

## Features

- Wide 4 : 1 Input Voltage Range(9~36V,18~75V)
- High Efficiency up to 88%
- Remote On/Off
- Input / Output Isolation Voltage: 1.5kVDC
- Extended Operating Temperature Range: -40°C to+85°C
- Output Short Circuit Protection:  
Hiccup, continuous & Auto Recovery
- Over Voltage Protection: Clamp Mode
- Shielded Metal Case with Insulated Baseplate
- Lead Free Design, RoHS Compliant
- 6 pin DIP Package with Industry-Standard Footprint
- Standard 1"X1" Package
- Customer Design Available



## Description

The BRN10W Series are isolated 10W DC/DC converters. Designed with highly efficiency, allow the operating temperature range of these units to be -40°C to +85°C (with derating) in a 6 pin DIP package with industry-standard footprint. Further features include wide 4 : 1 input voltage range, remote on/off control, short-circuit protection and over voltage 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. <sup>(1)</sup> (%)	Capacitive Load, max. <sup>(2)</sup> (uF)
			Min. Load	Full. Load	No Load	Full Load		
BRN10-24S0W	9~36V Nominal:24V	3.3	0	2200	29	388	82	3300
BRN10-24S1W		5.0	0	2000	34	515	85	2200
BRN10-24S2W		12	0	830	39	494	88	680
BRN10-24S3W		15	0	660	41	491	88	330
BRN10-24S5W		24	0	410	44	494	87	100
BRN10-24D1W		±5	0	±1000	32	515	85	±1000
BRN10-24D2W		±12	0	±410	42	488	88	±470
BRN10-24D3W		±15	0	±330	43	497	87	±220
BRN10-48S0W	18~75V Nominal:48V	3.3	0	2200	16	199	80	3300
BRN10-48S1W		5.0	0	2000	18	261	84	2200
BRN10-48S2W		12	0	830	19	250	87	680
BRN10-48S3W		15	0	660	21	249	87	330
BRN10-48S5W		24	0	410	22	247	87	100
BRN10-48D1W		±5	0	±1000	17	261	84	±1000
BRN10-48D2W		±12	0	±410	20	247	87	±470
BRN10-48D3W		±15	0	±330	22	249	87	±220

**Input Specifications**

Input Voltage	24V nominal input	9-36V
	48V nominal input	18-75V
Input filter		Pi Type
Input surge voltage (100ms max.)	24V nominal input	50V
	48V nominal input	100V
Input reflected ripple current	Nominal Vin and full load	62mA <sub>p-p</sub> max.
Start up time	Nominal Vin and constant resistive load	77ms typ.
Remote ON/OFF	Converter: ON	Open or $3.5V < V_r < 12V$
	Converter: OFF	Short <sup>(3)</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	< 12 mA

**Environmental Specifications**

Operating ambient temperature	-40°C to +85°C (with derating)	
Maximum case temperature	+105°C max.	
Storage temperature range	-55°C to +125°C	
Relative humidity	95% RH max.	
Temperature coefficient	±0.02% / °C max.	

**Output Specifications**

Output power	10 Watts max.	
Voltage accuracy	Full load and nominal Vin	±1%
Minimum load	See table	
Line regulation	LL to HL at full load	±1.0%
	25% load to full load	Single ±1.0%
Load Regulation	Balanced load	Dual ±0.5%
	Unbalanced load 25% to 100% full load	±5%
Ripple and Noise	20MHz bandwidth	80mV <sub>p-p</sub> max.
	3.3V <sub>out</sub> models	3.9V
Over voltage protection (Zener Diode Clamp)	5V <sub>out</sub> models	6.2V
	12V <sub>out</sub> models	15V
	15V <sub>out</sub> models	18V
	24V <sub>out</sub> models	27V
Capacitive load	See table	
Over load protection	% of full load at nominal input	110% min.
Short circuit protection	Hiccup, continuous (Auto Recovery)	
Transient response settling time	50% load step change	550µs max.
Transient response over shoot	di/dt=0.8A/µs	≤ ±5% of V <sub>o</sub> (≤ ±6% for 3.3V <sub>out</sub> )



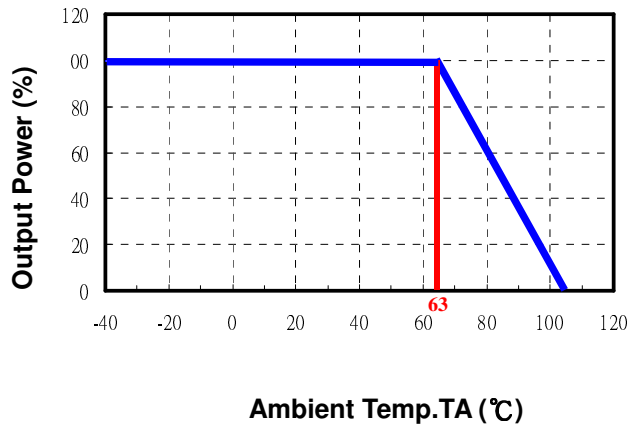
**General Specifications**

Efficiency	Nominal input	See table
Isolation voltage	Input to output	1500VDC
Isolation resistance	500VDC	10 <sup>9</sup> Ohms min.
Isolation capacitance		1100pF typ.
Switching frequency		330kHz typ.
Reliability, calculated MTBF		1.58 × 10 <sup>6</sup> Hrs

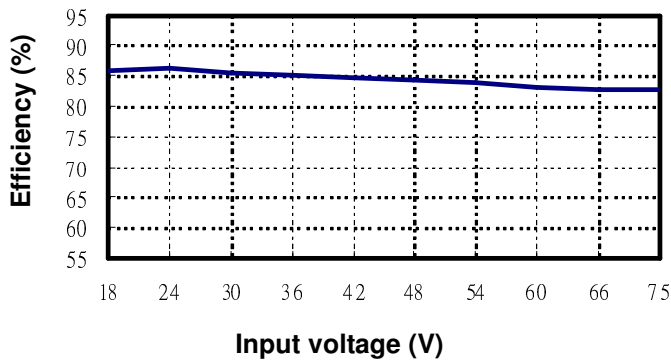
**Physical Specifications**

Case material	Nickel-coated copper
Base material	FR4 PCB
Potting material	Silicon rubber (UL94V-0)
Dimensions	1.0 × 1.0 × 0.4 Inch (25.4 × 25.4 × 10.2 mm)
Weight	17.4g (0.62oz) typ.

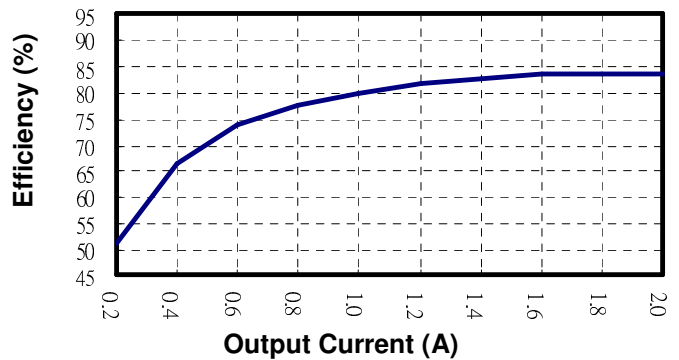
**BRN10W Series  
Power Derating Curve(5)**



**BRN10-48S1W  
Input voltage vs. Efficiency**



**BRN10-48S1W  
Output Current vs. Efficiency**



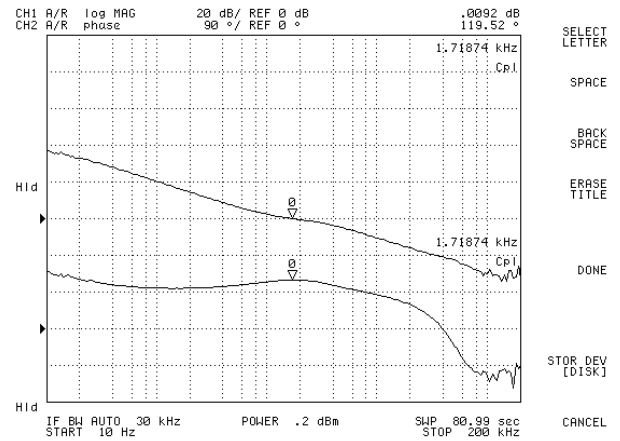
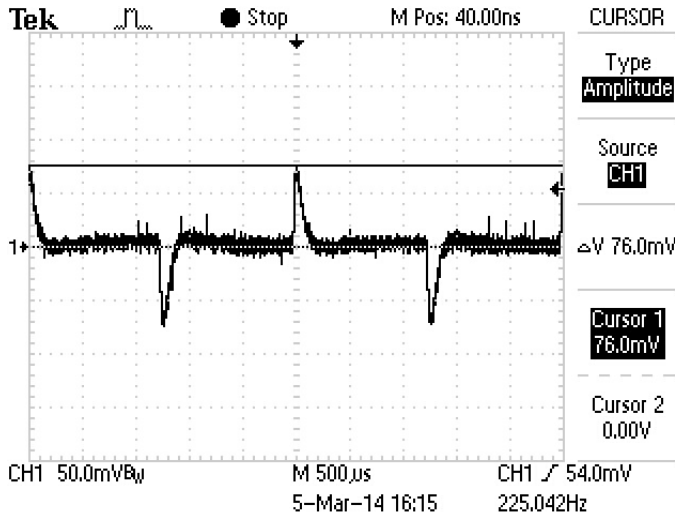


**BRN10-48S1W**

**BRN10-48S1W**

**Transient Response at 50%~100% Max Load**

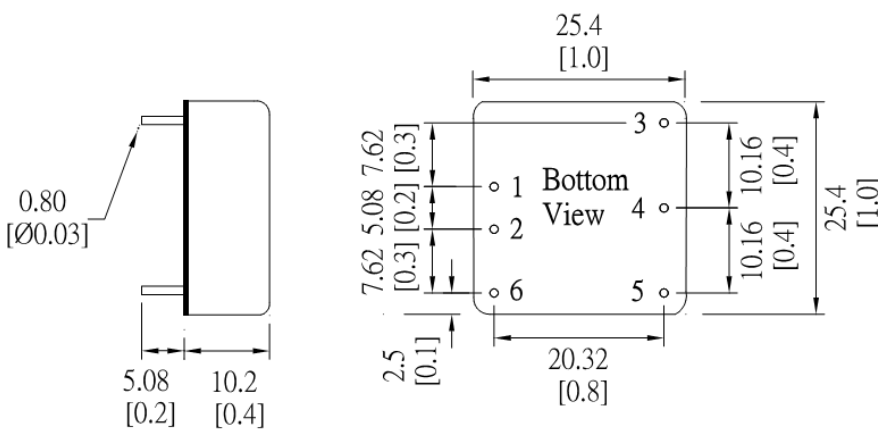
**Loop Gain & Phase at Vi=48V, Full Load**



**Note**

1. Typical value, tested at nominal input and full load.
2. For each output.
3. Short to -Vin (Pin 2).

**Mechanical Dimensions**



Pin Assignment		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	No pin	Common
5	-Vout	-Vout
6	Remote On/Off (optional)	

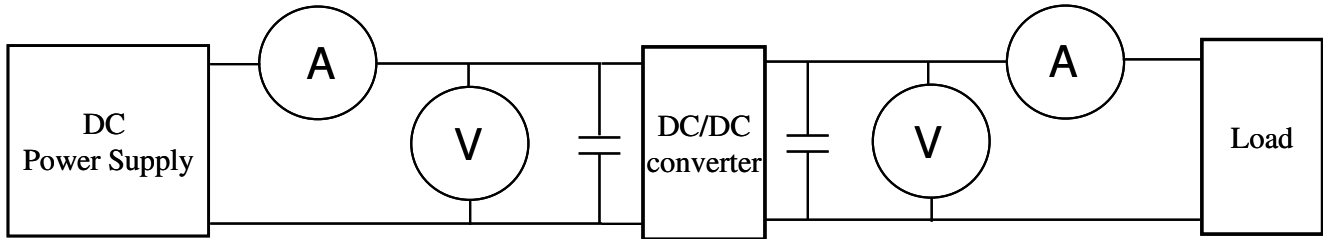
Unit: mm [inch]  
Tolerance: ±0.5 [0.02]

Specifications subject to change without noticed.



**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

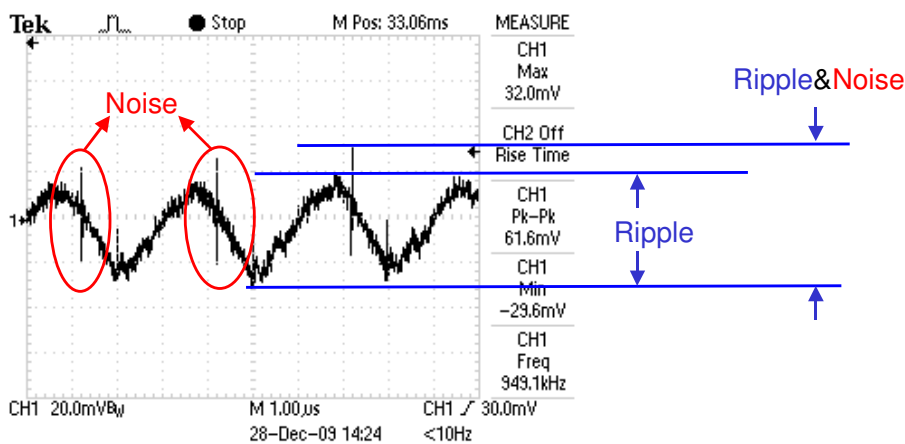
7. Load regulation :

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

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

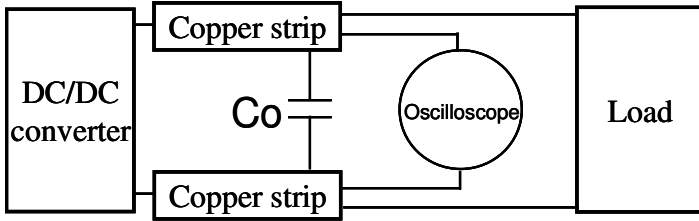
$V_{out(NL)}$ : Output voltage at 25% full load or 10% full load

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



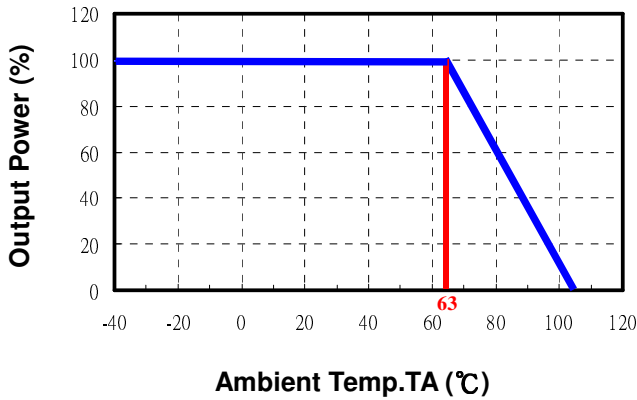


Output Ripple&Noise measurement test circuit: as shown below.



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.