

Features

- Wide 2 : 1 Input Voltage Range(9~18V,18~36V,36~75V)
- 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
- Customer Design Available
- Safety Standard / Approval : IEC / EN 60950-1



Description

The BUB15 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 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

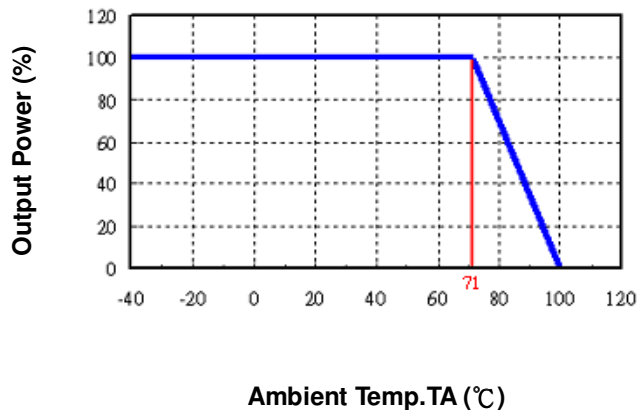
All specifications are typical at nominal input, full load and 25°C unless otherwise stated.

Model Number	Input Voltage Range	Output Voltage (V)	Output Current (mA)		Input Current (mA)		Eff. ⁽²⁾ (%)	Capacitive Load, max. ⁽³⁾ (uF)
			Min. Load ⁽¹⁾	Full. Load	No Load	Full Load		
BUB15-12S0	9~18V Nominal:12V	3.3	0	4000	64	1425	81	28000
BUB15-12S1		5	0	3000	89	1565	84	17760
BUB15-12S2		12	24	1250	91	1498	87	3680
BUB15-12S3		15	38	1000	87	1482	88	2104
BUB15-12D1		±5	0	±1500	83	1547	85	10080
BUB15-12D2		±12	±18	±625	88	1491	88	1920
BUB15-12D3		±15	0	±500	90	1484	88	1064
BUB15-24S0	18~36V Nominal:24V	3.3	0	4000	27	691	84	38320
BUB15-24S1		5	0	3000	31	768	85	19360
BUB15-24S2		12	0	1250	33	732	89	3784
BUB15-24S3		15	28	1000	30	725	90	2288
BUB15-24D1		±5	0	±1500	30	753	87	10288
BUB15-24D2		±12	0	±625	32	730	90	1600
BUB15-24D3		±15	0	±500	31	727	90	1144
BUB15-48S0	36~75V Nominal:48V	3.3	0	4000	12	353	82	36560
BUB15-48S1		5	0	3000	15	387	85	20560
BUB15-48S2		12	0	1250	15	368	89	4320
BUB15-48S3		15	24	1000	15	364	90	2368
BUB15-48D1		±5	0	±1500	16	380	86	8800
BUB15-48D2		±12	0	±625	16	368	89	1760
BUB15-48D3		±15	0	±500	16	365	90	1144

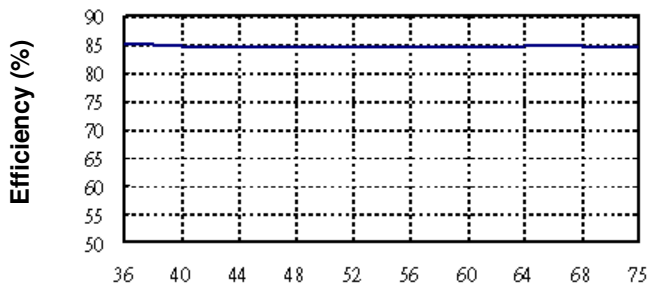
Input Specifications		
Input Voltage	12V nominal input	9-18V
	24V nominal input	18-36V
	48V nominal input	36-75V
Input filter		Pi Type
Input surge voltage (100ms max.)	12V nominal input	25Vdc
	24V nominal input	50Vdc
	48V nominal input	100Vdc
Input reflected ripple current	Nominal Vin and full load	100mA _{p-p} max.
Start up time	Nominal Vin and constant resistive load	80ms typ.
Remote ON/OFF	Converter: ON	Open or $3.5V < V_r < 12V$
	Converter: OFF	Short ⁽⁴⁾ or $0V < V_r < 0.5V$
Sourcing current of remote control pin	Nominal Vin	< 0.2 mA
Idle input current (at Remote OFF state)	Nominal Vin	< 15 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	5% to 95% RH	
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%	
Load Regulation	25% load to full load	Single ±0.5%
	Balanced load	Dual ±0.5%
	Unbalanced load 25% to 100% full load	
Ripple and Noise	20MHz bandwidth	
	80mV _{p-p} max.	
	3.3V _{out} models	3.9V
	5V _{out} models	6.2V
Over voltage protection (Zener Diode Clamp)	12V _{out} models	15V
	15V _{out} models	18V
	See table	
Capacitive load	See table	
Over load protection	% of full load at nominal input	150% typ.
Short circuit protection	Hiccup, continuous (Auto Recovery)	
Transient response settling time	50% load step change	1000µs max.
Transient response over shoot	di/dt=0.8A/µs	≤ ±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		550pF 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		2.0 × 1.0 × 0.4 Inch (50.8 × 25.4 × 10.2 mm)
Weight		32.0g (1.13oz) typ.

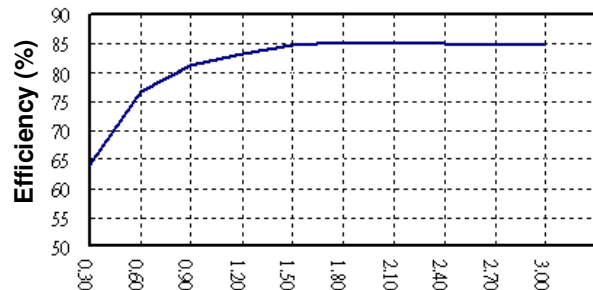
**BUB15 Series
Power Derating Curve(5)**



**BUB15-48S1
Input voltage vs. Efficiency**



**BUB15-48S1
Output Current vs. Efficiency**



Input voltage (V)

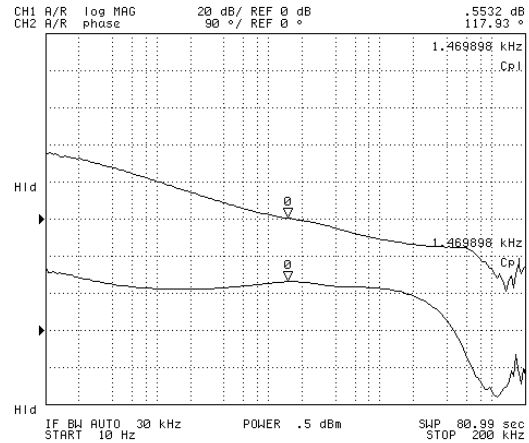
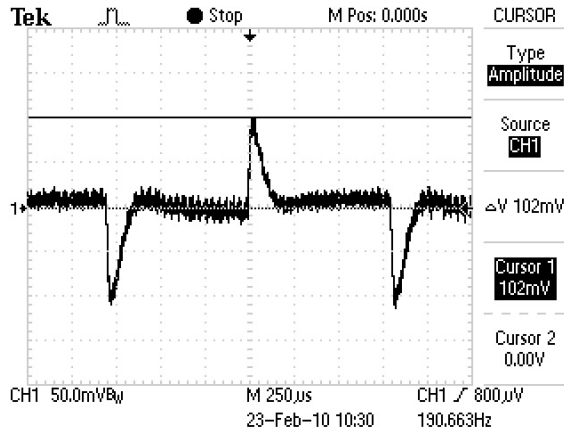
Output Current (A)

BUB15-48S1

BUB15-48S1

Transient Response at 50%~100% Max Load

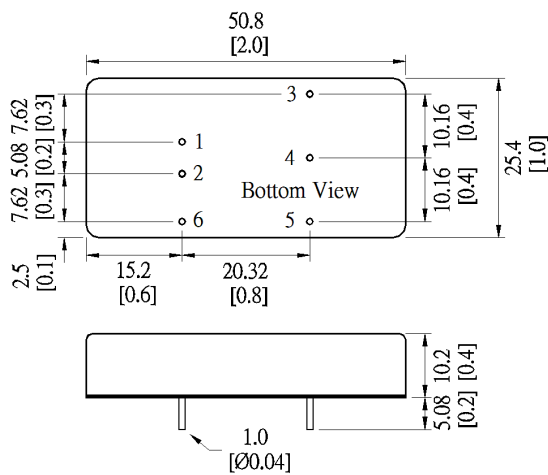
Loop Gain & Phase at $V_i=48V$, Full Load



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 BUB15-48S1.

Mechanical Dimensions



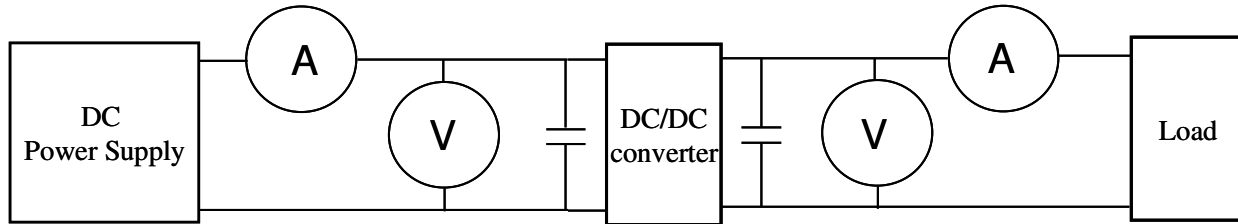
Unit: mm [inch]
Tolerance: ±0.5 [0.02]

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)	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

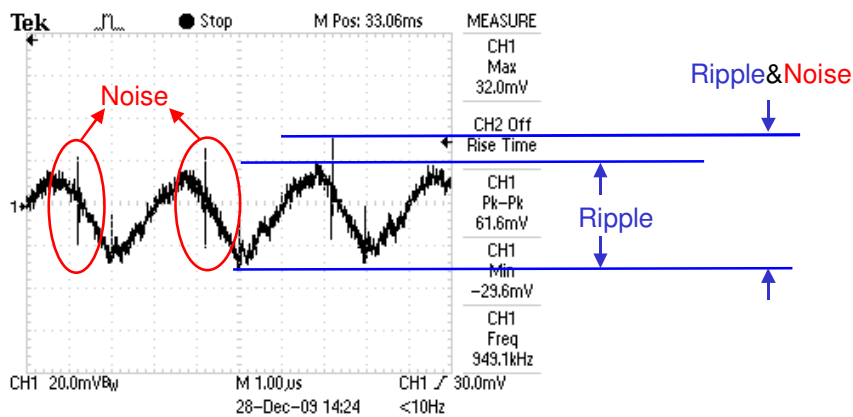
7. Load regulation :

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

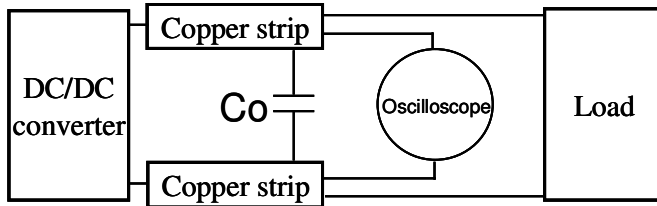
$V_{out(FL)}$: Output voltage at full load

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

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

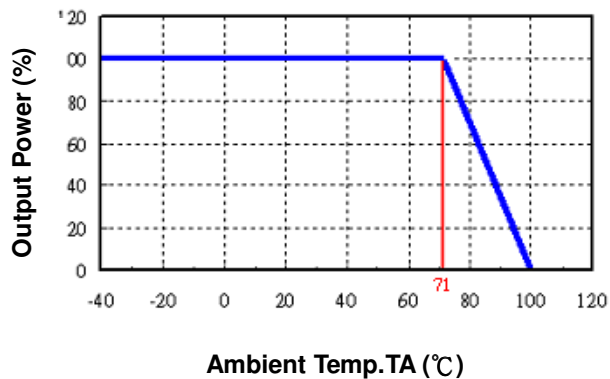


Output Ripple&Noise measurement test circuit: as shown below.



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.