

Features

- Wide 4 : 1 Input Voltage Range(9~36V,18~75V)
- High Efficiency up to 89%
- Remote On/Off
- Input / Output Isolation Voltage: 1.5K VDC
- 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 2"X1" Package
- Customer Design Available
- Safety Standard / Approval : IEC / EN 60950-1



Description

The BUB15W Series are isolated 15W 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, trimmable output, 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. ⁽²⁾ (%)	Capacitive Load, max. ⁽³⁾ (uF)
			Min. Load ⁽¹⁾	Full. Load	No Load	Full Load		
BUB15-24S0W	9~36V Nominal:24V	3.3	0	4000	21	719	81	25760
BUB15-24S1W		5.1	44	3000	22	819	82	14320
BUB15-24S2W		12	44	1250	24	760	86	3168
BUB15-24S3W		15	24	1000	24	755	87	2000
BUB15-24D1W		±5	0	±1500	27	794	83	8800
BUB15-24D2W		±12	14	±625	24	752	87	1600
BUB15-24D3W		±15	0	±500	29	757	87	1040
BUB15-48S0W	18~75V Nominal:48V	3.3	0	4000	6.9	352	82	25760
BUB15-48S1W		5.1	49	3000	9.3	399	84	14320
BUB15-48S2W		12	42	1250	7.3	369	89	3168
BUB15-48S3W		15	24	1000	7.5	372	88	2000
BUB15-48D1W		±5	0	±1500	8.5	381	86	8800
BUB15-48D2W		±12	9	±625	9.2	369	89	1600
BUB15-48D3W		±15	0	±500	10	373	88	1040

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	50mA _{p-p} max.	
Start up time	Nominal Vin and constant resistive load	76ms 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	< 12 mA	
Environmental Specifications			
Operating ambient temperature	-40°C to +85°C (with derating)		
Maximum case temperature	+100°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	15 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	±0.5%
Load Regulation	Balanced load	Dual	±0.5%
	Unbalanced load 25% to 100% full load		±5%
Ripple and Noise	20MHz bandwidth	80mV _{p-p} max.	
	3.3V _{out} models	3.9V	
Over voltage protection (Zener Diode Clamp)	5.1V _{out} models	6.2V	
	12V _{out} models	15V	
	15V _{out} models	18V	
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	250µs max.	
		(1.2ms for 3.3V _{out})	
Transient response over shoot	di/dt=0.8A/µs	≤ ±5% of V _o	

($\leq \pm 6\%$ for 3.3Vout)

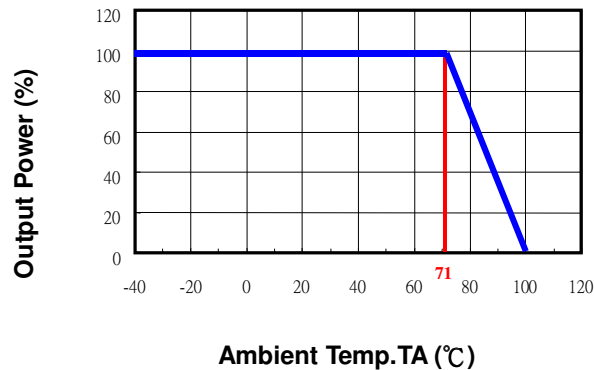
General Specifications

Efficiency	Nominal input	See table
Isolation voltage	Input to output	1500VDC
Isolation resistance	500VDC	10^9 Ohms min.
Isolation capacitance		1050pF typ.
Switching frequency		330kHz typ.
Reliability, calculated MTBF		1.85×10^6 Hrs

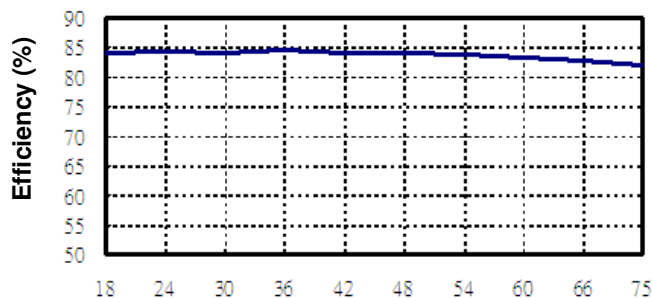
Physical Specifications

Case material	Nickel-coated copper
Base material	Non-conductive black plastic
Potting material	Silicon rubber (UL94V-0)
Dimensions	2.0 × 1.0 × 0.4 Inch (50.8 × 25.4 × 10.2 mm)
Weight	32.0g (1.13oz) typ.

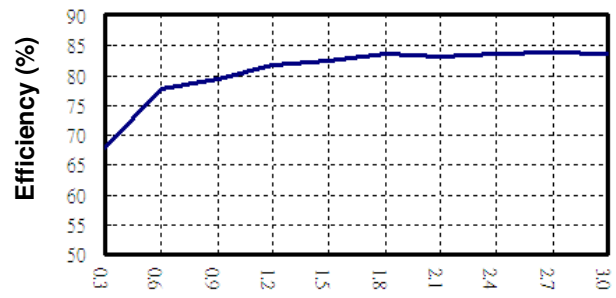
**BUB15W Series
Power Derating Curve(5)**



**BUB15-48S1W
Input voltage vs. Efficiency**



**BUB15-48S1W
Output Current vs. Efficiency**

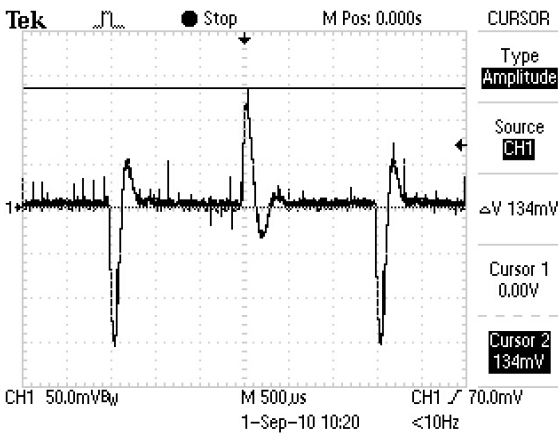


Input voltage (V)

Output Current (A)

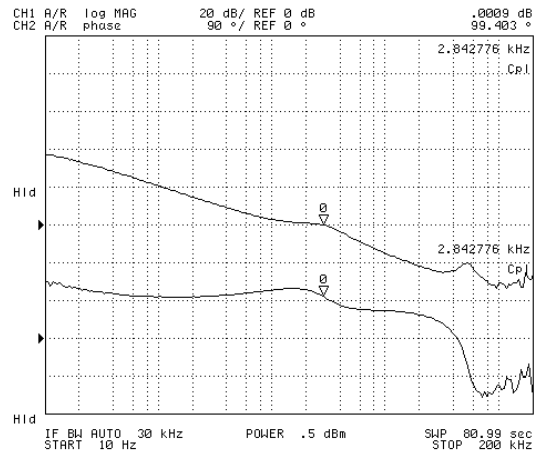
BUB15-48S1W

Transient Response at 50%~100% Max Load



BUB15-48S1W

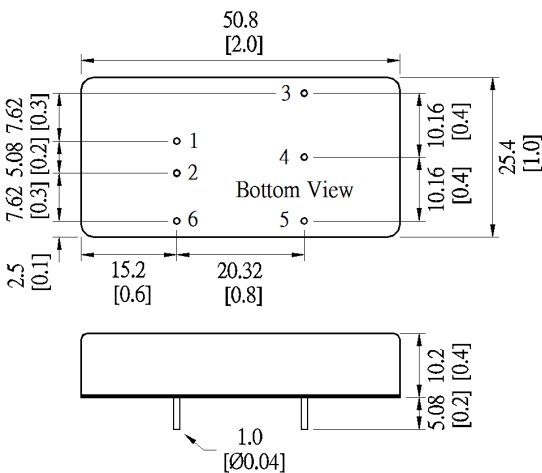
Loop Gain & Phase at Vi=48V, Full Load



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 BUB15-48S1W.

Mechanical Dimensions



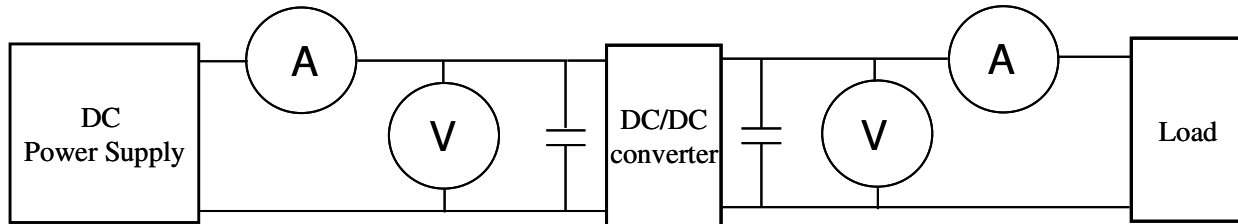
Unit: mm [inch]
Tolerance: ±0.5 [0.02]

Pin Assignment		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	Trim	Common
5	-Vout	-Vout
6	Remote On/Off (optional)	

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 $\pm(0.2\% \text{ rdg} + 2 \text{ digits})$
2000mA ~ 20A 2 ranges $\pm(0.3\% \text{ rdg} + 2 \text{ digits})$.
- ⊙Voltage meter (V): Accuracy → $\pm(0.03\% \text{ rdg} + 4 \text{ digits})$.
- ⊙Load: At full load.
- ⊙Wires: The resistance of the wires must be small.

1. Input voltage range: Narrow input voltage range ($\pm 10\%$) · wide input voltage range (2:1 and 4:1) ·

EX: Narrow input voltage range ($\pm 10\%$)

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:

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

V_{out} : Output voltage

$V_{out}(\text{nominal})$: 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

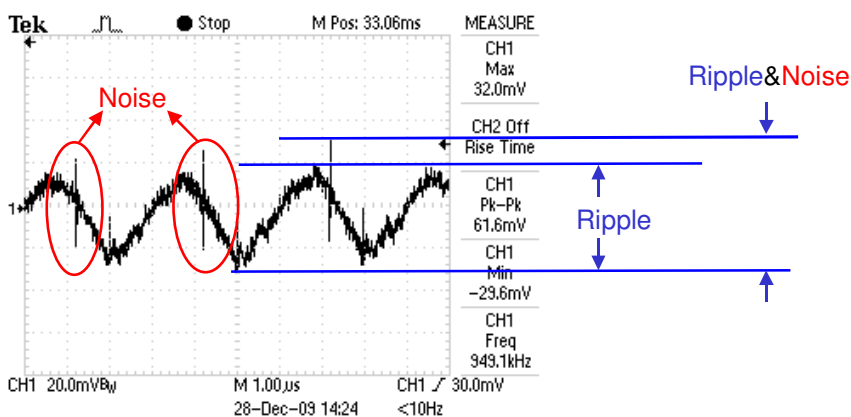
7. **Load regulation :**

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

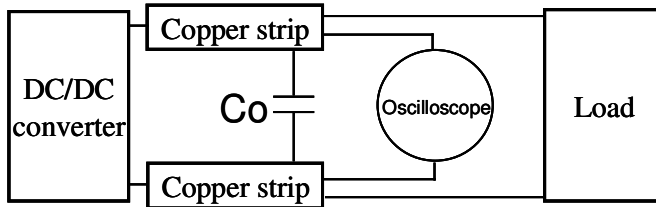
$V_{out(FL)}$: Output voltage at full load

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

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

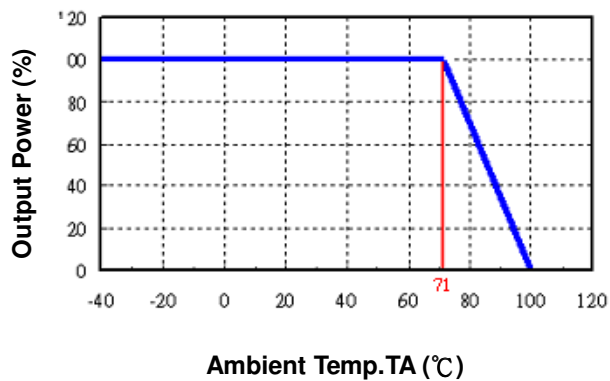


Output Ripple&Noise measurement test circuit: as shown below.



C_o : usually 0.47 μ F.

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.