

Features

- Wide 2 : 1 Input Voltage Range(9~18V,18~36V,36~75V)
- High Efficiency up to 89%
- 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 BRN10 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 2 : 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 (Vdc)	Output Current (mA)		Input Current (mA)		Eff. ⁽²⁾ (%)	Capacitive Load, max. ⁽³⁾ (uF)
			Min. Load ⁽¹⁾	Full. Load	No Load	Full Load		
BRN10-12S0	9~18V Nominal:12V	3.3	0	2200	40	766	83	3300
BRN10-12S1		5	0	2000	46	1016	86	2200
BRN10-12S2		12	0	830	49	976	89	680
BRN10-12S3		15	0	660	52	982	88	330
BRN10-12S5		24	0	410	53	976	88	100
BRN10-12D1		±5	0	±1000	44	1016	86	±1000
BRN10-12D2		±12	0	±410	51	965	89	±470
BRN10-12D3		±15	0	±330	60	982	88	±220
BRN10-24S0	18~36V Nominal:24V	3.3	0	2200	20	388	82	3300
BRN10-24S1		5	0	2000	21	508	86	2200
BRN10-24S2		12	0	830	21	494	88	680
BRN10-24S3		15	0	660	23	497	87	330
BRN10-24S5		24	0	410	25	494	87	100
BRN10-24D1		±5	0	±1000	20	514	85	±1000
BRN10-24D2		±12	0	±410	24	488	88	±470
BRN10-24D3		±15	0	±330	28	497	87	±220
BRN10-48S0	36~75V Nominal:48V	3.3	0	2200	16	199	80	3300
BRN10-48S1		5	0	2000	13	261	84	2200
BRN10-48S2		12	0	830	14	253	86	680
BRN10-48S3		15	0	660	17	255	85	330
BRN10-48S5		24	5	410	15	253	85	100
BRN10-48D1		±5	0	±1000	13	261	84	±1000
BRN10-48D2		±12	5	±410	16	250	86	±470
BRN10-48D3		±15	0	±330	18	255	85	±220



Input Specifications			
Input Voltage	12V nominal input		9-18V
	24V nominal input		18-36V
	48V nominal input		36-75V
Input filter			Pi Type
Input surge voltage (100ms max.)	12V nominal input		25V
	24V nominal input		50V
	48V nominal input		100V
Input reflected ripple current	Nominal Vin and full load		53mA _{p-p} max.
Start up time	Nominal Vin and constant resistive load		100ms typ.
Remote ON/OFF	Converter: ON	Open or 3.5V < Vr < 12V	
	Converter: OFF	Short ⁽⁴⁾ or 0V < Vr < 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 _{p-p} max.
Over voltage protection (Zener Diode Clamp)	3.3V _{out} models		3.9V
	5V _{out} models		6.2V
	12V _{out} models		15V
	15V _{out} models		18V
	24V _{out} 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		1300µs max.
Transient response over shoot	di/dt=0.8A/µs		≤ ±5% of Vo (≤ ±6% for 3.3V _{out})



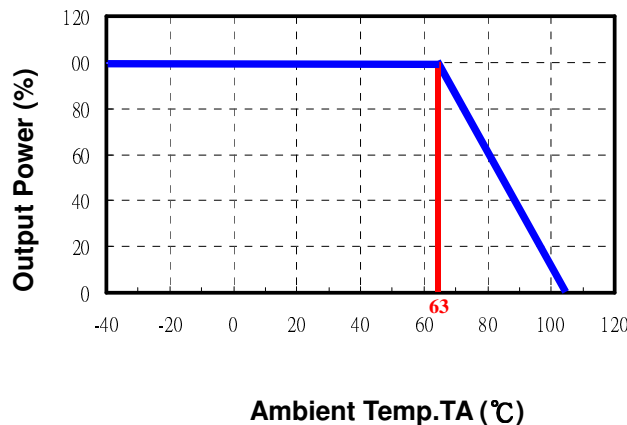
General Specifications

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

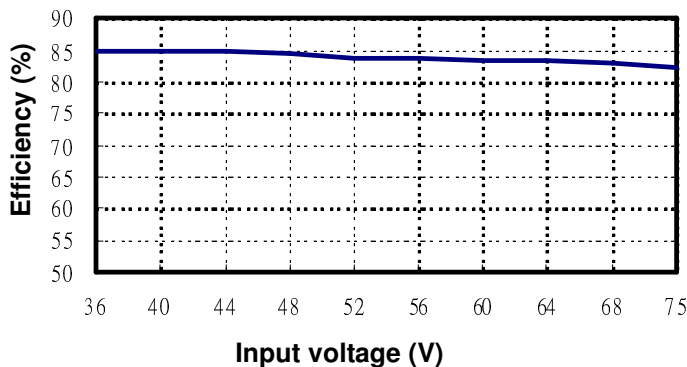
Physical Specifications

Case material	Nickel-coated copper
Base material	Non-conductive black plastic
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.

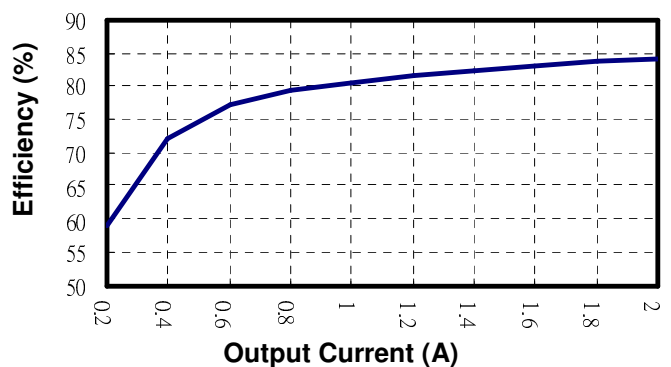
**BRN10 Series
Power Derating Curve(5)**



**BRN10-48S1
Input voltage vs. Efficiency**

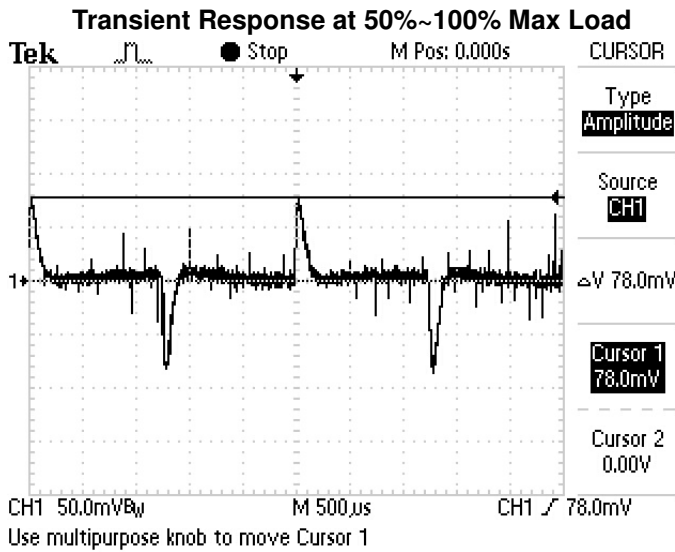


**BRN10-48S1
Output Current vs. Efficiency**

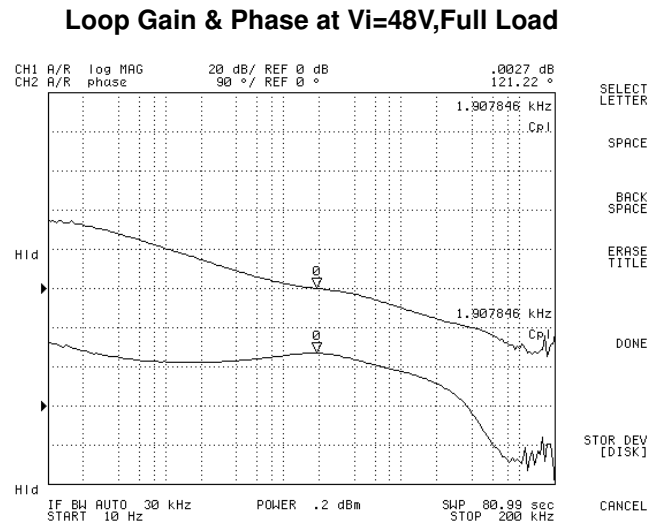




BRN10-48S1



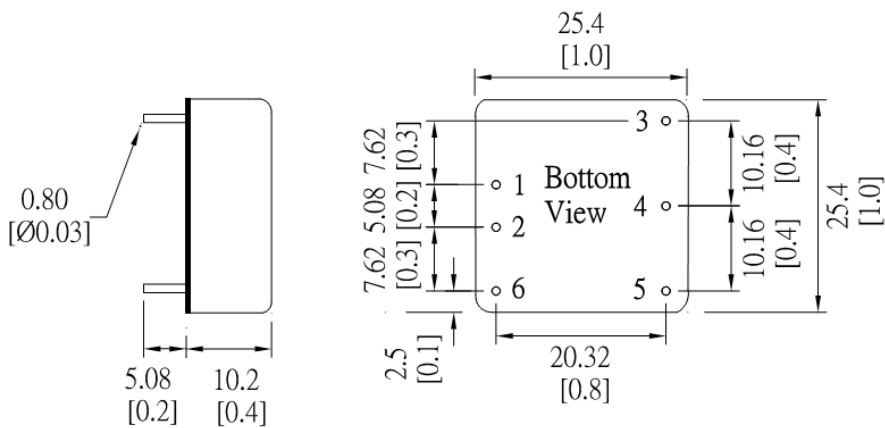
BRN10-48S1



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).

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)	

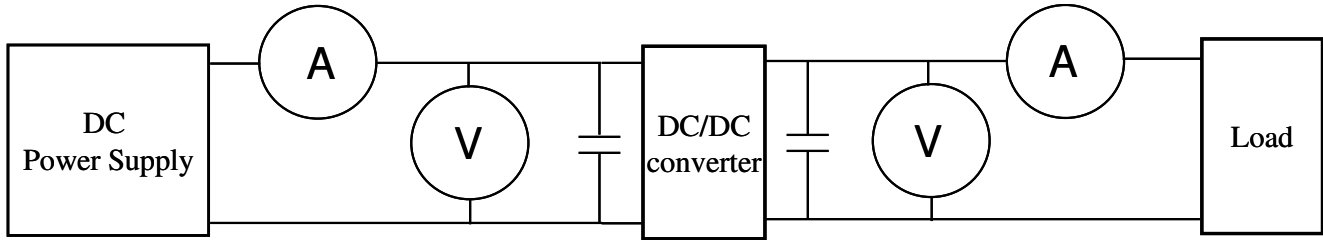
Unit: mm [inch]
Tolerance: ±0.5 [0.02]

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

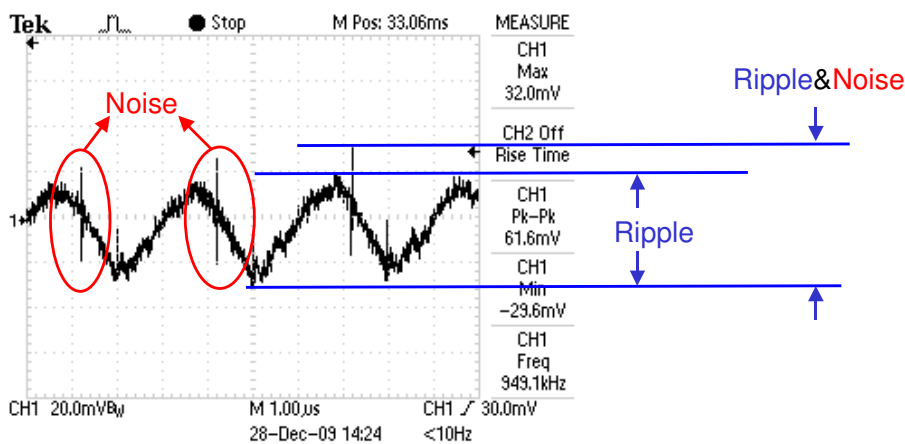
7. Load regulation :

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

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

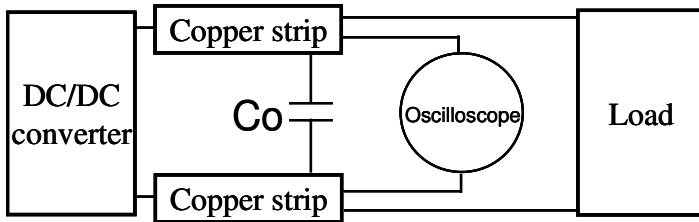
$V_{out(NL)}$: Output voltage at 25% full load or 10% full load

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



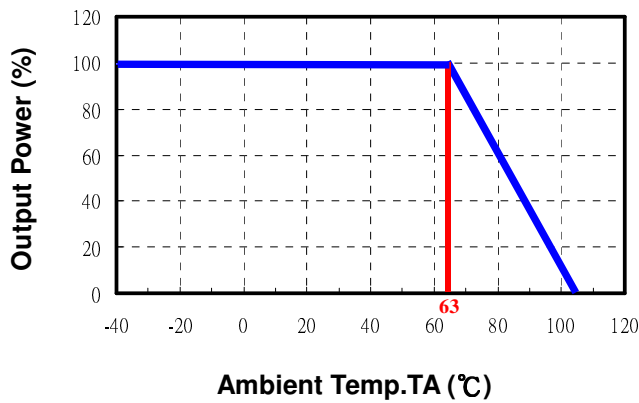


Output Ripple&Noise measurement test circuit: as shown below.



C_o : 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.