SBW-9W Series

9W 4:1 Regulated Single & Dual output

Features

- Highest Power Density In 8 Pin SIP Package
- Wide 4:1 Input Voltage Range
- Smallest Footprint 9W Converter
- -40°C ~+ 85°C Operation Temperature Range
- Efficiency Up To 89%
- Indefinite Short-Circuit Protection
- I/O Isolation 1600VDC
- Remote On/Off Control
- Fully RoHS Compliant

CE

The SBW-9W series is a family of high performanced 9W single & dual output DC-DC converters. These converters are built in copper package in a 8-pin SIP miniature compact case with high performance features wide range devices operate over 4:1 input voltage range providing stable output voltage which is much smaller than package of DIP 24 - Same power rating but only 43% of the traditional volume. Devices are encapsulated using flame retardant resin.

Input voltages are 24 Vdc and 48 Vdc with output voltage of 3.3 , 5 , 9 , 12 , 15 , 24 , ±5 , ±12 , ±15 Vdc. Featuring new PWM construction , no minimum load required and precise 1% output voltage accuracy.

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

OUTPUT SPECIFICATIONS

Voltage Accuracy	±1%, max.
Output Current	See table, max.
Line Regulation	±0.2%, max.
Load Regulation	Single output : ±0.5%, max.
(From 0% to 100% Load)	3.3V : ±1.0%, max.
	(Balance load)Dual output : ±1.0%, max.
Cross Regulation (Dual Output) (1)	±5%, max.
Ripple & Noise (20 MHz bandwidth)(2)	75mVpk-pk, max.
Over Voltage Protection	130%, typ.
Over Current Protection	180%, typ.
Short Circuit Protection	Indefinite (Automatic Recovery)
Temperature Coefficient	±0.02%/°C
Capacitive Load(3)	See table, max.
Transient Recovery Time (4)	250μs, typ.
Transient Response Deviation(4)	±3%, max.
	Output 3.3V&5V : ±5%, max.

INPUT SPECIFICATIONS

Voltage Range	See table
Start up Time(Nominal Vin and constant resistive load)	50mS, typ.
Input Filter	Capacitor
Input Current (No-Load)	See table, max.
Input Current (Full-Load)	See table, typ.
Input Reflected Ripple Current(5)	30mApk-pk, max.
Remote on/off	
ON:	Open or high impedance
OFF:	2-4mA input current (via 1KΩ).
Off stand by input current(Nominal Vin)	2.5mA, typ.
Under voltage lockout	
24V Module ON / OFF	8.9Vdc / 7.0Vdc, typ.
48V Module ON / OFF	16.0Vdc / 14.0Vdc, typ.

ABSOLUTE MAXIMUM RATINGS(6)

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.

GENERAL SPECIFICATIONS

Efficiency	See table, typ.
I/O Isolation Voltage (60sec)	
Input/Output	1600Vdc
Case/Input & Output	1000Vdc
I/O Isolation Resistance	1GΩ, min.
I/O Isolation Capacity	50 pF, max.
Switching Frequency	24Vin models : 400kHz, typ.
	48Vin models : 500kHz, typ.
Humidity	5-95% rel H
Reliability Calculated MTBF (MIL-HDBK-217 F)	>900 Khrs
Safety Standard(designed to meet)	IEC60950-1

PHYSICAL SPECIFICATIONS

Case Material	Copper
Potting Material	Epoxy (UL94V-0 rated)
Pin Material	C5191R-H Solder-coated
Weight	7.3g, typ.
Dimensions	0.86"x0.38"x0.44"

ENVIRONMENT SPECIFICATIONS

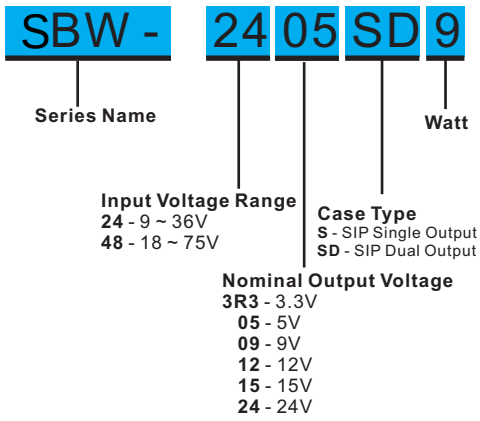
Operating Temperature	-40°C ~ +85°C(See Derating Curve)
	3.3V : -40°C ~ +50°C(For 100% load)
	Others : -40°C ~ +60°C(For 100% load)
Maximum Case Temperature	100°C
Storage Temperature	- 55°C~125°C
Cooling(7)	Nature Convection

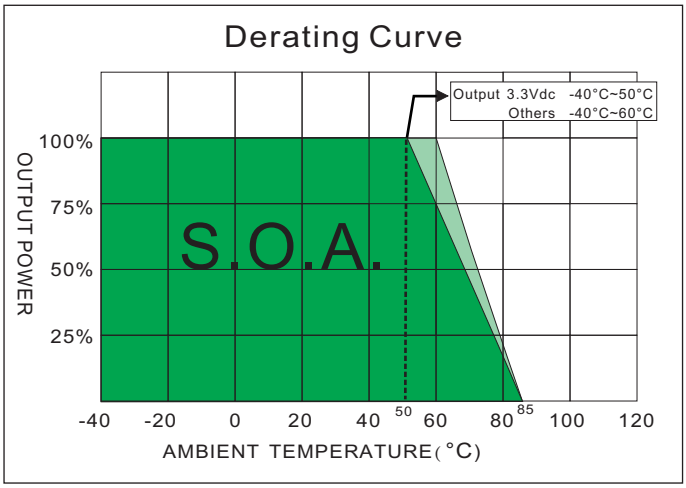
EMC CHARACTERISTICS

Radiated Emissions (8)	EN55032	CLASS A
Conducted Emissions (8)	EN55032	CLASS A
ESD	IEC61000-4-2	Perf. Criteria B
RS	IEC61000-4-3	Perf. Criteria A
EFT (9)	IEC61000-4-4	Perf. Criteria A
Surge (9)	IEC61000-4-5	Perf. Criteria A
CS	IEC61000-4-6	Perf. Criteria A
PFMF	IEC61000-4-8	Perf. Criteria A

SBW - 9W 4:1 Regulated Single & Dual output

PART NUMBER STRUCTURE





MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current No-Load (mA, max.)	INPUT Current Full Load (mA, typ.)	OUTPUT Voltage (Vdc)	OUTPUT Current Min. load (mA)	OUTPUT Current Full load (mA)	EFFICIENCY @FL (%, typ.)	Capacitor Load @FL (μF, max.)
SBW-243R3S9	9-36	9	335	3.3	0	2000	82	2600
SBW-2405S9	9-36	9	392	5	0	1600	85	1300
SBW-2409S9	9-36	9	426	9	0	1000	88	800
SBW-2412S9	9-36	9	426	12	0	750	88	560
SBW-2415S9	9-36	9	421	15	0	600	89	560
SBW-2424S9	9-36	9	421	24	0	375	89	200
SBW-2405SD9	9-36	9	392	±5	0	±800	85	±800
SBW-2412SD9	9-36	9	426	±12	0	±375	88	±390
SBW-2415SD9	9-36	9	431	±15	0	±300	87	±200
SBW-483R3S9	18-75	5	168	3.3	0	2000	82	2600
SBW-4805S9	18-75	5	196	5	0	1600	85	1300
SBW-4809S9	18-75	5	216	9	0	1000	87	800
SBW-4812S9	18-75	5	213	12	0	750	88	560
SBW-4815S9	18-75	5	211	15	0	600	89	560
SBW-4824S9	18-75	5	211	24	0	375	89	200
SBW-4805SD9	18-75	5	196	±5	0	±800	85	±800
SBW-4812SD9	18-75	5	216	±12	0	±375	87	±390
SBW-4815SD9	18-75	5	216	±15	0	±300	87	±200

NOTE

1. One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
2. Measured with a 1μF ceramic capacitor and a 10μF electrolytic capacitor.
3. Test by minimal Vin and constant resistive load.
4. Test by normal Vin and 100%-25% load,25% load step change.
5. Measured Input reflected ripple current with a simulated source inductance of 12uH and a source capacitor Cin(47uF, ESR<1.0Ω at 100KHz).
6. Exceeding the absolute ratings of the unit could cause damage. It's not allowed for continuous operating ratings.
7. "Nature Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).
8. EMI filter components are used to help meet radiated & conducted emissions, Which application refer to the EMI Filter of test configurations.
9. An external filter capacitor & TVS is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.

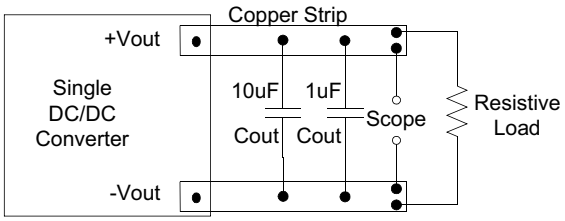
The fitler capacitor SCHMID-M suggest: 24Vin models : Nippon - chemi - con KY series, 330uF/100V and a TVS,3KW,70V.
48Vin models : Nippon - chemi - con KY series, 330uF/100V and a TVS,3KW,120V.

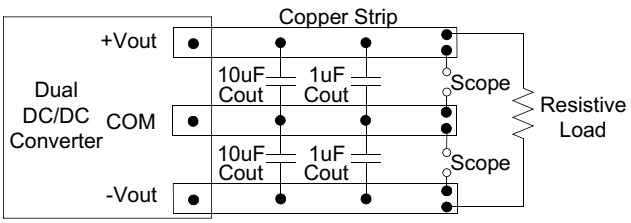
10. Operation at no load condition will not damage the product ; however, it will not meet all specifications.

TEST CONFIGURATIONS

Output Ripple & Noise Measurement Test

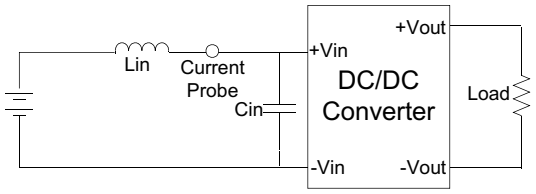
To reduce ripple and noise , it's recommended to connect a 1.0uF ceramic disk capacitor and a 10uF electrolytic capacitor to output.





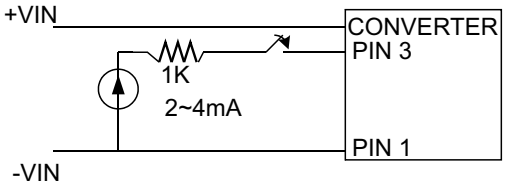
Input Reflected Ripple Current Test Step

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



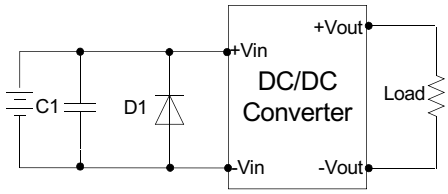
Remote ON / OFF Test Step

Input current(2~4mA) via 1KΩ to Pin3 , converter OFF. open or high impedance , converter ON.



EFT & Surge Test Countermeasures

The fitler capacitor SCHMID-M suggest: 24Vin models : Nippon - chemi - con KY series, 330uF/100V and a TVS,3KW,70V.
48Vin models : Nippon - chemi - con KY series, 330uF/100V and a TVS,3KW,120V.

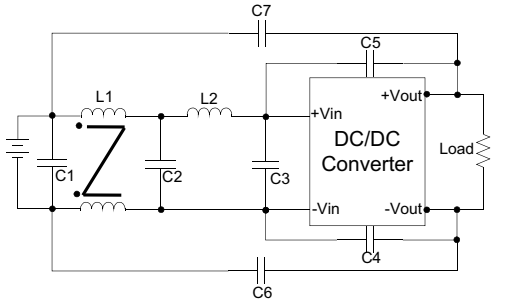


	C1	D1
SBW-24YYO9	330uF,100V	TVS,3KW,70V
SBW-48YYO9	330uF,100V	TVS,3KW,120V

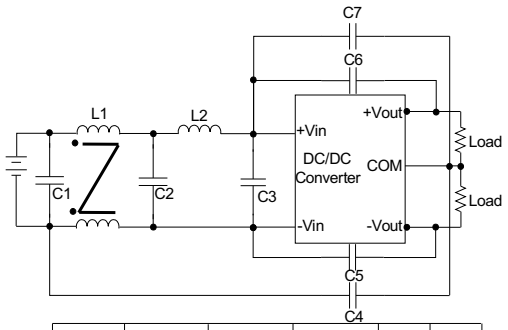
TEST CONFIGURATIONS

EMI Filter

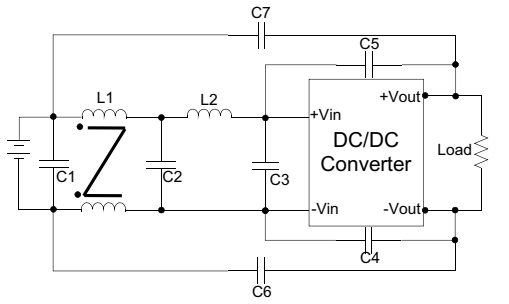
Input filter components (C1,C2,C3,C4,C5,C6,C7,L1,L2) are used to help meet conducted emissions requirement for the module.These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



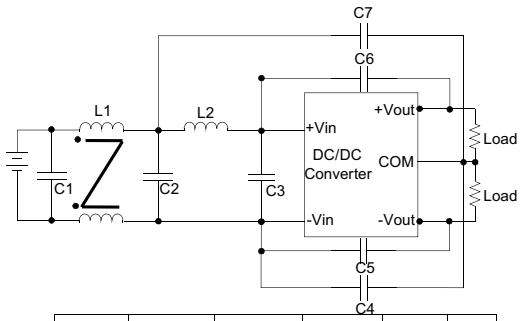
Models	C1,C2,C3	C4,C5,C6,C7	L1	L2
24Vin Single	1210 10uF/35V	1808 220pF/3kV	20uH	20uH



Models	C1,C2,C3	C4,C5,C6	C7	L1	L2
24Vin Dual	1210 10uF/35V	1808 220pF/3kV	1808 1000pF/3kV	20uH	20uH

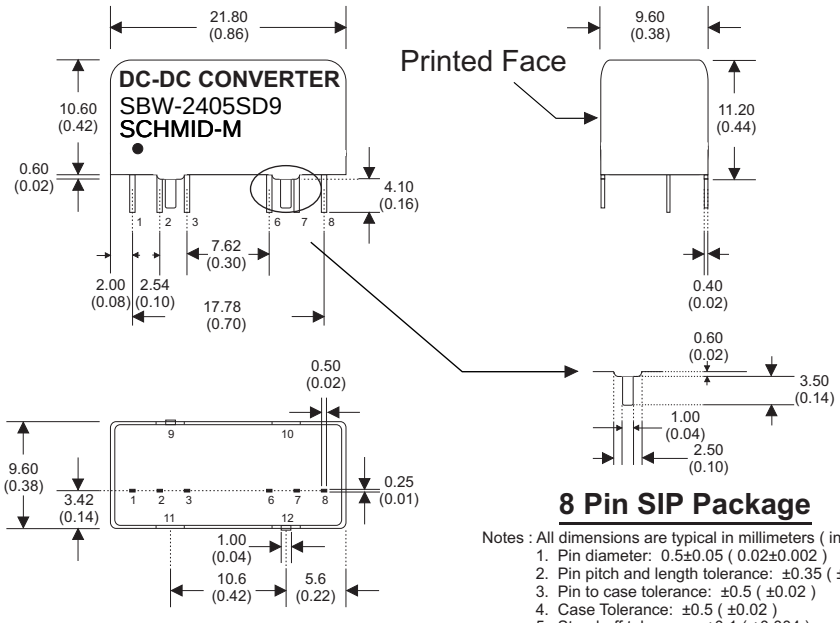


Models	C1,C2,C3	C4,C5,C6,C7	L1	L2
48Vin Single	1210 4.7uF/100V	1808 1000pF/3kV	132.8uH	10uH



Models	C1,C2,C3	C5,C6	C4,C7	L1	L2
48Vin Dual	1210 4.7uF/100V	1808 1000pF/3kV	1808 220pF/3kV	132.8uH	10uH

MECHANICAL SPECIFICATIONS



8 Pin SIP Package

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. Pin to case tolerance: ±0.5 (±0.02)
4. Case Tolerance: ±0.5 (±0.02)
5. Stand-off tolerance: ±0.1 (±0.004)

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	-V Output	Common
8	N.C	-V Output
9	Case	Case
10	Stand Off	Stand Off
11	Stand Off	Stand Off
12	Case	Case