



## Isolated DC-DC Converters BWA40 Series -- 40Watt

### Features

- Wide 2 : 1 Input Voltage Range (9~18V, 18~36V, 36~75V)
- Remote On/Off
- Input / Output Isolation Voltage: 1.5K Vdc
- High Efficiency up to 90%
- 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
- Optional Heat-sink
- Customer Design Available



### Description

The BWA40 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 2 : 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 (Vdc) | Output Current (mA)      |            | Input Current (mA) |           | Eff. <sup>(2)</sup> (%) | Capacitive Load, max. <sup>(3)</sup> (uF) |
|--------------|-------------------------|----------------------|--------------------------|------------|--------------------|-----------|-------------------------|-------------------------------------------|
|              |                         |                      | Min. Load <sup>(1)</sup> | Full. Load | No Load            | Full Load |                         |                                           |
| BWA40-12S0   | 9~18V<br>Nominal:12VDC  | 3.3                  | 0                        | 8000       | 158                | 2683      | 86                      | 38000                                     |
| BWA40-12S1   |                         | 5                    | 0                        | 8000       | 166                | 3968      | 88                      | 28000                                     |
| BWA40-12S2   |                         | 12                   | 0                        | 3300       | 48                 | 3976      | 87                      | 5000                                      |
| BWA40-12D2   |                         | ±12                  | 0                        | ±1800      | 144                | 4444      | 85                      | 2200                                      |
| BWA40-12D3   |                         | ±15                  | 0                        | ±1400      | 133                | 4321      | 85                      | 1800                                      |
| BWA40-24S0   | 18~36V<br>Nominal:24VDC | 3.3                  | 0                        | 8000       | 79                 | 1310      | 88                      | 38000                                     |
| BWA40-24S1   |                         | 5                    | 0                        | 8000       | 100                | 1938      | 90                      | 28000                                     |
| BWA40-24S2   |                         | 12                   | 0                        | 3300       | 34                 | 1919      | 90                      | 5000                                      |
| BWA40-24D2   |                         | ±12                  | 0                        | ±1800      | 66                 | 2118      | 89                      | 2200                                      |
| BWA40-24D3   |                         | ±15                  | 0                        | ±1400      | 67                 | 2059      | 89                      | 1800                                      |
| BWA40-48S0   | 36~75V<br>Nominal:48VDC | 3.3                  | 0                        | 8000       | 56                 | 655       | 88                      | 38000                                     |
| BWA40-48S1   |                         | 5                    | 0                        | 8000       | 66                 | 969       | 90                      | 28000                                     |
| BWA40-48S2   |                         | 12                   | 0                        | 3300       | 18                 | 959       | 90                      | 5000                                      |
| BWA40-48D2   |                         | ±12                  | 0                        | ±1800      | 31                 | 1047      | 90                      | 2200                                      |
| BWA40-48D3   |                         | ±15                  | 0                        | ±1400      | 28                 | 1017      | 90                      | 1800                                      |



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### Input Specifications

|                                          |                                         |                                           |
|------------------------------------------|-----------------------------------------|-------------------------------------------|
| Input voltage                            | 12V nominal input                       | 9-18Vdc                                   |
|                                          | 24V nominal input                       | 18-36Vdc                                  |
|                                          | 48V nominal input                       | 36-75Vdc                                  |
| Input filter                             |                                         | Pi type                                   |
| Input surge voltage<br>(100ms max.)      | 12V input                               | 25Vdc                                     |
|                                          | 24V input                               | 50Vdc                                     |
|                                          | 48V input                               | 100Vdc                                    |
| Input reflected ripple current           | Nominal Vin and full load               | 100mA <sub>p-p</sub> typ.                 |
| Start up time                            | Nominal Vin and constant resistive load | 78ms typ.                                 |
| Remote ON/OFF                            | Converter: ON                           | Open or $3.5V < V_r < 12V$                |
|                                          | Converter: OFF                          | Short <sup>(4)</sup> 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      | +100°C                         |
| Storage temperature range     | -55°C to +105°C                |
| Relative humidity             | 95% RH max.                    |
| Temperature coefficient       | ±0.02% / °C max.               |

### Output Specifications

|                                                |                                       |                            |
|------------------------------------------------|---------------------------------------|----------------------------|
| Output power                                   |                                       | 43.2 Watts max.            |
| Voltage accuracy                               | Full load and nominal Vin             | ±1%                        |
| Minimum load                                   |                                       | See table                  |
| Line regulation                                | LL to HL at full load                 | ±0.5%                      |
| Load Regulation                                | 25% load to full load                 | Single ±0.5%               |
|                                                | Balanced load                         | Dual ±0.5%                 |
|                                                | Unbalanced load 25% to 100% full load | ±3%                        |
| Ripple and Noise (20MHz Bandwidth)             | Single outputs                        | 50mV <sub>p-p</sub> max.   |
|                                                | Dual outputs                          | 85mV <sub>p-p</sub> max.   |
| Over voltage protection<br>(Zener Diode Clamp) | 3.3V <sub>out</sub> models            | 3.9V                       |
|                                                | 5V <sub>out</sub> models              | 6.2V                       |
|                                                | 12V <sub>out</sub> models             | 15V                        |
|                                                | 15V <sub>out</sub> models             | 18V                        |
| Capacitive load                                |                                       | See table                  |
| Over load protection                           | % of full load at nominal input       | 110% min.                  |
| Thermal shutdown                               |                                       | 115°C typ.                 |
| Short circuit protection                       |                                       | Hiccup, automatic recovery |
| Transient response settling time               | 50% load step change                  | 300μs typ.                 |



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Transient response over shoot  $di/dt=0.8A/\mu s$   $\leq \pm 5\%$  of  $V_o$

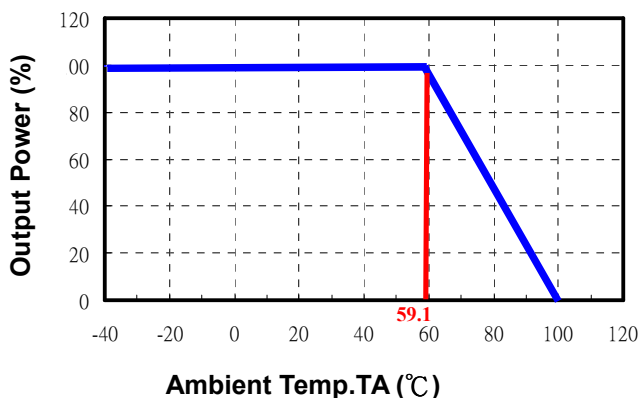
### General Specifications

|                              |                 |                        |
|------------------------------|-----------------|------------------------|
| 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 |                 | $9.17 \times 10^5$ Hrs |

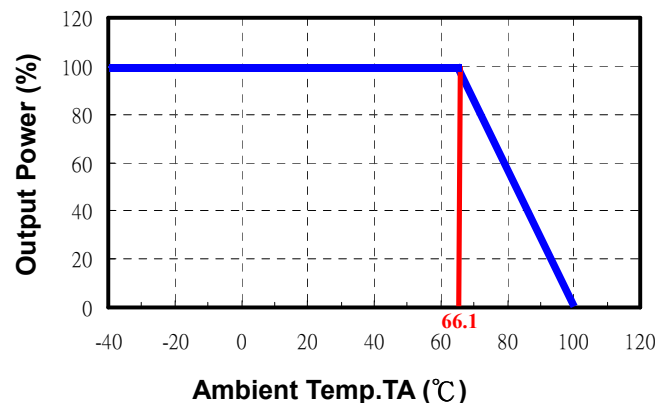
### Physical Specifications

|                  |                                                    |
|------------------|----------------------------------------------------|
| Case material    | Nickel-coated copper                               |
| Base material    | FR4 PCB                                            |
| Potting material | Silicon rubber (UL94 V-0)                          |
| Dimensions       | 2.00 × 2.00 × 0.40 Inch<br>(50.8 × 50.8 × 10.2 mm) |
| Weight           | 60g (2.11oz) typ.                                  |

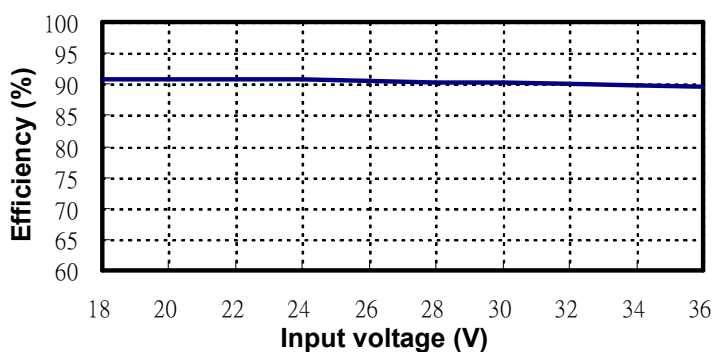
**BWA40 Series**  
Power Derating Curve without Heatsink<sup>(5)</sup>



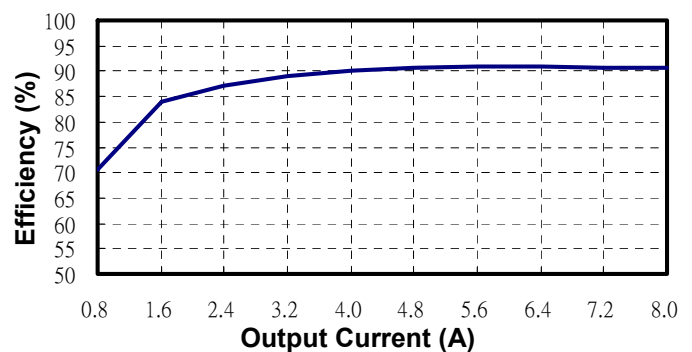
**BWA40 Series**  
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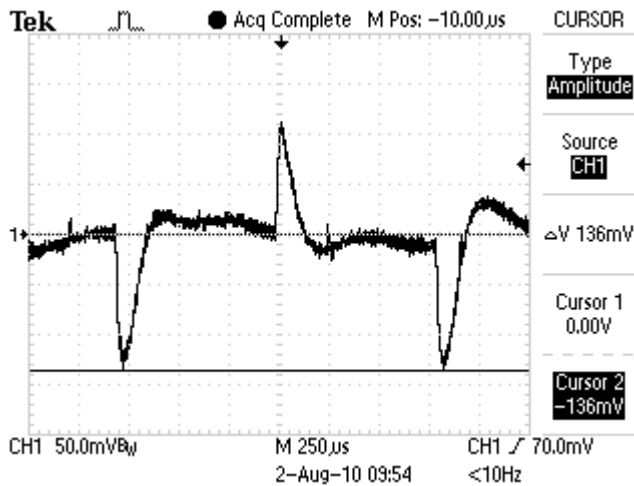
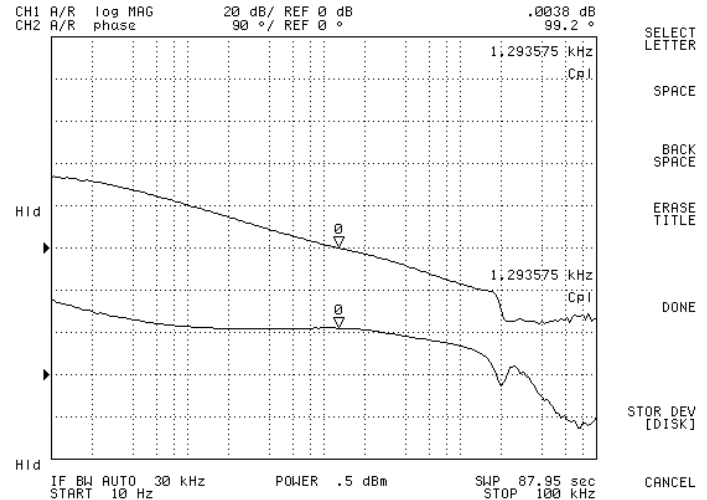


**BWA40-48S1**  
Input voltage vs. Efficiency

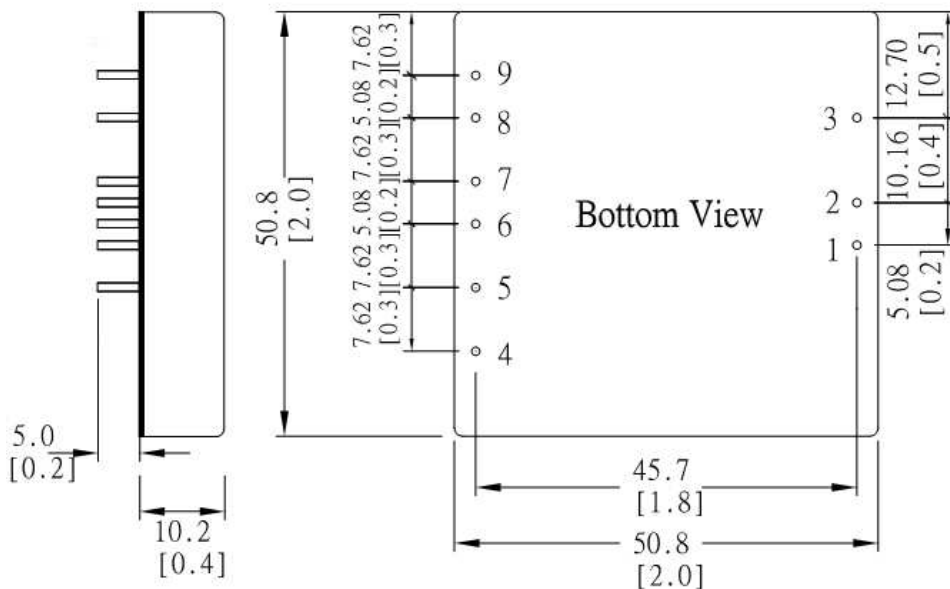


**BWA40-48S1**  
Output Current vs. Efficiency



**Isolated DC-DC Converters  
BWA40 Series -- 40Watt****BWA40-48S1****Transient Response at 50%~100% Max Load****BWA40-48S1****Loop Gain & Phase at Vi=48V, Full Load****Note**

1. To 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 BWA40-48S1.

**Mechanical Dimensions**

Unit: mm [inch]  
Tolerance:  $\pm 0.5 [\pm 0.02]$

| Pin Assignment |               |        |
|----------------|---------------|--------|
| Pin            | Single        | Dual   |
| 1              | +Vin          | +Vin   |
| 2              | -Vin          | -Vin   |
| 3              | Remote On/Off |        |
| 4              | No function   | No pin |
| 5              | -Sense        | +Vout  |
| 6              | +Sense        | Common |
| 7              | +Vout         | Common |
| 8              | -Vout         | -Vout  |
| 9              | Trim          |        |

Specifications subject to change without notice.

**Isolated DC-DC Converters**  
**BWA40 Series -- 40Watt****Heat-sink (Option)**

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.

Separate heat-sinks are only available for prototypes and small quantity orders.

