due to a catastrophic failure. See ConTech website for Fusing Application Notes to determine the correct fuse.



# Block Diagrams



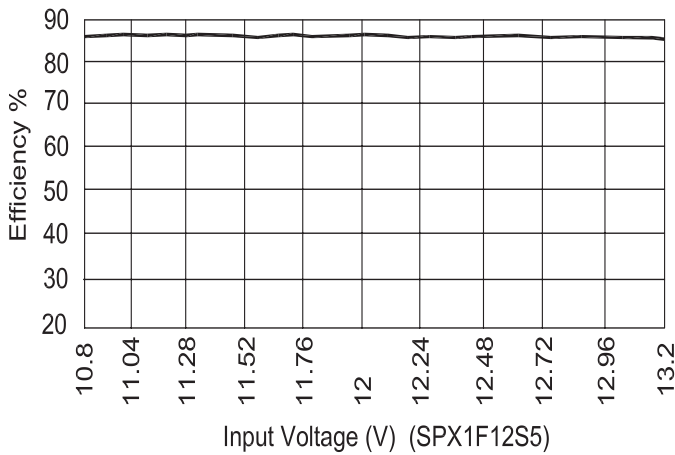
Single Output Block Diagram



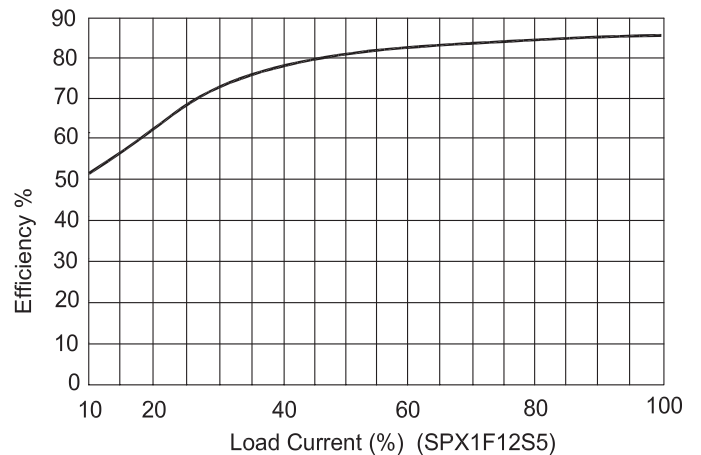
Dual Output Block Diagram

# Efficiency Curves

## Single Output

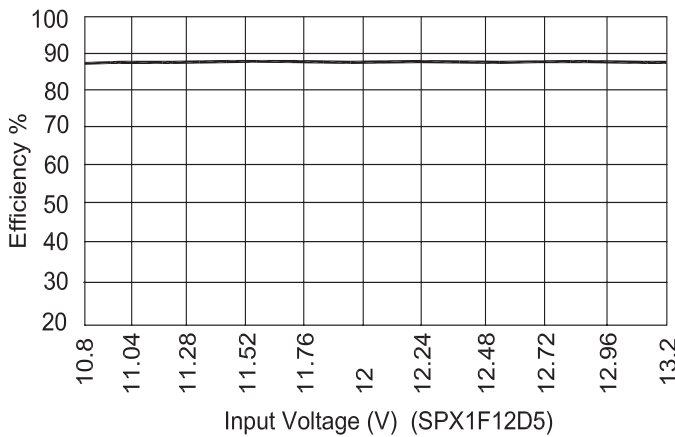


Efficiency vs Input Voltage

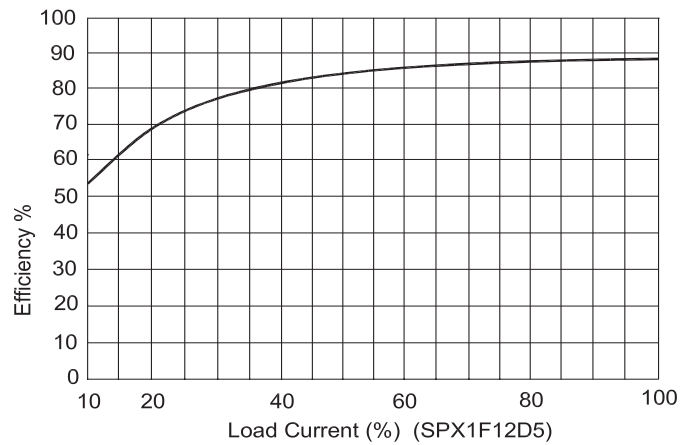


Efficiency vs Output Load

## Dual Output



Efficiency vs Input Voltage



Efficiency vs Output Load

