

## SB\_LS-1WR Series

1W, FIXED INPUT, ISOLATED & UNREGULATED  
DUAL/SINGLE OUTPUT DC-DC CONVERTER



### FEATURES

- SIP Package
- Output Short Circuit Protection
- Low Isolation Capacitance
- 1000VDC Isolation Voltage
- Operating Temperature: -40°C~+85°C
- Internal SMD construction
- Industry Standard Pinout
- RoHS Compliance

### APPLICATIONS

The SA\_S-1WR & SB\_LS-1WR Series are specially designed for applications where a group of polar power supplies are isolated from the input power supply in a distributed power supply system on a circuit board.

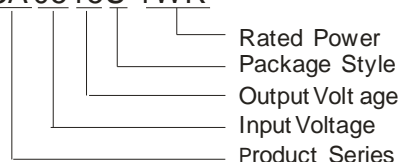
These products apply to:

- 1) Where the voltage of the input power supply is fixed (voltage variation  $\leq \pm 10\%$ );
- 2) Where isolation is necessary between input and output (isolation voltage  $\leq 1000\text{VDC}$ );
- 3) Where the regulation of the output voltage and the output ripple noise are not demanding.

Such as: purely digital circuits, ordinary low frequency analog circuits, and IGBT power device driving circuits.

### MODEL SELECTION

SA0515S-1WR



### PRODUCT PROGRAM

| Part Number  | Input         |           | Output        |              |          | Efficiency (%) (Typ.) |          |    |
|--------------|---------------|-----------|---------------|--------------|----------|-----------------------|----------|----|
|              | Voltage (VDC) |           | Voltage (VDC) | Current (mA) |          |                       |          |    |
|              | Nominal       | Range     |               | Max          | Min      |                       |          |    |
| SB0303LS-1WR | 3.3           | 3.0-3.6   | 3.3           | 303          | 30       | 68                    |          |    |
| SB0305LS-1WR |               |           | 5             | 200          | 20       | 70                    |          |    |
| SA0505S-1WR  | 5             | 4.5-5.5   | $\pm 5$       | $\pm 100$    | $\pm 10$ | 69                    |          |    |
| SA0509S-1WR  |               |           | $\pm 9$       | $\pm 56$     | $\pm 5$  | 73                    |          |    |
| SA0512S-1WR  |               |           | $\pm 12$      | $\pm 42$     | $\pm 4$  | 75                    |          |    |
| SA0515S-1WR  |               |           | $\pm 15$      | $\pm 34$     | $\pm 3$  | 75                    |          |    |
| SA0524S-1WR  |               |           | $\pm 24$      | $\pm 21$     | $\pm 2$  | 76                    |          |    |
| SB0505LS-1WR |               |           | 5             | 200          | 20       | 73                    |          |    |
| SB0509LS-1WR |               |           | 9             | 112          | 11       | 73                    |          |    |
| SB0512LS-1WR |               |           | 12            | 83           | 8        | 75                    |          |    |
| SB0515LS-1WR |               |           | 15            | 67           | 6        | 75                    |          |    |
| SB0524LS-1WR |               |           | 24            | 42           | 4        | 76                    |          |    |
| SA1205S-1WR  | 12            | 10.8-13.2 | $\pm 5$       | $\pm 100$    | $\pm 10$ | 70                    |          |    |
| SA1212S-1WR  |               |           | $\pm 12$      | $\pm 42$     | $\pm 4$  | 75                    |          |    |
| SA1215S-1WR  |               |           | $\pm 15$      | $\pm 34$     | $\pm 3$  | 76                    |          |    |
| SB1205LS-1WR |               |           | 5             | 200          | 20       | 73                    |          |    |
| SB1209LS-1WR |               |           | 9             | 112          | 11       | 72                    |          |    |
| SB1212LS-1WR |               |           | 12            | 83           | 8        | 75                    |          |    |
| SB1215LS-1WR |               |           | 15            | 67           | 6        | 76                    |          |    |
| SA1505S-1WR  |               |           | 15            | 13.5-16.5    | $\pm 5$  | $\pm 100$             | $\pm 10$ | 70 |
| SB1515LS-1WR |               |           |               |              | 15       | 67                    | 6        | 75 |
| SA2405S-1WR  |               |           | 24            | 21.6-26.4    | $\pm 5$  | $\pm 100$             | $\pm 10$ | 68 |
| SA2412S-1WR  | $\pm 12$      | $\pm 42$  |               |              | $\pm 4$  | 76                    |          |    |
| SA2415S-1WR  | $\pm 15$      | $\pm 34$  |               |              | $\pm 3$  | 76                    |          |    |
| SB2403LS-1WR | 3.3           | 303       |               |              | 30       | 70                    |          |    |
| SB2405LS-1WR | 5             | 200       |               |              | 20       | 70                    |          |    |
| SB2412LS-1WR | 12            | 83        |               |              | 8        | 75                    |          |    |
| SB2415LS-1WR | 15            | 67        |               |              | 6        | 76                    |          |    |

### COMMON SPECIFICATIONS

| Item                      | Test conditions                | Min                        | Typ | Max | Units  |
|---------------------------|--------------------------------|----------------------------|-----|-----|--------|
| Storage humidity          |                                |                            |     | 95  | %      |
| Operating Temperature     |                                | -40                        |     | 85  | °C     |
| Storage Temperature       |                                | -55                        |     | 125 |        |
| Temp. rise at full load   |                                |                            | 20  | 30  |        |
| Lead temperature          | 1.5mm from case for 10 seconds |                            |     | 300 |        |
| Cooling                   |                                | Free air convection        |     |     |        |
| Case material             |                                | Plastic (UL94-V0)          |     |     |        |
| Short circuit protection* |                                | Continuous, ,Auto-recovery |     |     |        |
| MTBF                      |                                | 1940                       |     |     | Khours |

| INPUT SPECIFICATIONS                 |                 |     |        |     |       |
|--------------------------------------|-----------------|-----|--------|-----|-------|
| Item                                 | Test conditions | Min | Typ    | Max | Units |
| Input current<br>(No load/Full load) | 5V input        |     | 30/260 |     | mA    |
|                                      | 12V input       |     | 12/110 |     |       |
|                                      | 15V input       |     | 12/100 |     |       |
|                                      | 24V input       |     | 7/55   |     |       |
| Surge voltage<br>(1S max)            | 5V input        |     |        | 9   | V     |
|                                      | 12V input       |     |        | 18  |       |
|                                      | 15V input       |     |        | 21  |       |
|                                      | 24V input       |     |        | 30  |       |

| OUTPUT SPECIFICATIONS   |                                     |      |      |       |       |
|-------------------------|-------------------------------------|------|------|-------|-------|
| Item                    | Test conditions                     | Min. | Typ. | Max.  | Units |
| Output power            |                                     | 0.1  |      | 1     | W     |
| Line regulation         | For Vin change of ±1%               |      | ±1.1 | ±1.5  | %     |
| Load regulation         | 10% to 100% load                    |      | 10   | 20    |       |
| Output voltage accuracy | Follow the tolerance envelope graph |      |      |       |       |
| Temperature drift       | 100% full load                      |      |      | ±0.03 | %/°C  |
| Ripple & Noise*         | 20MHz Bandwidth                     |      | 100  | 200   | mVp-p |
| Switching frequency     | Full load, nominal input            |      | 100  |       | kHz   |

\*Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

| ISOLATION SPECIFICATIONS |                                  |      |     |     |       |
|--------------------------|----------------------------------|------|-----|-----|-------|
| Item                     | Test conditions                  | Min  | Typ | Max | Units |
| Isolation voltage        | Tested for 1 minute and 1 mA max | 1000 |     |     | VDC   |
| Isolation resistance     | Test at 500VDC                   | 1000 |     |     | MΩ    |
| Isolation Capacitance    |                                  |      | 6   | 15  | PF    |

### APPLICATION NOTE

#### ① Requirement on output load

To ensure this module can operate efficiently and reliably, During operation, the minimum output load **could not be less than 10% of the full load**. If the actual output power is very small, please connect a resistor with resistance of 10% rated power at the output end in parallel, or use our company's products with a lower rated output power

#### ② Overload Protection

Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is to connect a slow-blow fuse in series at the input end or add a circuit breaker to the circuit.

#### ③ Recommended testing and application circuit

If you want to further decrease the input ripple or the input inrush current, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, see (Figure 1).

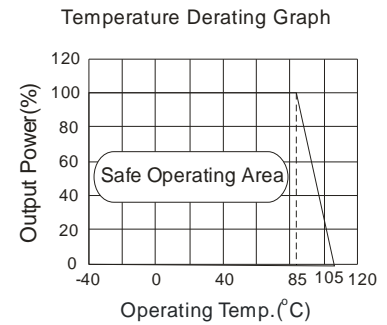
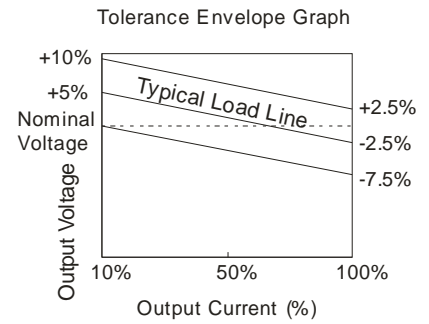
It should also be noted that the inductance and the frequency of the "LC" filtering network should be staggered with the DC/DC frequency to avoid mutual interference. However, the capacitance of the output filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the recommended capacitance of its filter capacitor sees (Table 1).

#### ④ Output Voltage Regulation and Over-voltage Protection Circuit

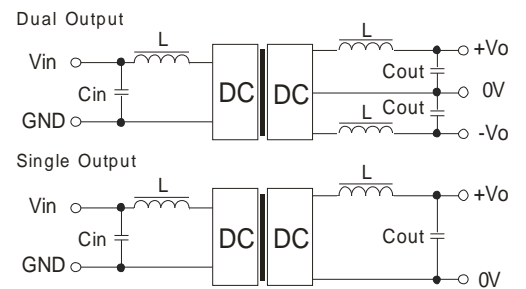
The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (Figure 2).

#### ⑤ No parallel connection or plug and play.

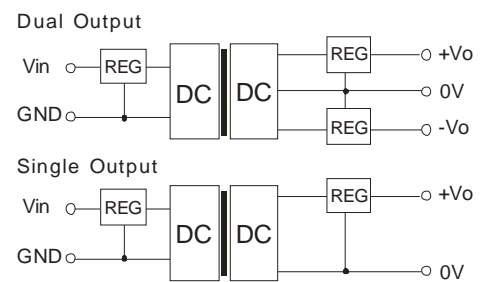
### TYPICAL CHARACTERISTICS



### RECOMMENDED CIRCUIT



(Figure 1)



(Figure 2)

#### Recommended capacitance (Table 1)

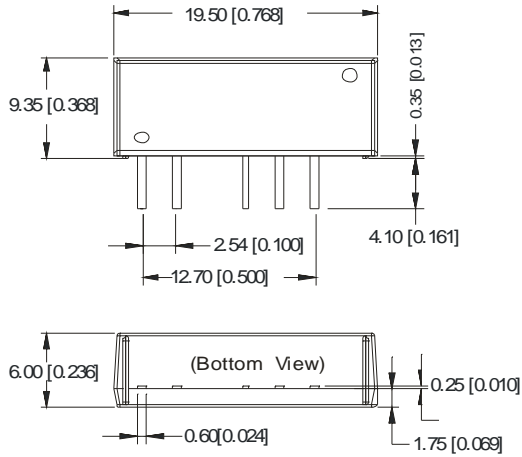
| Vin (VDC) | Cin (uF) | Single output (VDC) | Cout (uF) | Dual output (VDC) | Cout (uF) |
|-----------|----------|---------------------|-----------|-------------------|-----------|
| 5         | 4.7      | 5                   | 10        | ±5                | 4.7       |
| 12        | 2.2      | 9                   | 4.7       | ±9                | 2.2       |
| 15        | 2.2      | 12                  | 2.2       | ±12               | 1         |
| 24        | 1        | 15                  | 1         | ±15               | 0.47      |

1. The recommended external capacitance please use the ceramic capacitor;

2. For applications where output power is less than 0.5W in reality, external capacitors are not recommended.

# OUTLINE DIMENSIONS & PIN CONNECTIONS

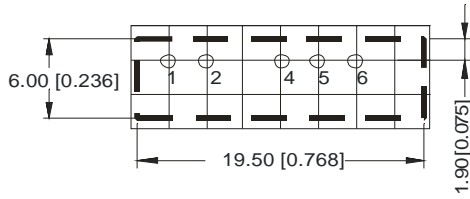
## MECHANICAL DIMENSIONS



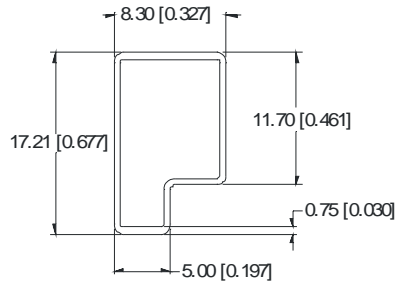
Note:  
 Unit: mm[inch]  
 Pinsection tolerances  $\pm 0.10\text{mm}[\pm 0.004\text{inch}]$   
 General tolerances:  $\pm 0.25\text{mm}[\pm 0.010\text{inch}]$

| FOOTPRINT DETAILS |          |           |
|-------------------|----------|-----------|
| PIN               | SA_S-1WR | SB_LS-1WR |
| 1                 | Vin      | Vin       |
| 2                 | GND      | GND       |
| 4                 | -Vo      | 0V        |
| 5                 | 0V       | No Pin    |
| 6                 | +Vo      | +Vo       |

## RECOMMENDED FOOTPRINT



## TUBE OUTLINE DIMENSIONS



Note:  
 Unit: mm[inch]  
 General tolerances  $\pm 0.50\text{mm}[\pm 0.020\text{inch}]$   
 L=530mm[20.866inch] Devices per tube quantity: 25pcs  
 L=220mm[8.661inch] Devices per tube quantity: 10pcs  
 Short tube inner package dimensions: 255\*170\*80mm  
 Short tube outer package dimensions: 375\*280\*270mm  
 Long tube inner package dimensions: 580\*200\*100mm  
 Long tube outer package dimensions(with two inner package box): 600\*215\*220mm  
 Long tube outer package dimensions(with three inner package box):600\*215\*325mm

Note:

1. Operation under minimum load will not damage the converter; However, they may not meet all specification listed, and that will reduce the life of product.
2. All specifications measured at Ta=25°C, humidity <75%, nominal input voltage and rated output load unless otherwise specified.
3. In this datasheet, all the test methods of indications are based on corporate standards.
4. Only typical models listed, other models may be different, please contact our technical person for more details.