

# SCHMID-M

## SB-2W Series

2W 2:1 Regulated Single & Dual output

### Features

- 8 Pin SIL / 16 Pin DIL
- Wide 2:1 Input Range
- Full SMD Technology
- 1000 VDC Isolation, Up to 3000 VDC
- Continuous Short Circuit Protection
- Efficiency up to 80%
- -40 ~ 85°C Operation Temperature Range
- Plastic Case Standard, Optional Metal Case
- Remote on/off Control (Optional)

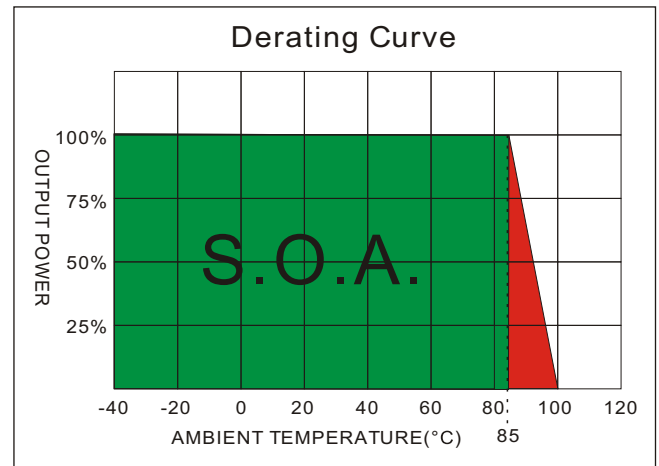
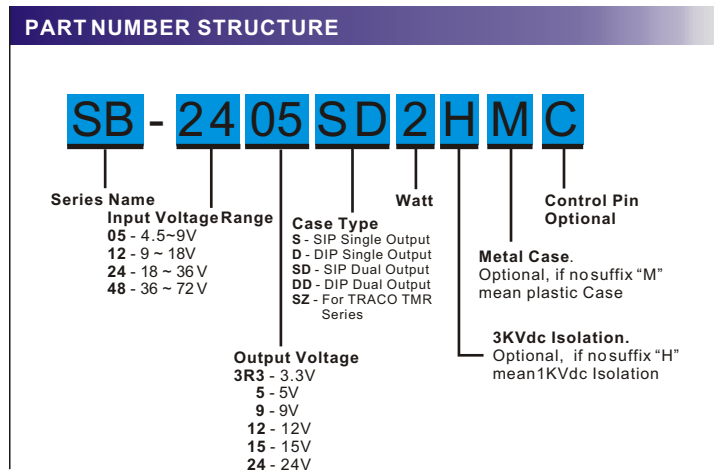


The SB series is a family of cost effective 2W single & dual output DC-DC converters. These converters combine non-conductive black plastic case in a 8-pin SIL / 16-pin DIL package with high performance features such as 1000Vdc~3000Vdc input/output isolation voltage, continuous short circuit protection with automatic restart and high line / load regulation. Devices are encapsulated using flame retardant resin. Input voltages of 5,12,24 and 48 with output voltage of 3.3, 5,9, 12, 15, 24, ±3.3, ±5, ±9, ±12, ±15, ±24 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		GENERAL SPECIFICATIONS	
Voltage Accuracy	±2%	Efficiency	See table
Maximun Output Current	See table	I/O Isolation Voltage (tested for 3 sec)	1000~3000Vdc
Line Regulation	±0.5%,max	Metal Case/Input & Output	1000Vdc
Load Regulation (From 25% to 100% Loading)	±1%,max	I/O Isolation Capacitance	60 pF,max
Cross Regulation (Dual Output) (4)	±5%	I/O Isolation Resistance	1000M Ohm,min
Ripple & Noise (20 Mhz bandwidth)(5)	80mVpp,max	Switching Frequency	100~650kHz
Short Circuit Protection	Indefinite (Automatic Recovery)	Humidity	95%reIH
Temperature Coefficient	±0.02%/°C	Reliability Calculated MTBF(MIL-HDBK-217 F)	>1.61 Mhrs
Capacitive Load(6)	See table	Safety Standard (designed to meet)	IEC/EN 60950-1
		Remote On/Off (CTRL) (11)	
INPUT SPECIFICATIONS		PHYSICAL SPECIFICATIONS	
Voltage Range	See table	Case Material	Non-conductive Black Plastic(UL94V-0 rated) Nickel-coated Copper
Max. Input Current	See table	Pin Material	SIP Case Alloy42 Solder-coated DIP Case Ø0.5mm Brass Solder-coated
No-Load Input Current	See table	Potting Material	Epoxy (UL94V-0 rated)
Input Filter	Capacitor	Weight	4.5g(SIP)~6g(DIP) Metal Case/6.5g(SIP)~8g(DIP)
Input Reflected Ripple Current(7)	35mA pk-pk	Dimensions	SIP Case 0.86"x0.36"x0.44" DIP Case 0.92"x0.55"x0.40"
ENVIRONMENT SPECIFICATIONS		EMC SPECIFICATIONS	
Operating Temperature	-40°C~85°C(See Derating Curve)	Radiated Emissions	EN55022 CLASS A
Maximum Case Temperature	100°C	Conducted Emissions (12)	EN55022 CLASS A
Storage Temperature	- 40°C~125°C	ESD	IEC 61000-4-2 Perf. Criteria B
Cooling	Nature Convection	RS	IEC 61000-4-3 Perf. Criteria A
		EFT (13)	IEC 61000-4-4 Perf. Criteria B
		Surge (13)	IEC 61000-4-5 Perf. Criteria B
		CS	IEC 61000-4-6 Perf. Criteria A
		PFMF	IEC 61000-4-8 Perf. Criteria A
ABSOLUTE MAXIMUM RATINGS(8)			
These are stressratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.			
Input Surge Voltage(100ms max)			
05 Models	12Vdc,max.		
12 Models	24Vdc,max.		
24 Models	40Vdc,max.		
48 Models	80Vdc,max. 260°C max.		
Soldering Temperature (1.5mm from case 10sec. max. )			

## SB - 2W 2:1 Regulated Single & Dual output



## MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL (%)	Capacitor Load (uF)
		No-Load (mA)	Full Load (mA)		Min. load (mA)	Full load (mA)		
SB-053R3S2	4.5-9	15	492	3.3	125	500	67	3300
SB-0505 S2	4.5-9	15	571	5	100	400	70	3300
SB-0509 S2	4.5-9	30	555	9	56	222	72	470
SB-0512 S2	4.5-9	30	555	12	42	167	72	470
SB-0515 S2	4.5-9	30	547	15	33	133	73	470
SB-0524 S2	4.5-9	60	533	24	21	83	75	220
SB-123R3S2	9-18	15	205	3.3	125	500	67	3300
SB-1205 S2	9-18	15	216	5	100	400	77	3300
SB-1209 S2	9-18	15	213	9	56	222	78	470
SB-1212 S2	9-18	15	208	12	42	167	80	470
SB-1215 S2	9-18	15	213	15	33	133	78	470
SB-1224 S2	9-18	15	208	24	21	83	80	220
SB-243R3S2	18-36	8	98	3.3	125	500	70	3300
SB-2405 S2	18-36	8	108	5	100	400	77	3300
SB-2409 S2	18-36	8	104	9	56	222	80	470
SB-2412 S2	18-36	8	104	12	42	167	80	470
SB-2415 S2	18-36	8	104	15	33	133	80	470
SB-2424 S2	18-36	8	104	24	21	83	80	220
SB-483R3S2	36-72	6	48	3.3	125	500	71	3300
SB-4805 S2	36-72	6	56	5	100	400	74	3300
SB-4809 S2	36-72	6	53	9	56	222	78	470
SB-4812 S2	36-72	6	53	12	42	167	78	470
SB-4815 S2	36-72	6	53	15	33	133	78	470
SB-4824 S2	36-72	6	52	24	21	83	80	220
SB-053R3D2	4.5-9	15	492	3.3	125	500	67	3300
SB-0505D2	4.5-9	15	571	5	100	400	70	3300
SB-0509D2	4.5-9	30	555	9	56	222	72	470
SB-0512D2	4.5-9	30	555	12	42	167	72	470
SB-0515D2	4.5-9	30	547	15	33	133	73	470
SB-0524D2	4.5-9	60	533	24	21	83	75	220
SB-123R3D2	9-18	15	205	3.3	125	500	67	3300
SB-1205D2	9-18	15	216	5	100	400	77	3300
SB-1209D2	9-18	15	213	9	56	222	78	470
SB-1212D2	9-18	15	208	12	42	167	80	470
SB-1215D2	9-18	15	213	15	33	133	78	470
SB-1224D2	9-18	15	208	24	21	83	80	220

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

MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL (%)	Capacitor Load (uF)
		No-Load (mA)	Full Load (mA)		Min. load (mA)	Full load (mA)		
SB-24 3R3D2	18-36	8	98	3.3	125	500	70	3300
SB-24 05D2	18-36	8	108	5	100	400	77	3300
SB-24 09D2	18-36	8	104	9	56	222	80	470
SB-24 12D2	18-36	8	104	12	42	167	80	470
SB-24 15D2	18-36	8	104	15	33	133	80	470
SB-24 24D2	18-36	8	104	24	21	83	80	220
SB-48 3R3D2	36-72	6	48	3.3	125	500	71	3300
SB-48 05D2	36-72	6	56	5	100	400	74	3300
SB-48 09D2	36-72	6	53	9	56	222	78	470
SB-48 12D2	36-72	6	53	12	42	167	78	470
SB-48 15D2	36-72	6	53	15	33	133	78	470
SB-48 24D2	36-72	6	52	24	21	83	80	220
SB-053R3SD2	4.5-9	20	471	±3.3	±63	±250	70	±1000
SB-0505SD2	4.5-9	20	571	±5	±50	±200	70	±1000
SB-0509SD2	4.5-9	20	540	±9	±28	±111	74	±220
SB-0512SD2	4.5-9	25	533	±12	±21	±83	75	±220
SB-0515SD2	4.5-9	25	533	±15	±17	±67	75	±220
SB-0524SD2	4.5-9	60	563	±24	±10	±42	71	±100
SB-123R3SD2	9-18	15	188	±3.3	±63	±250	73	±1000
SB-1205SD2	9-18	15	222	±5	±50	±200	75	±1000
SB-1209SD2	9-18	15	210	±9	±28	±111	79	±220
SB-1212SD2	9-18	15	208	±12	±21	±83	80	±220
SB-1215SD2	9-18	15	210	±15	±17	±67	79	±220
SB-1224SD2	9-18	30	219	±24	±10	±42	76	±100
SB-243R3SD2	18-36	8	94	±3.3	±63	±250	73	±1000
SB-2405SD2	18-36	8	106	±5	±50	±200	78	±1000
SB-2409SD2	18-36	8	105	±9	±28	±111	79	±220
SB-2412SD2	18-36	8	104	±12	±21	±83	80	±220
SB-2415SD2	18-36	8	104	±15	±17	±67	80	±220
SB-2424SD2	18-36	20	106	±24	±10	±42	78	±100
SB-483R3SD2	36-72	6	47	±3.3	±63	±250	73	±1000
SB-4805SD2	36-72	6	56	±5	±50	±200	74	±1000
SB-4809SD2	36-72	6	53	±9	±28	±111	79	±220
SB-4812SD2	36-72	6	53	±12	±21	±83	79	±220
SB-4815SD2	36-72	6	52	±15	±17	±67	80	±220
SB-4824SD2	36-72	12	55	±24	±10	±42	75	±100
SB-05 3R3DD2	4.5-9	20	471	±3.3	±63	±250	70	±1000
SB-05 05DD2	4.5-9	20	571	±5	±50	±200	70	±1000
SB-05 09DD2	4.5-9	20	540	±9	±28	±111	74	±220
SB-05 12DD2	4.5-9	25	533	±12	±21	±83	75	±220
SB-05 15DD2	4.5-9	25	533	±15	±17	±67	75	±220
SB-05 24DD2	4.5-9	60	563	±24	±10	±42	71	±100
SB-12 3R3DD2	9-18	15	188	±3.3	±63	±250	73	±1000
SB-12 05DD2	9-18	15	222	±5	±50	±200	75	±1000
SB-12 09DD2	9-18	15	210	±9	±28	±111	79	±220
SB-12 12DD2	9-18	15	208	±12	±21	±83	80	±220
SB-12 15DD2	9-18	15	210	±15	±17	±67	79	±220
SB-12 24DD2	9-18	30	219	±24	±10	±42	76	±100
SB-24 3R3DD2	18-36	8	94	±3.3	±63	±250	73	±1000
SB-24 05DD2	18-36	8	106	±5	±50	±200	78	±1000

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

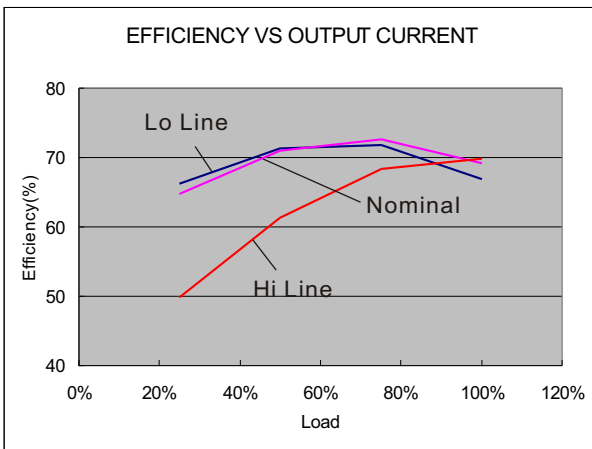
MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL (%)	Capacitor Load(μF)
		No-Load (mA)	Full Load (mA)		Min. load (mA)	Full load (mA)		
SB-24 09DD2	18-36	8	105	±9	±28	±111	79	±220
SB-24 12DD2	18-36	8	104	±12	±21	±83	80	±220
SB-24 15DD2	18-36	8	104	±15	±17	±67	80	±220
SB-24 24DD2	18-36	20	106	±24	±10	±42	78	±100
SB-48 3R3DD2	36-72	6	47	±3.3	±63	±250	73	±1000
SB-48 05DD2	36-72	6	56	±5	±50	±200	74	±1000
SB-48 09DD2	36-72	6	53	±9	±28	±111	79	±220
SB-48 12DD2	36-72	6	53	±12	±21	±83	79	±220
SB-48 15DD2	36-72	6	52	±15	±17	±67	80	±220
SB-48 24DD2	36-72	12	55	±24	±10	±42	75	±100

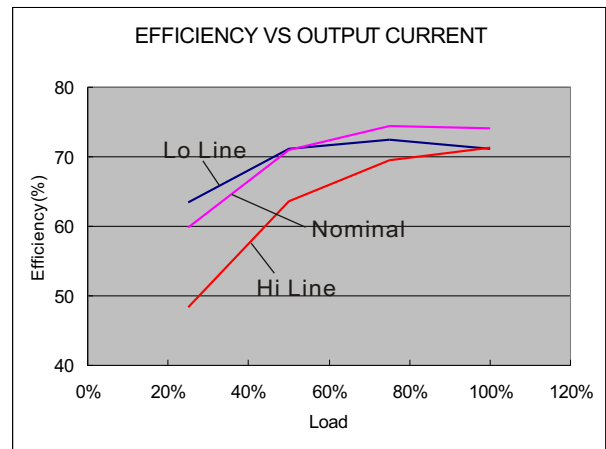
Suffix "H" means 3KVdc isolation

Suffix "C" means with controlpin

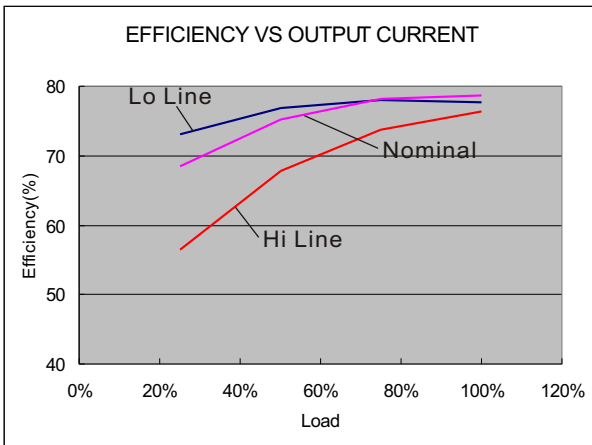
Suffix "M" means with Metal Case



05 Models



12 Models



24 Models

NOTE

1. Maximum value at nominal input voltage and full load.
2. Typical value at nominal input voltage and full load.
3. 25% minimum loading is needed.
4. One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
5. Ripple/Noise measured with 20MHz bandwidth.
6. Test by nominal input voltage and constant resistor load.
7. Measured Input reflected ripple current with a simulated source inductance of 12μH.
8. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.
9. Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.
10. It's necessary to add minimum capacitor in output for some models, please check single model datasheet for detail value.

**NOTE**

11. MCU (Master Control Unit)  
 The MCU Pin Voltage is referenced to -Vin(Pin 1)  
 ON:0 ~ 0.8VDC Max.  
 (Short circuit Pin 1 and Pin 3) or open circuit  
 OFF:4.5 to 15VDC Max.(or 3.5mA to 15mA Max.)(via R1 D1)  
 OFF idle current:5mA typ.

**Connection example**

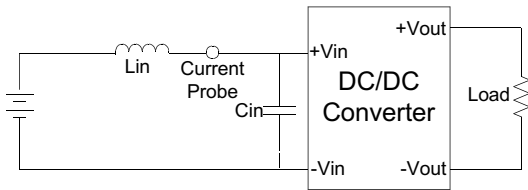


12. Input filter components are required to help meet conducted emission class A, which application refer to the EMI Filter of design & test configuration.  
 13. An external filter capacitor is required if the module has to meet EN61000-4-4 and EN61000-4-5.  
 The filter capacitor Schmid-M suggest: Nippon - chemi - con KY series, 220uF/100V.

**TEST CONFIGURATIONS**

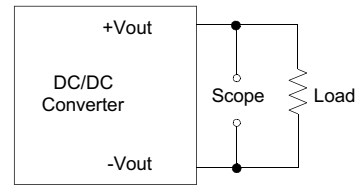
**Input Reflected Ripple Current Test Step**

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.



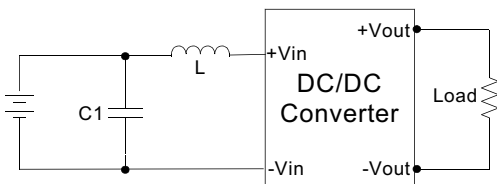
**Output Ripple & Noise Measurement Test**

The Scope measurement bandwidth is 20MHz.



**EMI Filter**

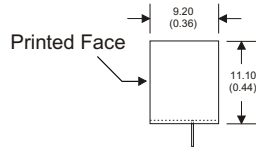
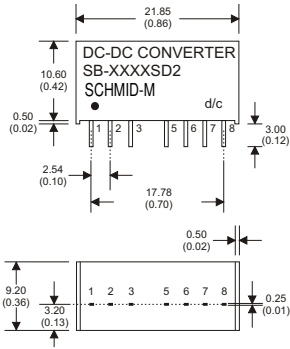
Input filter components (C1, L) are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



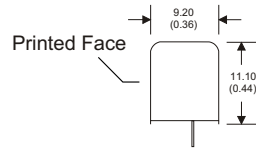
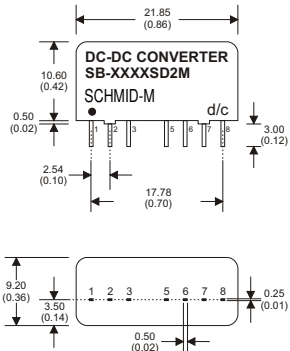
	C1	L
SB-1W&2W-Series	100uF/100V	12uH

# SB - 2W 2:1 Regulated Single & Dual output

## MECHANICAL SPECIFICATIONS

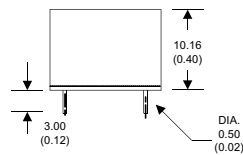
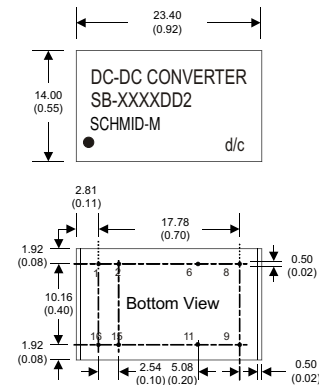


**8 Pin SIL Package**  
Non-Conductive Plastic

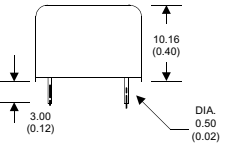
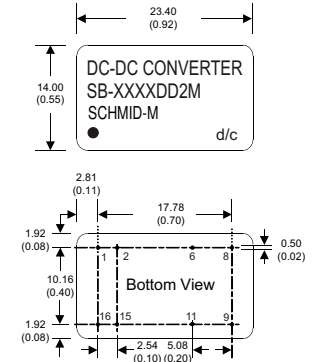


**8 Pin SIL Package**  
Nickel-Coated Copper

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



**16 Pin DIL Package**  
Non-Conductive Plastic



**16 Pin DIL Package**  
Nickel-Coated Copper

### PIN CONNECTIONS

PIN NUMBER	SINGLE	DUAL/(SD)	DUAL/(SZ)
1	-V Input	-V Input	-V Input
2	+V Input	+V Input	+V Input
3	N.P.	N.C.	N.C.
5	N.P.	N.C.	N.C.
6	+V Output	+V Output	+V Output
7	-V Output	-V Output	Common
8	N.C.	Common	-V Output
PIN NUMBER	SINGLE+C	DUAL/(SD+C)	DUAL/(SZ+C)
1	-V Input	-V Input	-V Input
2	+V Input	+V Input	+V Input
3	Remote On/Off	Remote On/Off	Remote On/Off
5	N.C.	N.C.	N.C.
6	+V Output	+V Output	+V Output
7	-V Output	-V Output	Common
8	N.C.	Common	-V Output

(The Pin Connection of high isolation one is the same with normal one.)

### PIN CONNECTIONS

PIN NUMBER	SINGLE	DUAL
1	-V Input	-V Input
2	-V Input	-V Input
6	N.C.	Common
8	N.C.	-V Output
9	+V Output	+V Output
11	-V Output	Common
15	+V Input	+V Input
16	+V Input	+V Input

(The Pin Connection of high isolation one is the same with normal one.)