

Features

- Wide 4 : 1 Input Voltage Range (9~36V,18~75V)
- Remote On/Off
- Input / Output Isolation Voltage: 1.5K VDC
- High Efficiency up to 89%
- Output Short Circuit Protection:
Hiccup & Auto Recovery
- Over Voltage Protection: Clamp Mode
- Over Temperature Protection
- Shielded Metal Case with Insulated Baseplate
- Lead Free Design, RoHS Compliant
- Adjustable Output Voltage
- Synchronous Rectifier Topology
- Customer Design Available
- Safety Standard / Approval : IEC / EN 60950-1



Description

The BWC40W Series are isolated 40W DC/DC converters. Designed with highly efficiency, allow the operating temperature range of these units to be -40°C to +85°C in a 50.8×50.8×10.2mm shielded metal case. Further features include wide 4 : 1 input voltage range, remote on/off control, short-circuit protection, over voltage protection and over temperature protection.

Applications

These converters are well suitable for battery operated equipment, measurement equipment, telecom, wireless network, Industry control system, everywhere where isolated, tightly regulated voltages and compact size are required.

Technical Specification

All specifications are typical at nominal input, full load and 25°C unless otherwise stated.

Model Number	Input Voltage Range	Output Voltage (V)	Output Current (mA)		Input Current (mA)		Eff. ⁽²⁾ (%)	Capacitive Load, max. ⁽³⁾ (uF)
			Min. Load ⁽¹⁾	Full. Load	No Load	Full Load		
BWC40-24S0W	9~36V Nominal:24V	3.3	0	10000	88	1677	86	28000
BWC40-24S1W		5	0	8000	119	2008	87	18000
BWC40-24S2W		12	0	3350	122	2018	87	3800
BWC40-24S3W		15	0	2650	112	1972	88	3000
BWC40-24D2W		±12	0	±1650	58	2012	86	2200
BWC40-24D3W		±15	0	±1350	77	2058	86	1200
BWC40-48S0W	18~75V Nominal:48V	3.3	0	10000	49	838	86	28000
BWC40-48S1W		5	0	8000	57	992	88	18000
BWC40-48S2W		12	0	3350	60	997	88	3800
BWC40-48S3W		15	0	2650	57	974	89	3000
BWC40-48D2W		±12	0	±1650	53	994	87	2200
BWC40-48D3W		±15	0	±1350	60	1017	87	1200

Input Specifications			
Input voltage	24V nominal input	9-36V	
	48V nominal input	18-75V	
Input filter	Pi type		
Input surge voltage (100ms max.)	24V input	50V	
	48V input	100V	
Input reflected ripple current	Nominal Vin and full load	67mAp-p typ.	
Start up time	Nominal Vin and constant resistive load	69ms typ.	
Remote ON/OFF	Converter: ON	Open or $3.5V < V_r < 12V$	
	Converter: OFF	Short ⁽⁴⁾ or $0V < V_r < 0.7V$	
Sourcing current of remote control pin	Nominal Vin	< 0.2 mA	
Idle input current (at Remote OFF state)	Nominal Vin	< 20 mA	
Environmental Specifications			
Operating ambient temperature	-40°C to +85°C (with derating)		
Maximum case temperature	+105°C		
Storage temperature range	-55°C to +125°C		
Relative humidity	95% RH max.		
Temperature coefficient	±0.02% / °C max.		
Output Specifications			
Output power	40.2 Watts max.		
Voltage accuracy	Full load and nominal Vin	±1%	
Minimum load	See table		
Line regulation	LL to HL at full load		±0.5%
	25% load to full load	Single	±0.5%
Load Regulation	Balanced load	Dual	±0.5%
	Unbalanced load 25% to 100% full load		±3%
Ripple and Noise (20MHz Bandwidth)	85mVp-p max.		
Over voltage protection (Zener Diode Clamp)	3.3Vout models		3.9V
	5Vout models		6.2V
	12Vout models		15V
	15Vout models		18V
Capacitive load	See table		
Over load protection	% of full load at nominal input		110% min.
Thermal shutdown	110°C typ.		
Short circuit protection	Hiccup, automatic recovery		
Transient response settling time	50% load step change		380µs typ.
Transient response over shoot	di/dt=0.8A/µs		≤ ±5% of Vo

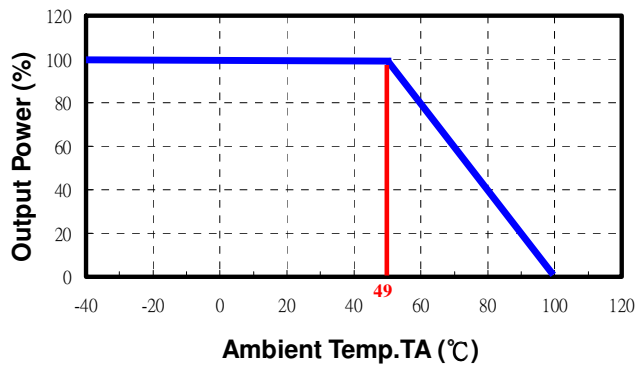
General Specifications

Efficiency	Nominal input	See table
Isolation voltage	Input to output	1500VDC
Isolation resistance	500VDC	10^9 Ohms min.
Isolation capacitance		1200pF typ.
Switching frequency		300kHz typ.
Reliability, calculated MTBF		9.68×10^5 Hrs

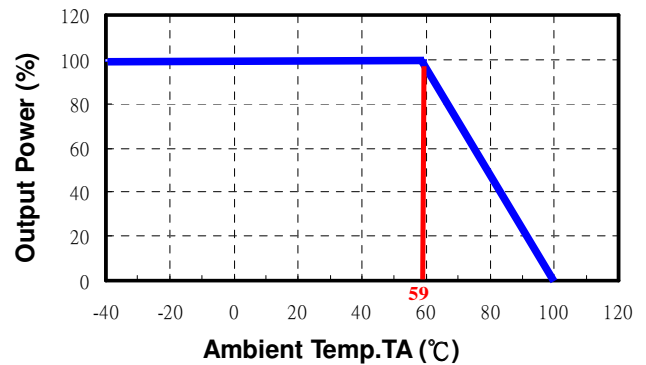
Physical Specifications

Case material	Nickel-coated copper
Base material	FR4 PCB
Potting material	Silicon rubber (UL94 V-0)
Dimensions	2.0 × 2.0 × 0.4 Inch (50.8 × 50.8 × 10.2 mm)
Weight	60g (2.11oz) typ.

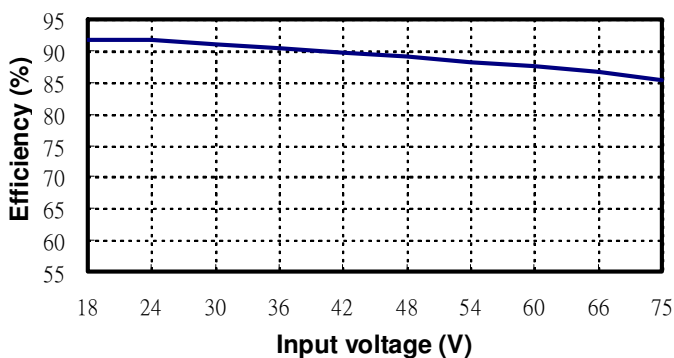
BWC40W Series
Power Derating Curve without Heatsink⁽⁵⁾



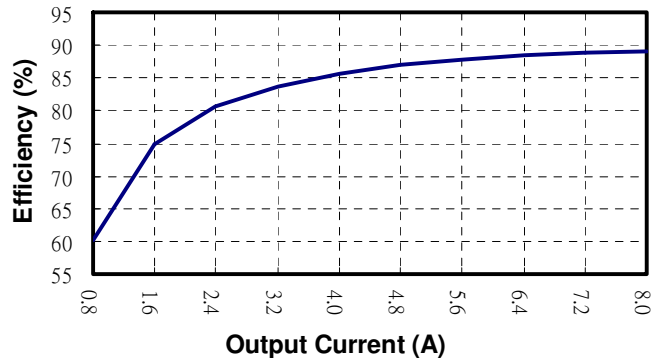
BWC40W Series
Power Derating Curve with Heatsink⁽⁵⁾



BWC40-48S1W
Input voltage vs. Efficiency

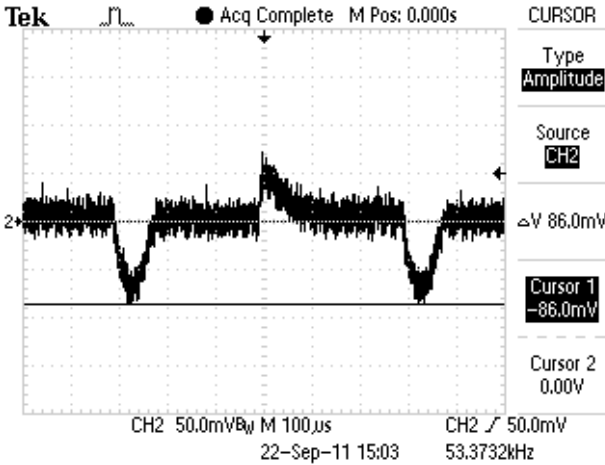


BWC40-48S1W
Output Current vs. Efficiency



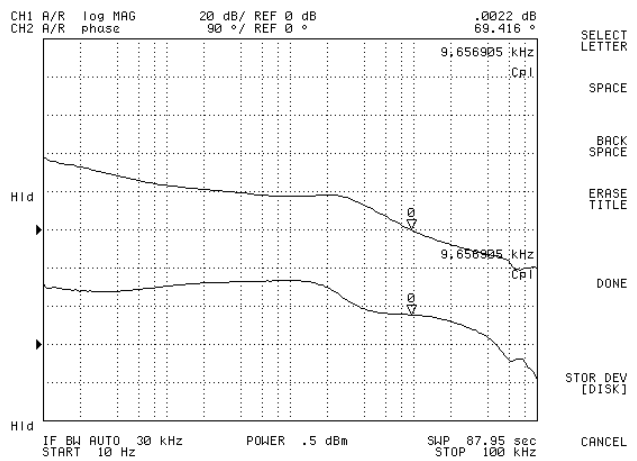
BWC40-48S1W

Transient Response at 50%~100% Max Load



BWC40-48S1W

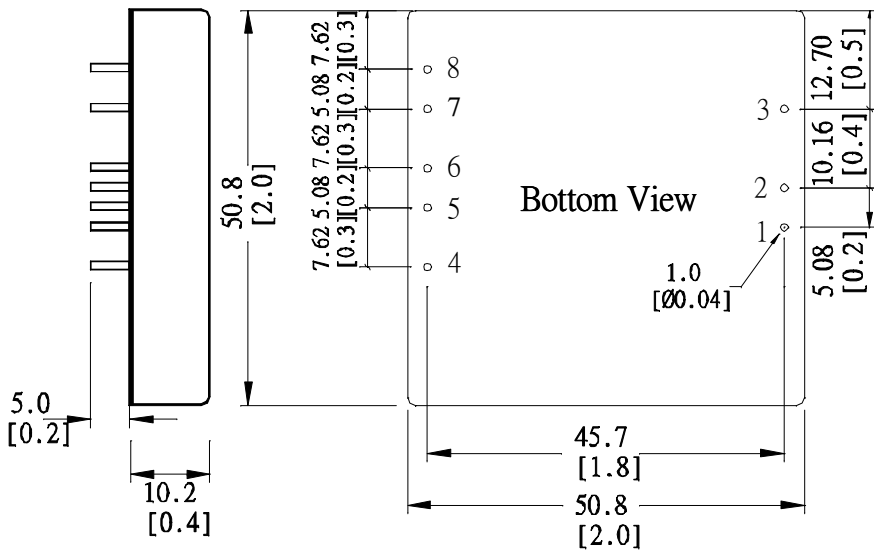
Loop Gain & Phase at Vi=48V, Full Load



Note

1. Io below this value will not damage these converters, however, they may not meet all listed specifications.
2. Typical value, tested at nominal input and full load.
3. For each output.
4. Short to -Vin (Pin 2).
5. Based on BWC40-48S1W.

Mechanical Dimensions



Unit: mm [inch]
 Tolerance: ±0.5 [±0.02]

Pin Assignment		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	Remote On/Off	
4	-Sense	+Vout
5	+Sense	Common
6	+Vout	Common
7	-Vout	-Vout
8	Trim	

Heat-sink

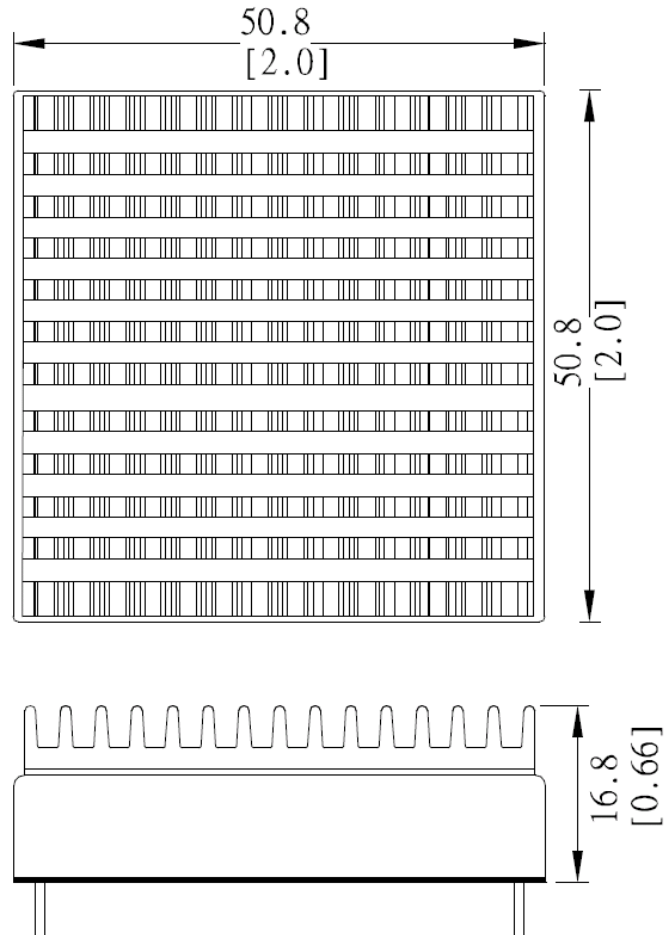
Material: Aluminum

Weight: 19g (0.67oz) (without converter)

Note:

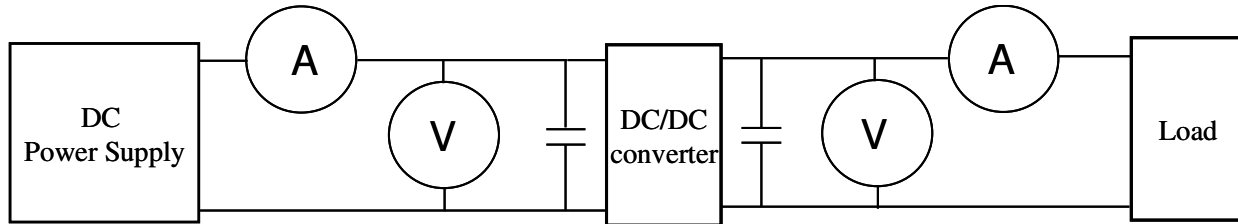
The product label on converter has to be removed before mounting the heat-sink.

For volume orders, converters will be supplied with heat-sink already mounted. Please contact factory for quotation.



Test Configurations

All specifications are typical at nominal input, full load and 25 °C unless otherwise stated.



- ⊙DC Power Supply: It offers a wide voltage and current range precisely.
- ⊙Current meter (A): Accuracy → 200μA ~ 200mA 4 ranges+(0.2% rdg + 2 digits)
2000mA ~ 20A 2 ranges+(0.3% rdg + 2 digits).
- ⊙Voltage meter (V): Accuracy → ±(0.03% rdg + 4 digits).
- ⊙Load: At full load.
- ⊙Wires: The resistance of the wires must be small.

1. Input voltage range: Narrow input voltage range (±10%) 、 wide input voltage range (2:1 and 4:1) ◦

EX: Narrow input voltage range (±10%)

5V nominal input	→	4.5~5.5V
12V nominal input	→	10.8~13.2V
24V nominal input	→	21.6~26.4V

Wide input voltage range 2:1

5V nominal input	→	4.5~9V
12V nominal input	→	9~18V
24V nominal input	→	18~36V
48V nominal input	→	36~75V

Wide input voltage range 4:1 (W)

24V nominal input	→	9~36V
48V nominal input	→	18~75V

2. Input power :

$$P_{in} = V_{in} \times I_{in}$$

V_{in} : Input voltage

I_{in} : Input current

3. Output power :

$$P_{out} = V_{out} \times I_{out}$$

V_{out} : Output voltage

I_{out} : Output current

4. Efficiency :

$$\text{Efficiency} = \frac{P_{out}}{P_{in}} \times 100\%$$

P_{out} : Output power

P_{in} : Input power

5. Voltage accuracy:

$$\frac{|V_{out} - V_{out(nominal)}|}{V_{out}} \times 100\%$$

V_{out} : Output voltage

$V_{out(nominal)}$: Nominal output voltage

6. **Line regulation:** (1) Wide input voltage range and regulated output voltage series.

$$\frac{|V_{out(LL)} - V_{out(HL)}|}{V_{out(LL)}} \times 100\%$$

LL: Low Line input voltage
HL: High Line input voltage

(2) Narrow input voltage range ($\pm 10\%$) and unregulated output voltage series.

$$\text{Line regulation} = \left| \frac{\Delta V_{out}}{\Delta V_{in}} \right|$$

$$\Delta V_{out} = \frac{V_{out(+10\%)} - V_{out(-10\%)}}{V_{out}} \times 100\%$$

$V_{out(+10\%)}$: Output voltage at $V_{in} = 1.1 \times V_{in}(\text{nominal})$ & full load

$V_{out(-10\%)}$: Output voltage at $V_{in} = 0.9 \times V_{in}(\text{nominal})$ & full load

V_{out} : Output voltage at $V_{in} = V_{in}(\text{nominal})$ & full load

$$\Delta V_{in} = \frac{V_{in(+10\%)} - V_{in(-10\%)}}{V_{in}(\text{nominal})} \times 100\%$$

$V_{in(+10\%)}$: Input voltage = $1.1 \times V_{in}(\text{nominal})$

$V_{in(-10\%)}$: Input voltage = $0.9 \times V_{in}(\text{nominal})$

$V_{in}(\text{nominal})$: Nominal Input voltage

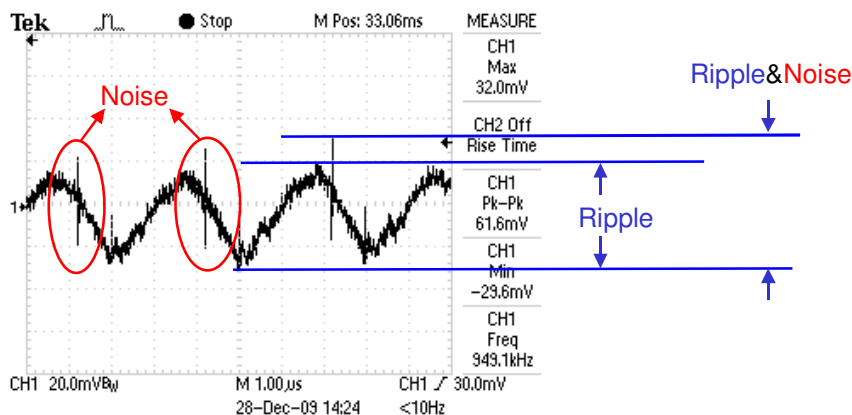
7. **Load regulation :**

$$\frac{|V_{out(FL)} - V_{out(NL)}|}{V_{out(FL)}} \times 100\%$$

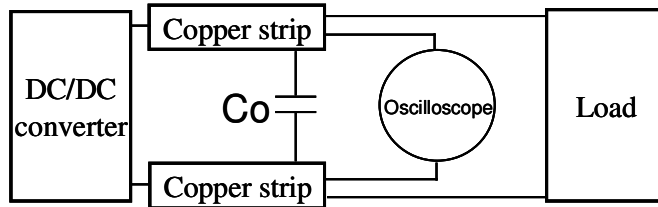
$V_{out(FL)}$: Output voltage at full load

$V_{out(NL)}$: Output voltage at 25% full load or 10% full load

8. **Ripple and Noise:** as shown below. The bandwidth is 0-20MHz.

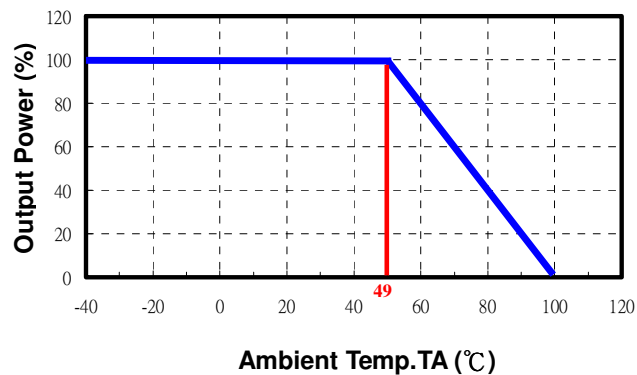


Output Ripple&Noise measurement test circuit: as shown below.



Co: usually 0.47uF.

9. [Temperature derating curve](#): The DC-DC converter will operate over a wider temperature range if less power is drawn from the output and the device is already running. The temperature derating curve shows the operating power-temperature range. As shown below.



10. [Switching frequency](#): The nominal operating frequency of the DC-DC converters.
11. [Input to output isolation](#): The dielectric breakdown strength test between input and output circuits. This is the isolation voltage the device is capable of withstanding for a specified time, usually 1 second or 1 minute.