

SMBW-3W Series

3W 4:1 Regulated Single & Dual output

Features

- Highest Power Density In 6 Pin SIL Package
- Wide 4:1 Input Range
- Smallest Footprint 3W Converter
- Full SMD Technology
- 1600 VDC Isolation
- Continuous Short Circuit Protection
- Under Voltage Lock-Out Circuit
- Efficiency up to 84%
- -40 ~ 76°C Operation Temperature Range



The SMBW-3W series is a family of cost effective and high performed 3W single & dual output DC-DC converters. These converters are built in non-conductive black plastic package in a 6-pin SIL miniature compact case with high performance features wide range devices operate over 4:1 input voltage range providing stable output voltage. Devices are encapsulated using flame retardant resin. Input voltages of 12, 24, 48 Vdc with output voltage of 3.3, 5, 12, 15, ± 5 , ± 12 , ± 15 Vdc. High performance features include high efficiency operation up to 84% and output voltage accuracy of $\pm 1\%$ maximum.

All specifications typical at $T_a=25^\circ\text{C}$, nominal input voltage and full load unless otherwise specified

OUTPUT SPECIFICATIONS	
Voltage Accuracy	$\pm 1\%$, max.
Maximum Output Current	See table
Line Regulation	$\pm 0.2\%$, max.
Load Regulation	(From 0% to 100% Load) $\pm 1.0\%$, max.
Cross Regulation (Dual Output) (1)	$\pm 5\%$, max.
Ripple & Noise (20 MHz bandwidth)(2)	Single 150mVpp, max. Dual 100mVpp, max.
Short Circuit Protection	Indefinite (Automatic Recovery)
Temperature Coefficient	$\pm 0.02\%/^\circ\text{C}$
Capacitive Load(3)	See table
Transient Recovery Time (4)	500us, typ.
Transient Response Deviation(4)	$\pm 3\%$, max.
	Single Output 3.3V, 5V: $\pm 5\%$, max.

PHYSICAL SPECIFICATIONS	
Case Material	Non conductive black plastic (UL94V-0 rated)
Potting Material	Epoxy (UL94V-0 rated)
Pin Material	C5191R-H Solder-coated
Weight	3.85g, typ.
Dimensions	0.69"x0.40"x0.48"

ENVIRONMENT SPECIFICATIONS	
Operating Temperature	-40°C~76°C (See Derating Curve) -40°C~71°C (For 100% Load)
Maximum Case Temperature	100°C
Storage Temperature	-55°C~125°C
Cooling(6)	Nature Convection

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)	
12 Models	25Vdc, max.
24 Models	50Vdc, max.
48 Models	100Vdc, max.
Soldering Temperature	260°C, max.
(1.5mm from case 10 sec. max.)	

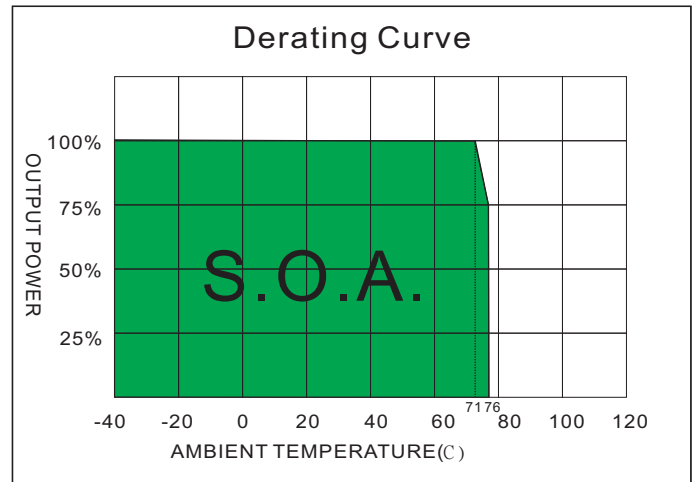
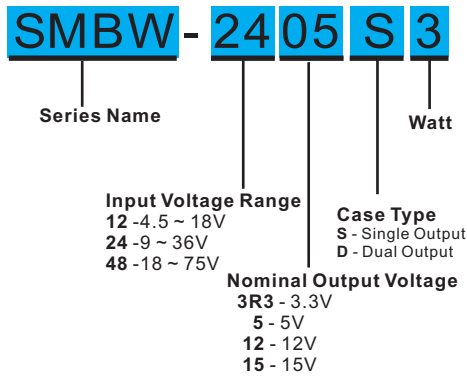
INPUT SPECIFICATIONS	
Voltage Range	See table
Start up Time(Nominal V_{in} and constant resistive load)	30mS, typ.
Input Current	See table
No-Load Input Current	See table
Input Filter	Capacitor
Input Reflected Ripple Current(5)	20mA pk-pk, typ.
Remote on/off	
ON:	open or high impedance
OFF:	2-4mA input current (via 1K)
Off stand by input current(Nominal V_{in})	2.5mA, max.
Under Voltage Lockout	
12V Modes	Module ON / OFF 4.2Vdc / 3.5Vdc, typ.
24V Modes	Module ON / OFF 8.5Vdc / 7.0Vdc, typ.
48V Modes	Module ON / OFF 17.5Vdc / 15.5Vdc, typ.

GENERAL SPECIFICATIONS	
Efficiency	See table, typ.
I/O Isolation Voltage (tested for 60 sec)	1600Vdc
I/O Isolation Capacity	40 pF, max.
I/O Isolation Resistance	1000M Ohm, min.
Switching Frequency	100kHz, min.
Humidity	95%reIH
Reliability Calculated MTBF (MIL-HDBK-217 F)	>956Khrs@25°C
Safety Standard(designed to meet)	IEC/UL/EN 60950-1 IEC/UL/EN 62368-1

EMC CHARACTERISTICS		
Radiated Emissions(8)	EN55032	CLASS A
Conducted Emissions(8)	EN55032	CLASS A
ESD	IEC61000-4-2	Perf. Criteria A
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

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PART NUMBER STRUCTURE



MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL (%.typ)	Capacitor Load @FL (uF,max)
		No-Load (mA,max)	Full Load (mA,typ.)		Min. load (mA)	Full load (mA)		
SMBW-123R3S3	12 (4.5-18)	45	257	3.3	0	700	75	3300
SMBW-1205S3	12 (4.5-18)	45	309	5	0	600	81	1680
SMBW-1212S3	12 (4.5-18)	50	301	12	0	250	83	820
SMBW-1215S3	12 (4.5-18)	55	301	15	0	200	83	680
SMBW-1205D3	12 (4.5-18)	40	313	±5	0	±300	80	±1000
SMBW-1212D3	12 (4.5-18)	50	305	±12	0	±125	82	±470
SMBW-1215D3	12 (4.5-18)	60	301	±15	0	±100	83	±330
SMBW-243R3S3	24 (9-36)	25	127	3.3	0	700	76	3300
SMBW-2405S3	24 (9-36)	25	152	5	0	600	82	1680
SMBW-2412S3	24 (9-36)	35	149	12	0	250	84	820
SMBW-2415S3	24 (9-36)	35	149	15	0	200	84	680
SMBW-2405D3	24 (9-36)	30	154	±5	0	±300	81	±1000
SMBW-2412D3	24 (9-36)	35	151	±12	0	±125	83	±470
SMBW-2415D3	24 (9-36)	40	149	±15	0	±100	84	±330
SMBW-483R3S3	48 (18-75)	15	65	3.3	0	700	74	3300
SMBW-4805S3	48 (18-75)	15	77	5	0	600	81	1680
SMBW-4812S3	48 (18-75)	15	77	12	0	250	81	820
SMBW-4815S3	48 (18-75)	20	76	15	0	200	82	680
SMBW-4805D3	48 (18-75)	15	79	±5	0	±300	79	±1000
SMBW-4812D3	48 (18-75)	20	78	±12	0	±125	80	±470
SMBW-4815D3	48 (18-75)	30	78	±15	0	±100	80	±330

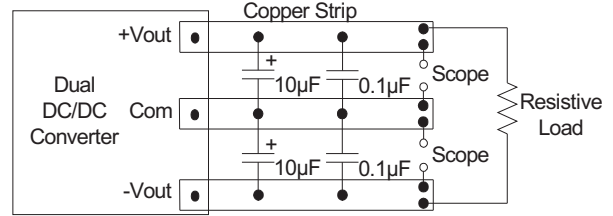
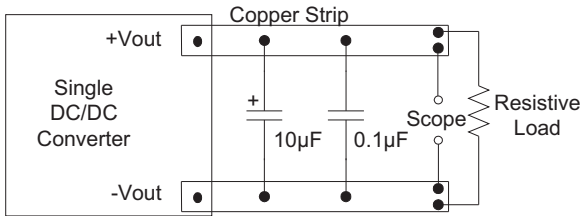
NOTE

- One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
- Ripple/Noise measured with a 10µF electrolytic capacitor and 0.1µF ceramic capacitor.
- Test by minimal Vin and constant resistive load.
- Test by normal Vin and 100%-25% load, 25% load step change.
- Measured Input reflected ripple current with a simulated source inductance of 27µH and a source capacitor Cin(47µF, ESR<1.0Ω at 100KHz).
- "Nature Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).
- Exceeding the absolute ratings of the unit could cause damage. It's not allowed for continuous operating ratings.
- Input filter components are required to help meet conducted emission and radiated emission class A, which application refer to the EMI filter of design & feature configuration.
- 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, 220µF/100V.

TEST CONFIGURATIONS

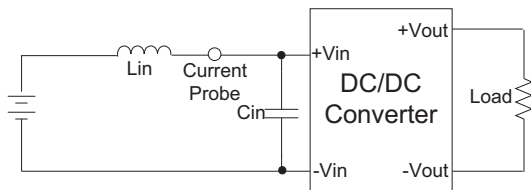
Output Ripple & Noise Measurement Test

Use a 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor.
The Scope measurement bandwidth is 20MHz.



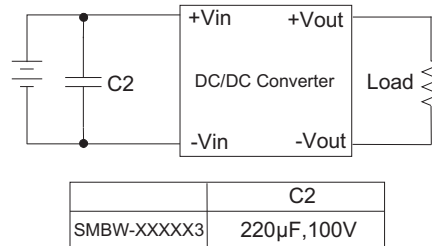
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor L_{in} (27 μ H) and a source capacitor C_{in} (47 μ F, ESR<1.0 Ω at 100KHz) at nominal input and full load.



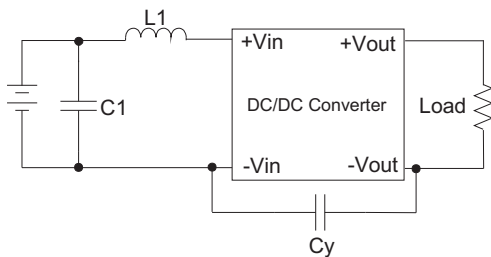
EFT/Surge Filter

Input filter components (C2) is used to help meet IEC61000-4-4 and IEC61000-4-5 .



EMI Filter(Conducted Emissions)

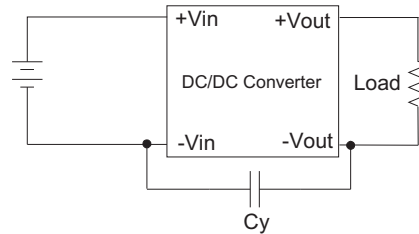
Input filter components (C1,Cy,L1) are used to meet EMI test criterial A. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



	C1	L1	Cy
SMBW-12XXX3	1210,10 μ F,35V	2.2 μ H	1206,100pF,2kV
SMBW-24XXX3	1210,2.2 μ F,100V	10 μ H	1206,100pF,2kV
SMBW-48XXX3	1210,4.7 μ F,100V	18 μ H	1206,100pF,2kV

EMI Filter(Radiated Emissions)

Input filter components (Cy) is used to meet EMI test criterial A. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.

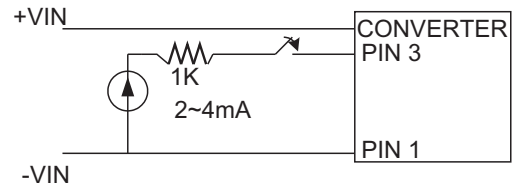


Cy	
SMBW-XXXXX3	1206,100pF,2kV

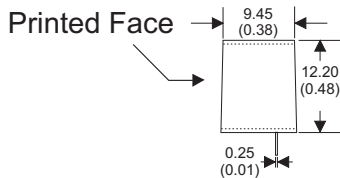
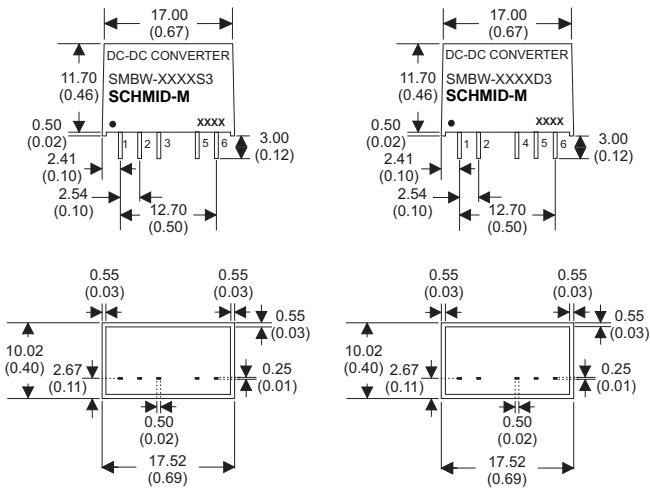
TEST CONFIGURATIONS

Remote ON / OFF Test Step

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



MECHANICAL SPECIFICATION



6 Pin SIL 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)

PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
1	-V Input	-V Input
2	+V Input	+V Input
3	Remote On/Off	N.P.
4	N.P.	+V Output
5	+V Output	Common
6	-V Output	-V Output