

# VBW-2W Series

2W 4:1 Regulated Single & Dual output



## Features

- 9 Pin SIL
- Wide 4:1 Input Range
- Full SMD Technology
- 1500 VDC Isolation
- Continuous Short Circuit Protection
- Efficiency up to 85%
- -40°C ~ 75°C Operation Temperature Range
- Remote on/off Control



The VBW series is a family of cost effective 2W single & dual output DC-DC converters. These converters combine non-conductive black plastic package in a 9-pin SIL compatible case with high performance features such as 1500 VDC input/output isolation voltage, continuous short circuit protection with automatic restart and high line / load regulation. Wide range devices operate over 4:1 input voltage range providing stable output voltage. Devices are encapsulated using flame retardant resin. Input voltages of 24 and 48 with output voltage of 3.3, 5, 12, 15,  $\pm 5$ ,  $\pm 12$ ,  $\pm 15$  Vdc. High performance features include high efficiency operation up to 85% and output voltage accuracy of  $\pm 1\%$  maximum.

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

OUTPUT SPECIFICATIONS		PHYSICAL SPECIFICATIONS	
Voltage Accuracy	$\pm 1\%$ , max.	Case Material	Non conductive black plastic
Output Current	See table, max.	Potting Material	Epoxy (UL94V-0 rated)
Line Regulation	$\pm 0.5\%$ , max.	Pin Material	C5191R-H Solder-coated
Load Regulation (1)	(From 10% to 100% Loading) $\pm 0.5\%$ , max.	Weight	6.5g, typ
	(From 0% to 100% Loading) Vout=12V and 15V $\pm 0.5\%$ , max.	Dimensions	1.02"x0.36"x0.49"
	Vout=3.3V and 5V $\pm 1.0\%$ , max.		
Cross Regulation (Dual Output) (2)	$\pm 5\%$	GENERAL SPECIFICATIONS	
Ripple & Noise (20 Mhz bandwidth)(3)	50mVpk-pk, max.	Efficiency	See table, typ.
Short Circuit Protection	Indefinite(hiccup) (Automatic Recovery)	I/O Isolation Voltage (60sec)	1500Vdc
Temperature Coefficient	$\pm 0.02\%/^{\circ}\text{C}$	I/O Isolation Capacity	500 pF, max.
Capacitive Load(4)	See table, max.	I/O Isolation Resistance	1000M Ohm, min.
Transient Recovery Time (5)	300 $\mu$ s, typ.	Switching Frequency	250kHz, typ
Transient Response Deviation(5)	$\pm 3\%$ , max.	Humidity	95%relH
		Reliability Calculated MTBF(MIL-HDBK-217 F)	>1.212Mhrs@ 25°C
INPUT SPECIFICATIONS		Safety Standard	UL/cUL 60950-1 , 62368-1 IEC/EN 60950-1 , 62368-1
Voltage Range	See table	Safety Approvals	UL/cUL 60950-1 , 62368-1 IEC/EN 60950-1 , 62368-1
Start up Time(Nominal Vin and constant resistive load)	10mS, typ.	ENVIRONMENT SPECIFICATIONS	
Input Current (No Load)	See table, max.	Operating Temperature	-40°C ~ +85°C(See Derating Curve)
Input Current (Full Load)	See table, typ.		-40°C ~ +75°C(For 100% load)
Input Filter	Capacitor	Maximum Case Temperature	100°C
Input Reflected Ripple Current(6)	20mA pk-pk, typ.	Storage Temperature	-40°C~125°C
Remote on/off		Cooling	Nature Convection
ON:	0 ~ 0.6Vdc or open circuit		
OFF:	2.7~15.0Vdc		
Off stand by input current(Nominal Vin)	5mA max.		
ABSOLUTE MAXIMUM RATINGS(7)		EMC CHARACTERISTICS	
These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.		Conducted Emissions (8)	EN55032 CLASS A
Input Surge Voltage(100ms max)		Radiated Emissions	EN55032 CLASS A
24 Models	50Vdc, max.	ESD	IEC 61000-4-2 Perf. Criteria A
48 Models	100Vdc, max.	RS	IEC 61000-4-3 Perf. Criteria A
Soldering Temperature	260°C, max.	EFT(9)	IEC 61000-4-4 Perf. Criteria A
(1.5mm from case 10sec max.)		Surge(9)	IEC 61000-4-5 Perf. Criteria B
		CS	IEC 61000-4-6 Perf. Criteria A
		PFMF	IEC 61000-4-8 Perf. Criteria A

## PART NUMBER STRUCTURE

**VBW - 24 05 SD 2**

Series Name  
W: wide range

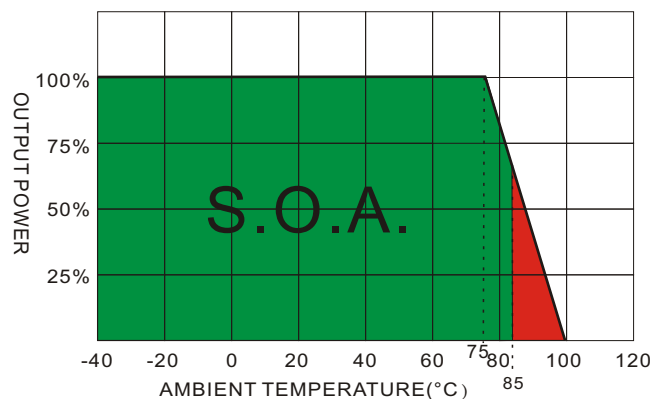
Input Voltage Range  
24 - 9 ~ 36V  
48 - 18 ~ 75V

Case Type  
S - SIP Single Output  
SD - SIP Dual Output

Nominal Output Voltage  
3R3 - 3.3V  
05 - 5V  
12 - 12V  
15 - 15V

Watt

## Derating Curve



## MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL (% , typ.)	Capacitor Load @ FL (μF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. load (mA)	Full load (mA)		
VBW-243R3S2	9-36	10	92	3.3	0	500	75	2200uF
VBW-2405S2	9-36	10	103	5	0	400	81	1000uF
VBW-2412S2	9-36	10	100	12	0	165	84	165uF
VBW-2415S2	9-36	10	98	15	0	135	85	100uF
VBW-483R3S2	18-75	5	46	3.3	0	500	75	2200uF
VBW-4805S2	18-75	5	53	5	0	400	80	1000uF
VBW-4812S2	18-75	5	50	12	0	165	84	165uF
VBW-4815S2	18-75	5	50	15	0	135	84	100uF
VBW-2405SD2	9-36	10	103	±5	0	±200	81	±470uF
VBW-2412SD2	9-36	10	101	±12	0	±85	83	±100uF
VBW-2415SD2	9-36	15	102	±15	0	±65	82	±47uF
VBW-4805SD2	18-75	5	53	±5	0	±200	80	±470uF
VBW-4812SD2	18-75	5	52	±12	0	±85	81	±100uF
VBW-4815SD2	18-75	5	50	±15	0	±65	84	±47uF

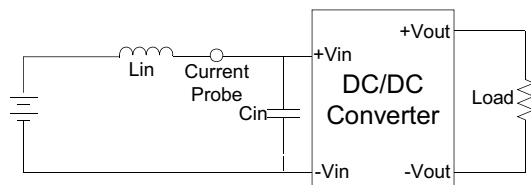
## NOTE

1. Operation at no load condition will not damage the product ; however, it will not meet all specifications.
2. One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
3. Operation at lower load and no load may have bigger ripple and noise.
4. Test by minimal Vin and constant resistive load.
5. Test by normal Vin and 100%-25% load, 25% load step change; If the output voltage is 3.3V then the Transient Response Deviation is ±5%.
6. Measured Input reflected ripple current with a simulated source inductance of 12μH and a source capacitor Cin(47μF, ESR<1.0Ω at 100KHz).
7. Exceeding the absolute ratings of the unit could cause damage. It's not allowed for continuous operating ratings.
8. Input filter components are required to help meet conducted emission class A, which application refer to the EMI Filter of design & feature configuration.
9. An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.  
The filter capacitor Motien suggest: Nippon - chemi - con KY series, 220μF/100V.

## TEST CONFIGURATIONS

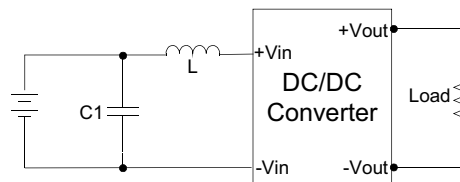
## Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor  $L_{in}$  ( $12\mu H$ ) and a source capacitor  $C_{in}$  ( $47\mu F$ ,  $ESR < 1.0\Omega$  at  $100KHz$ ) at nominal input and full load.



## EMI Filter

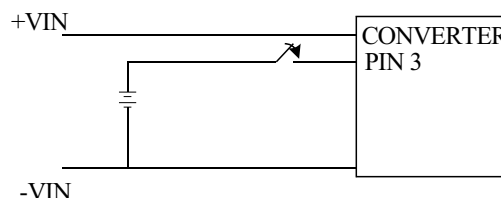
Input filter components ( $C1$ ,  $L$ ) are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



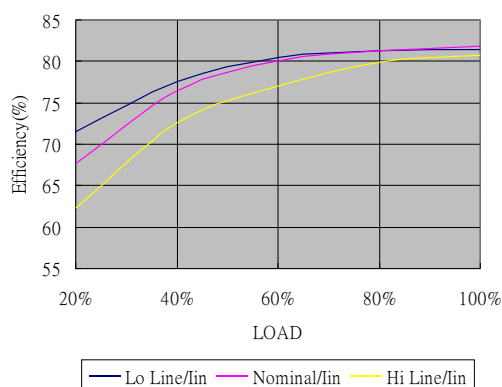
	C1	L
VBW-24XXXXXX	1210,225K/100V,X7R * 2PCS	6.8uH
VBW-48XXXXXX	1210,105K/100V,X7R	56uH

## CTRL Module ON / OFF

ON: 0~0.6Vdc or open circuit  
OFF: 2.7Vdc~15.0Vdc

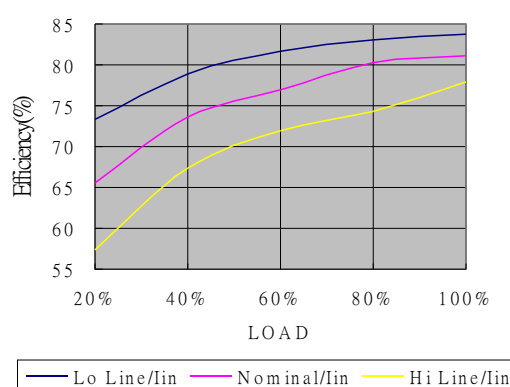


EFFICIENCY VS OUTPUT CURRENT



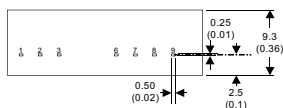
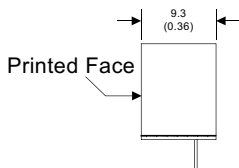
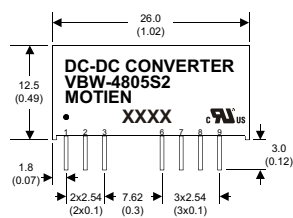
24 Models

EFFICIENCY VS OUTPUT CURRENT



48 Models

## MECHANICAL SPECIFICATIONS



### 9 Pin SIL Package Non-Conductive Plastic

All dimensions are typical in millimeters ( inches ).  
 1. Pin diameter:  $1.0 \pm 0.05$  (  $0.04 \pm 0.002$  )  
 2. Pin pitch and length tolerance:  $\pm 0.35$  (  $\pm 0.014$  )  
 3. Case Tolerance:  $\pm 0.5$  (  $\pm 0.02$  )

### 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	N.C	Common
8	N.C.	N.C.
9	-V Output	-V Output