

DC-DC Converter

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	±1%,max.	
Maximun Output Current	See table	
Line Regulation	±0.2%,max.	
Load Regulation	(From 0% to 100% Load) ±1.0%,max.	
Cross Regulation (Dual Output) (1)	±5%,max.	
Ripple & Noise (20 MHz bandwidth)(2)	Single	150mVpp,max.
	Dual	100mVpp,max.
Short Circuit Protection	Indefinite (Automatic Recovery)	
Temperature Coefficient	±0.02%/°C	
Capacitive Load(3)	See table	
Transient Recovery Time (4)	500us, typ.	
Transient Response Deviation(4)	±3%, max.	
	Single Output 3.3V, 5V:±5%, max.	
INPUT SPECIFICATIONS		
Voltage Range	See table	
Start up Time(Nominal Vin 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 Vin)	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%relH	
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	

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"	

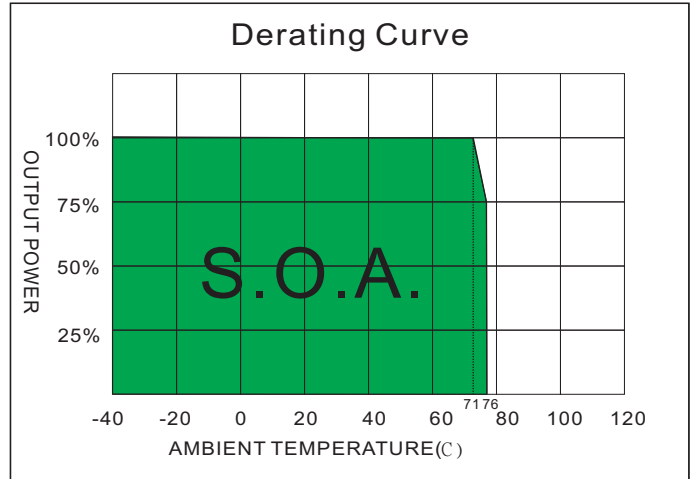
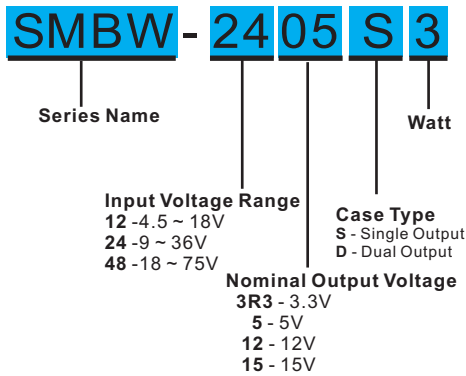
ENVIRONMENT SPECIFICATIONS		
Operating Temperature	-40°C~76°C (See Derating Curve)	
	-40°C~71°C (For 100% Load)	
Maximum Case Temperature	100°C	
Storage Temperature	-55°C~125°C	
Cooling(6)	Nature Convection	

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.)		

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

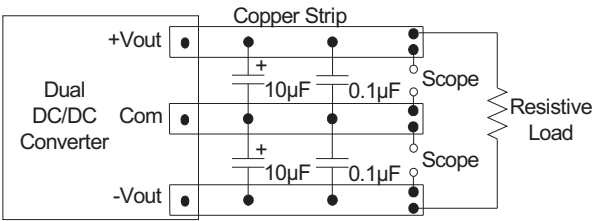
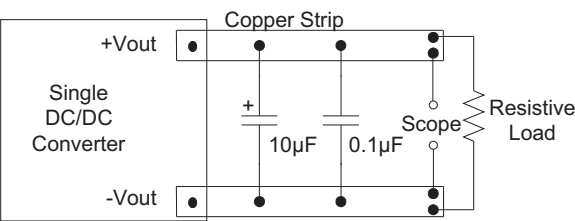
NOTE

- 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

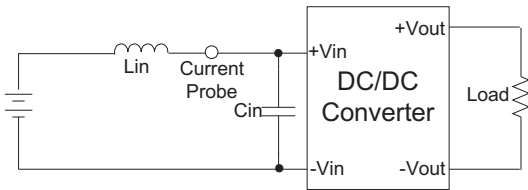
Output Ripple & Noise Measurement Test

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



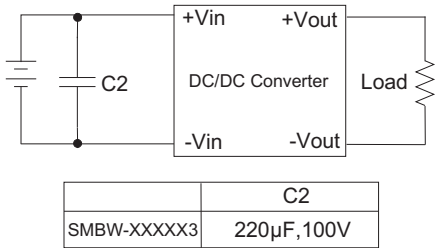
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor Lin(27μH) and a source capacitor Cin(47μF, ESR<1.0Ω at 100KHz) at nominal input and full load.



EFT/Surge Filter

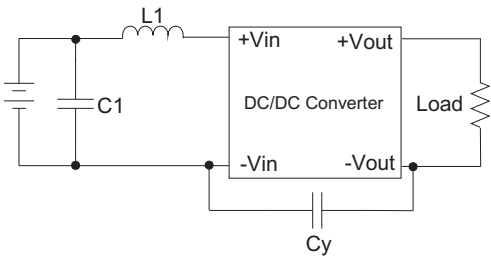
Input filter components (C2) is used to help meet IEC61000-4-4 and IEC61000-4-5 .



	C2
SMBW-XXXXX3	220μF, 100V

EMI Filter(Conducted Emissions)

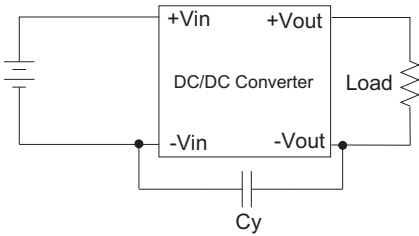
Input filter components (C1,Cy,L1) are used to meet EMI test criterial A.
These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



	C1	L1	Cy
SMBW-12XXX3	1210,10μF,35V	2.2μH	1206,100pF,2kV
SMBW-24XXX3	1210,2.2μF,100V	10μH	1206,100pF,2kV
SMBW-48XXX3	1210,4.7μF,100V	18μH	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.

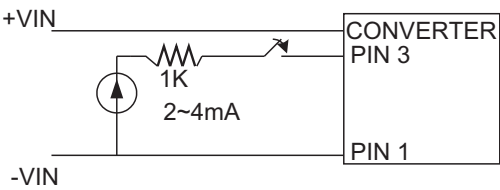


	Cy
SMBW-XXXXX3	1206,100pF,2kV

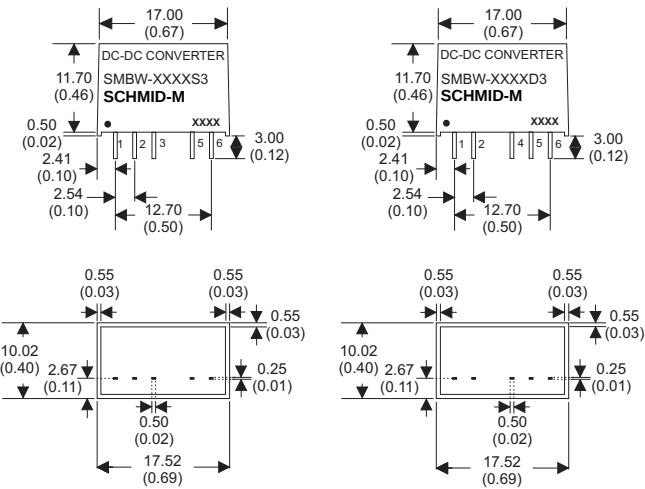
TEST CONFIGURATIONS

Remote ON / OFF Test Step

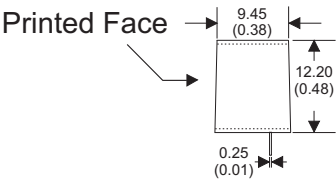
Input current(2~4mA) via 1KΩ to Pin3 , converter OFF.
open or high impedance , converter ON.



MECHANICAL SPECIFICATION



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



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)