SMB-1W Series

1W 2:1 Regulated Single & Dual output

Features

- 6 Pins SIL Package, Full SMD Technology Inside.
- Wide 2:1 Input Range
- 1500VDC Isolation
- Fully regulated output
- No minimum load required
- Continuous Short Circuit Protection
- Efficiency up to 81%
- Low Ripple and Noise
- -40°C ~ +85°C Operating Temperature Range

The SMB-1W series is a family of cost effective 1W single & dual output DC-DC converters. These converters are consisted with Non-conductive Black Plastic in a 6-pin SIL package with high performance features such as 1500 VDC input/output isolation voltage, continuous short circuit protection with automatic restart and tight line / load regulation. Devices are encapsulated using flame retardant resin. Input voltages of 5, 12, 24 and 48 with output voltage of 5,12,15,24, ±12 and ±15 Vdc. High performance features include high efficiency operation up to 80% and output voltage accuracy of ±2% maximum.

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

OUTPUT SPECIFICATIONS

Output Voltage Accuracy	±2%
Minimum Output Current	0mA, min.
Maximum Output Current	See table
Line Regulation	±0.2%, max.
Load Regulation (Singlel Output)(0% to 100%)	±1.0%, max.
(Dual Output)(0% to 100%)	±2.0%, max.
(Dual Output)(5% to 100%)	±1.0%, max.
Cross Regulation (Dual Output) **(1)**	±5%
Ripple&Noise (20 Mhz bandwidth) **(2)**	50mVpk-pk, max.
Short Circuit Protection	Continuous(Automatic Recovery)
Temperature Coefficient	±0.02%/°C
Capacitive Load **(3)**	See table
Transient Recovery Time **(4)**	500us, typ.
Transient Response Deviation **(4)**	±3%, max.

INPUT SPECIFICATIONS

Input Voltage Range	See table.
Input Filter	Capacitors
Input Current (No-Load)	See table, max.
Input Current (Full-Load)	See table, typ.
Input Reflected Ripple Current **(5)**	35mA pk-pk

GENERAL SPECIFICATIONS

Efficiency	See table, typ.
I/O Isolation Voltage (60 sec.)	1500 Vdc
I/O Isolation Capacitance	70 pF, typ.
I/O Isolation Resistance	1000M Ohm, min.
Switching Frequency	150~550KHz
Humidity	95% rel H
Reliability Calculated MTBF (MIL-HDBK-217 F)	> 2.8 Mhrs
Safety Standard	UL/cUL 60950-1 , IEC/EN 60950-1
Safety Approvals	UL/cUL 60950-1 , IEC/EN 60950-1

PHYSICAL SPECIFICATIONS

Case Material	Non-conductive Black Plastic(UL94V-0 rated)
Pin Material	C5191R-H Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	3.0g, typ.
Dimensions	0.67"x0.30"x0.43"

ENVIRONMENT SPECIFICATIONS

Operating Temperature	-40°C ~ +85°C(See Derating Curve)
Maximum Case Temperature	105°C
Storage Temperature	-55°C~125°C
Cooling	Nature Convection

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(1000mS)	
05 Models	15 Vdc, max.
12 Models	25 Vdc, max.
24 Models	50 Vdc, max.
48 Models	100 Vdc, max.
Soldering Temperature (1.5mm from case 10 sec. max.)	260°C, max.

EMC SPECIFICATIONS

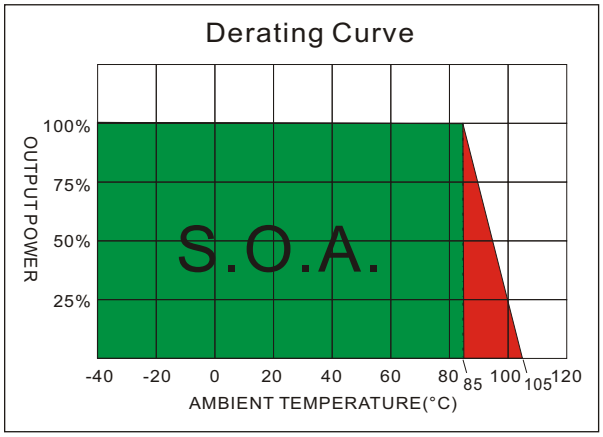
Radiated Emissions	EN55022	CLASS A
Conducted Emissions **(7)**	EN55022	CLASS A
ESD	IEC 61000-4-2	Perf. Criteria A
RS	IEC 61000-4-3	Perf. Criteria A
EFT **(8)**	IEC 61000-4-4	Perf. Criteria A
Surge **(8)**	IEC 61000-4-5	Perf. Criteria A
CS	IEC 61000-4-6	Perf. Criteria A
PFMF	IEC 61000-4-8	Perf. Criteria A

SMB-1W 2:1 Regulated Single & Dual output

PART NUMBER STRUCTURE

SMB-05 05 S 1

- **Series Name**
- **Input Voltage Range**
  - **05** - 4.5 ~ 9V
  - **12** - 9 ~ 18V
  - **24** - 18 ~ 36V
  - **48** - 36 ~ 75V
- **Output Voltage**
  - **05** - 5V
  - **12** - 12V
  - **15** - 15V
  - **24** - 24V
- **Output Type**
  - **S** - Single output
  - **D** - Dual Output
- **1 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 (%)	Capacitive Load (uF)
SMB-0505S1	4.5-9	35	263	5	0	200	76	1680
SMB-0512S1	4.5-9	35	253	12	0	83	79	820
SMB-0515S1	4.5-9	35	250	15	0	67	80	680
SMB-0524S1	4.5-9	35	250	24	0	42	80	470
SMB-1205S1	9-18	20	107	5	0	200	78	1680
SMB-1212S1	9-18	20	105	12	0	83	80	820
SMB-1215S1	9-18	20	103	15	0	67	81	680
SMB-1224S1	9-18	20	105	24	0	42	80	470
SMB-2405S1	18-36	10	54	5	0	200	78	1680
SMB-2412S1	18-36	10	52	12	0	83	80	820
SMB-2415S1	18-36	10	52	15	0	67	80	680
SMB-2424S1	18-36	10	52	24	0	42	81	470
SMB-4805S1	36-75	7	28	5	0	200	76	1680
SMB-4812S1	36-75	7	27	12	0	83	78	820
SMB-4815S1	36-75	7	27	15	0	67	78	680
SMB-4824S1	36-75	7	27	24	0	42	77	470
SMB-0512D1	4.5-9	35	259	±12	0	±42	77	±470
SMB-0515D1	4.5-9	35	254	±15	0	±33	79	±330
SMB-1212D1	9-18	20	106	±12	0	±42	79	±470
SMB-1215D1	9-18	20	105	±15	0	±33	80	±330
SMB-2412D1	18-36	10	52	±12	0	±42	80	±470
SMB-2415D1	18-36	10	53	±15	0	±33	79	±330
SMB-4812D1	36-75	7	27	±12	0	±42	77	±470
SMB-4815D1	36-75	7	27	±15	0	±33	77	±330

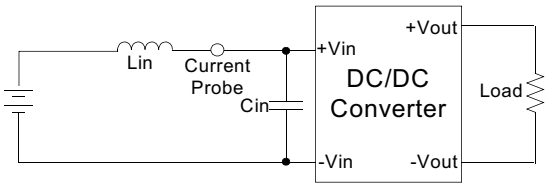
NOTE

1. One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
2. Ripple/Noise measured with a 1uF ceramic capacitor.
3. Tested by minimal Vin and constant resistive load.
4. Tested by normal Vin and 25% load step change (75%-50%-25% of Io).
5. Measured Input reflected ripple current with a simulated source inductance of 12uH.
6. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.
7. Input filter components are be required to help meet conducted emission class A, which application refer to The EMI Filter of Design & feature configuration.
8. 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: 5Vin models : Nippon - chemi - con KY series, 330uF/100V.
   Other models : Nippon - chemi - con KY series, 220uF/100V.

TEST CONFIGURATIONS

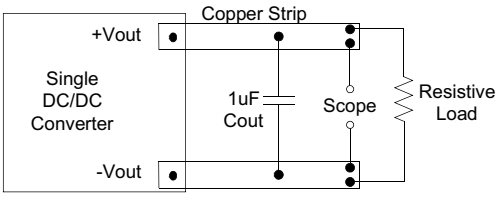
Input Reflected Ripple Current Test Step

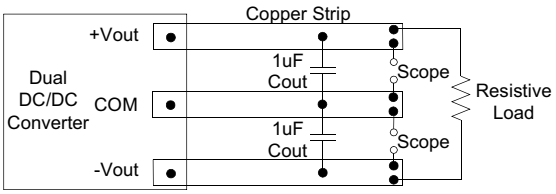
Input reflected ripple current is measured through a source inductor Lin(12uH) and a source capacitor Cin(47uF, ESR<1.0Ω at 100KHz) at nominal input and full load.



Output Ripple & Noise Measurement Test

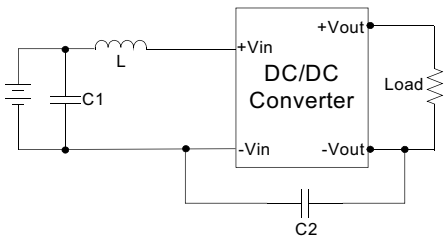
Use a capacitor Cout(1.0uF) measurement.
The Scope measurement bandwidth is 20MHz.



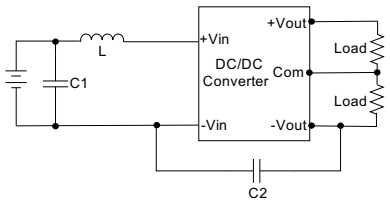


EMI Filter

Input filter components (C1,C2,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.

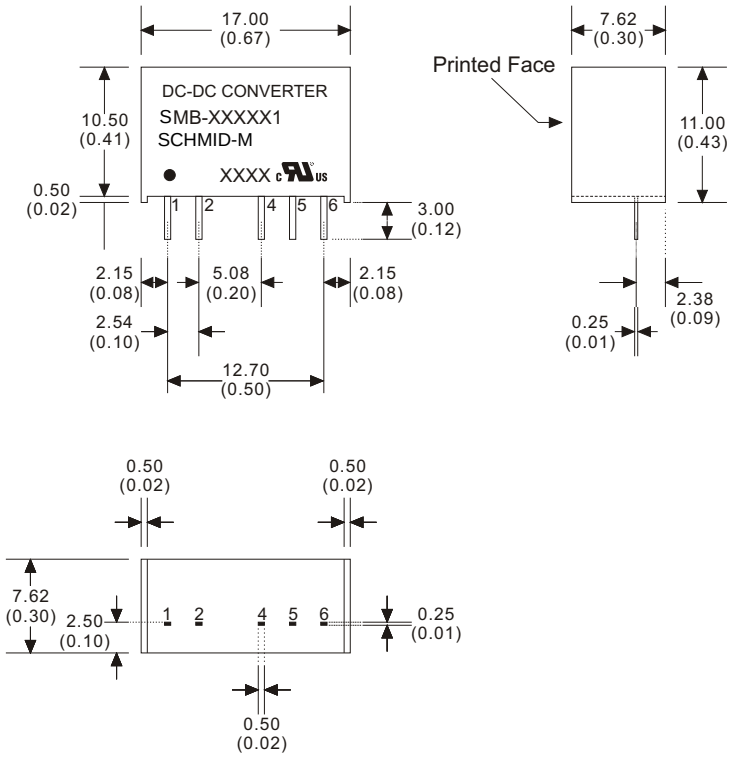


	C1	C2	L
SMB-05XXS1	MLCC 4.7uF/50V	MLCC 220pF/3KV	4.7uH
SMB-12XXS1	MLCC 4.7uF/50V	MLCC 220pF/3KV	4.7uH
SMB-24XXS1	MLCC 4.7uF/50V	MLCC 220pF/3KV	18 uH
SMB-48XXS1	MLCC 4.7uF/100V	MLCC 220pF/3KV	18 uH



	C1	C2	L
SMB-05XXD1	MLCC 4.7uF/50V	MLCC 220pF/3KV	4.7uH
SMB-12XXD1	MLCC 4.7uF/50V	MLCC 220pF/3KV	4.7uH
SMB-24XXD1	MLCC 4.7uF/50V	MLCC 220pF/3KV	18 uH
SMB-48XXD1	MLCC 4.7uF/100V	MLCC 220pF/3KV	18 uH

MECHANICAL SPECIFICATIONS



PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
1	-V Input	-V Input
2	+V Input	+V Input
4	+V Output	+V Output
5	N.P.	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)
5. Stand-off tolerance: ±0.1 (±0.004)