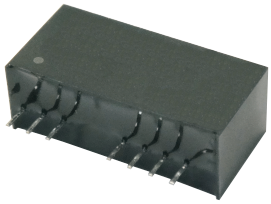
# SBW-2W Series

*2W 4:1 Regulated Single & Dual output*

## Features

- 9 Pin SIL
- Wide 4:1 Input Range
- Full SMD Technology
- 1500 VDC Isolation
- Continuous Short Circuit Protection
- Efficiency up to 85%
- -40°C ~ 75°C Operation Temperature Range
- Remote on/off Control



The SBW series is a family of cost effective 2W single & dual output DC-DC converters. These converters combine non-conductive black plastic package in a 9-pin SIL compatible case with high performance features such as 1500 VDC input/output isolation voltage, continuous short circuit protection with automatic restart and high line / load regulation. Wide range devices operate over 4:1 input voltage range providing stable output voltage. Devices are encapsulated using flame retardant resin. Input voltages of 24 and 48 with output voltage of 3.3, 5, 12, 15,±5,±12,±15 Vdc. High performance features include high efficiency operation up to 85% and output voltage accuracy of ±1% maximum.

All specifications typical at Ta=25°C, nominal input voltage and full load unless otherwise specified

### OUTPUT SPECIFICATIONS

| | | |
|---|---|---|
| Voltage Accuracy | | ±1% |
| Maximun Output Current | | See table |
| Line Regulation | | ±0.5%,max. |
| Load Regulation (1) | (From 10% to 100% Loading) | ±0.5%,max. |
| | (From 0% to 100% Loading) Vout=12V and 15V | ±0.5%,max. |
| | Vout=3.3V and 5V | ±1.0%,max. |
| Cross Regulation (Dual Output) (2) | | ±5% |
| Ripple & Noise (20 Mhz bandwidth)(3) | | 50mVpp,max. |
| Short Circuit Protection | | Indefinite(hiccup) (Automatic Recovery) |
| Temperature Coefficient | | ±0.002%/°C |
| Capacitive Load(4) | | See table |
| Transient Recovery Time (5) | | 300us, typ. |
| Transient Response Deviation(5) | | ±3%,max. |

### INPUT SPECIFICATIONS

| | |
|---|---|
| Voltage Range | See table |
| Start up Time(Nominal Vin and constant resistive load) | 10mS, typ. |
| Max. Input Current | See table |
| No-Load Input Current | See table |
| Input Filter | Capacitor |
| Input Reflected Ripple Current(6) | 20mA pk-pk |
| Remote on/off | |
| ON: | 0 ~ 0.6Vdc or open circuit |
| OFF: | 2.7~15.0Vdc |
| Off stand by input current(Nominal Vin) | 5mA max. |

### ABSOLUTE MAXIMUM RATINGS(7)

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

| | |
|---|---|
| Input Surge Voltage(100ms max) | |
| 24 Models | 50Vdc,max. |
| 48 Models | 100Vdc,max. |
| Soldering Temperature (1.5mm from case 10 sec. max.) | 260°C,max. |

### PHYSICAL SPECIFICATIONS

| | |
|---|---|
| Case Material | Non conductive black plastic |
| Potting Material | Epoxy (UL94V-0 rated) |
| Pin Material | C5191R-H Solder-coated |
| Weight | 6.5g,typ |
| Dimensions | 1.02''x0.36''x0.49'' |

### GENERAL SPECIFICATIONS

| | |
|---|---|
| Efficiency | See table,typ. |
| I/O Isolation Voltage (60 sec) | 1500Vdc |
| I/O Isolation Capacity | 500 pF,max. |
| I/O Isolation Resistance | 1000M Ohm,min. |
| Switching Frequency | 250kHz,typ. |
| Humidity | 95%relH |
| Reliability Calculated MTBF(MIL-HDBK-217 F) | >1.212 Mhrs@ 25°C |
| Safety Standard(designed to meet) | IEC60950 |

### ENVIRONMENT SPECIFICATIONS

| | |
|---|---|
| Operating Temperature | -40°C ~ +85°C(See Derating Curve) |
| | -40°C ~ +75°C(For 100% load) |
| Maximum Case Temperature | 100°C |
| Storage Temperature | -40°C~125°C |
| Cooling | Nature Convection |

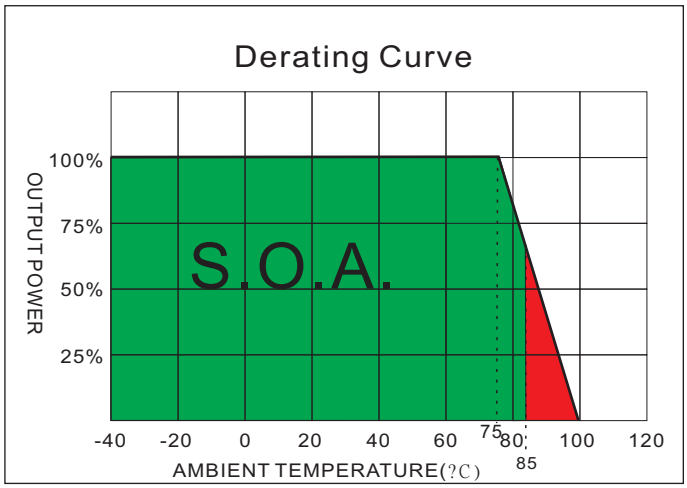
### EMC CHARACTERISTICS

| | | |
|---|---|---|
| Conducted Emissions (8) | EN55022 | CLASS A |
| Radiated Emissions | EN55022 | CLASS A |
| ESD | IEC 61000-4-2 | Perf. Criteria A |
| RS | IEC 61000-4-3 | Perf. Criteria A |
| EFT(9) | IEC 61000-4-4 | Perf. Criteria A |
| Surge(9) | IEC 61000-4-5 | Perf. Criteria B |
| CS | IEC 61000-4-6 | Perf. Criteria A |
| PFMF | IEC 61000-4-8 | Perf. Criteria A |

## PART NUMBER STRUCTURE

SBW - 24 05 SD 2

- SBW: Series Name W:wide range
- 24: Input Voltage Range **24** - 9 ~ 36V, **48** - 18 ~ 75V
- 05: Nominal Output Voltage **3R3** - 3.3V, **05** - 5V, **12** - 12V, **15** - 15V
- SD: Case Type **S** - SIP Single Output, **SD** - SIP Dual Output
- 2: Watt




# MODEL SELECTION GUIDE

| MODEL NUMBER | INPUT Voltage Range (Vdc) | INPUT Current No-Load (mA) | INPUT Current Full Load (mA) | OUTPUT Voltage (Vdc) | OUTPUT Current Min. load (mA) | OUTPUT Current Full load (mA) | EFFICIENCY @FL(%) | Capacitor Load(uF) |
|---|---|---|---|---|---|---|---|---|
| SBW-243R3S2 | 9-36 | 10 | 92 | 3.3 | 0 | 500 | 75 | 2200uF |
| SBW-2405S2 | 9-36 | 10 | 103 | 5 | 0 | 400 | 81 | 1000uF |
| SBW-2412S2 | 9-36 | 10 | 100 | 12 | 0 | 165 | 84 | 165uF |
| SBW-2415S2 | 9-36 | 10 | 98 | 15 | 0 | 135 | 85 | 100uF |
| SBW-483R3S2 | 18-75 | 5 | 46 | 3.3 | 0 | 500 | 75 | 2200uF |
| SBW-4805S2 | 18-75 | 5 | 53 | 5 | 0 | 400 | 80 | 1000uF |
| SBW-4812S2 | 18-75 | 5 | 50 | 12 | 0 | 165 | 84 | 165uF |
| SBW-4815S2 | 18-75 | 5 | 50 | 15 | 0 | 135 | 84 | 100uF |
| SBW-2405SD2 | 9-36 | 10 | 103 | 5 | 0 | 200 | 81 | 470uF |
| SBW-2412SD2 | 9-36 | 10 | 101 | 12 | 0 | 85 | 83 | 100uF |
| SBW-2415SD2 | 9-36 | 15 | 102 | 15 | 0 | 65 | 82 | 47uF |
| SBW-4805SD2 | 18-75 | 5 | 53 | 5 | 0 | 200 | 80 | 470uF |
| SBW-4812SD2 | 18-75 | 5 | 52 | 12 | 0 | 85 | 81 | 100uF |
| SBW-4815SD2 | 18-75 | 5 | 50 | 15 | 0 | 65 | 84 | 47uF |

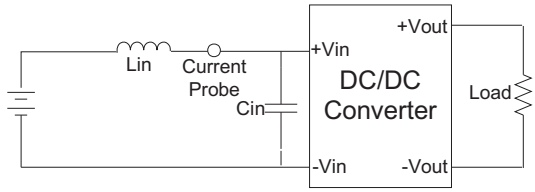
## NOTE

1. Operation at no load condition will not damage the product ; however, it will not meet all specifications.
2. One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
3. Operation at lower load and no load may have bigger ripple and noise.
4. Test by minimal Vin and constant resistive load.
5. Test by normal Vin and 100%-25% load,25% load step change;If the output voltage is 3.3V then the Transient Response Deviation is ±5%.
6. Measured Input reflected ripple current with a simulated source inductance of 12uH and a source capacitor Cin(47uF, ESR<1.0Ω at 100KHz).
7. Exceeding the absolute ratings of the unit could cause damage. It's not allowed for continuous operating ratings.
8. Input filter components are be required to help meet conducted emission class A, which application refer to the EMI Filter of design & feature configuration.
9. An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5. The filter capacitor SCHMID-M suggest: Nippon - chemi - con KY series, 220uF/100V.

## TEST CONFIGURATIONS

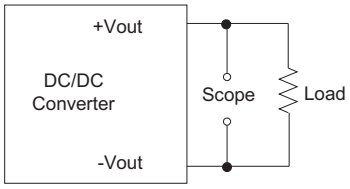
### Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor Lin(12uH) and a source capacitor Cin(47uF, ESR<1.0Ω at 100KHz) at nominal input and full load.



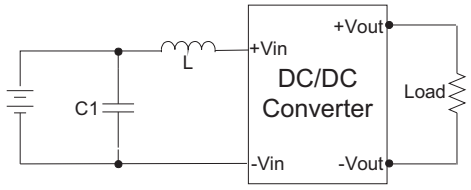

### Output Ripple & Noise Measurement Test

The Scope measurement bandwidth is 20MHz.




### EMI Filter

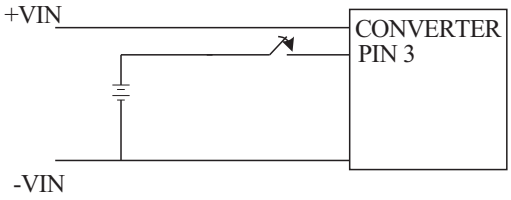
Input filter components (C1, L) are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.

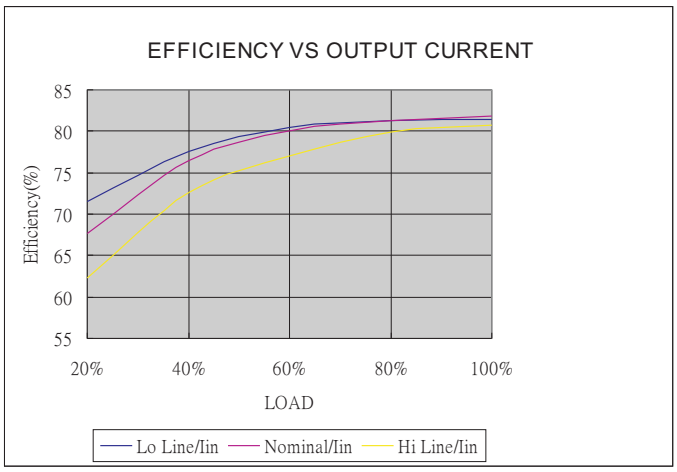



| | C1 | L |
|---|---|---|
| SVBW-24XXXXX | 1210,225K/100V,X7R * 2PCS | 6.8uH |
| SVBW-48XXXXX | 1210,105K/100V,X7R | 56uH |

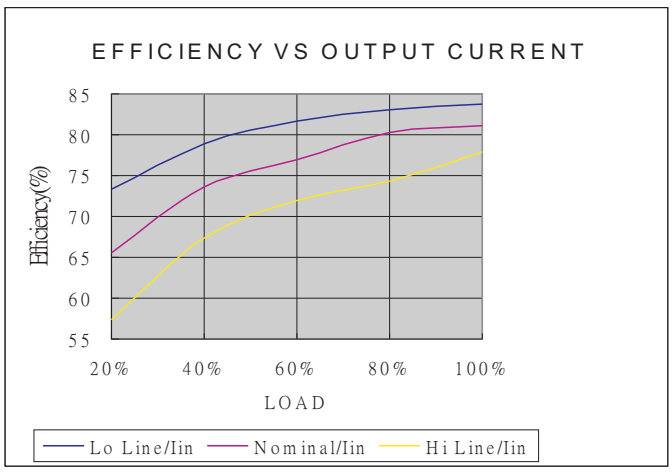
### CTRL Module ON / OFF

ON: 0~0.6Vdc or open circuit
OFF: 2.7Vdc~15.0Vdc



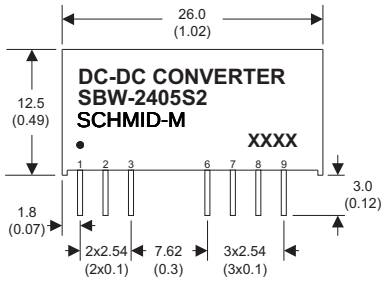



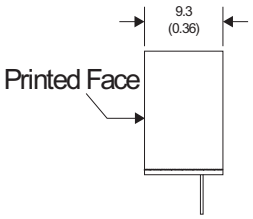

24 Models



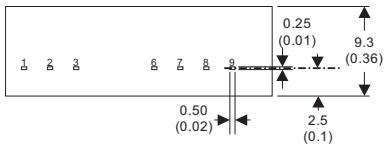

48 Models

## MECHANICAL SPECIFICATIONS




9 Pin SIL Package
Non-Conductive Plastic




| PIN CONNECTIONS | | |
|---|---|---|
| PIN NUMBER | SINGLE | DUAL |
| 1 | -V Input | -V Input |
| 2 | +V Input | +V Input |
| 3 | Remote On/Off | Remote On/Off |
| 6 | +V Output | +V Output |
| 7 | N.C | Common |
| 8 | N.C. | N.C. |
| 9 | -V Output | -V Output |

Notes: All dimensions are typical in millimeters ( inches ).
1. Pin diameter: 0.5 ±0.05 ( 0.02 ±0.002 )
2. Pin pitch and length tolerance: ±0.35 ( ±0.014 )
3. Case Tolerance: ±0.5 ( ±0.02 )