## 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℃ to+85℃
- 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


RoHS compliant

### 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℃ to +85℃ (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℃ unless otherwise stated.

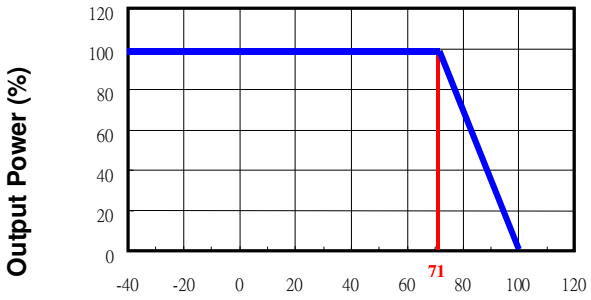
| Model Number | Input Voltage Range | Output Voltage (V) | Output Current (mA) | | Input Current (mA) | | Eff.(2) (%) | Capacitive Load, max.(3) (uF) |
|---|---|---|---|---|---|---|---|---|
| | | | Min. Load(1) | Full. Load | No Load | Full Load | | |
| BUB15-24S0W | 9~36V Nominal:24V | 3.3 | 0 | 4000 | 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 | 24V nominal input | 50V |
| (100ms max.) | 48V nominal input | 100V |
| Input reflected ripple current | Nominal Vin and full load | 50mAp-p max. |
| Start up time | Nominal Vin and constant resistive load | 76ms 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℃ to +85℃ (with derating) |
| Maximum case temperature | | +100℃ max. |
| Storage temperature range | | -55℃ to +125℃ |
| Relative humidity | | 95% RH max. |
| Temperature coefficient | | ±0.02% / ℃ 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% |
| Load Regulation | 25% load to full load Single | ±0.5% |
| | Balanced load Dual | ±0.5% |
| | Unbalanced load 25% to 100% full load | ±5% |
| Ripple and Noise | 20MHz bandwidth | 80mVp-p max. |
| Over voltage protection (Zener Diode Clamp) | 3.3Vout models | 3.9V |
| | 5.1Vout models | 6.2V |
| | 12Vout models | 15V |
| | 15Vout 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 3.3Vout) |
| Transient response over shoot | di/dt=0.8A/μs | ≤ ±5% of Vo |

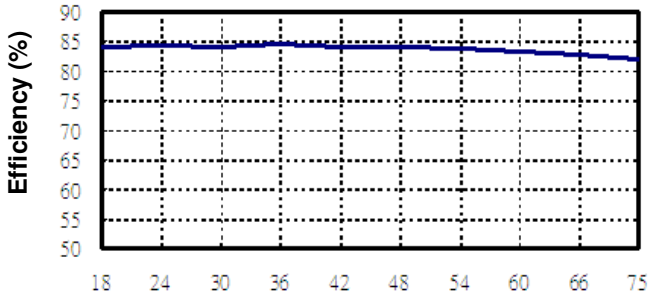
(≤ ±6% for 3.3Vout)

| 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 | | $1.85 \times 10^6$ 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<br>(50.8 × 25.4 × 10.2 mm) |
| Weight | | 32.0g (1.13oz) typ. |

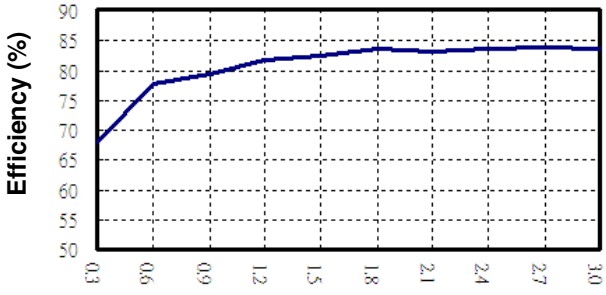
**BUB15W Series**
**Power Derating Curve(5)**




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



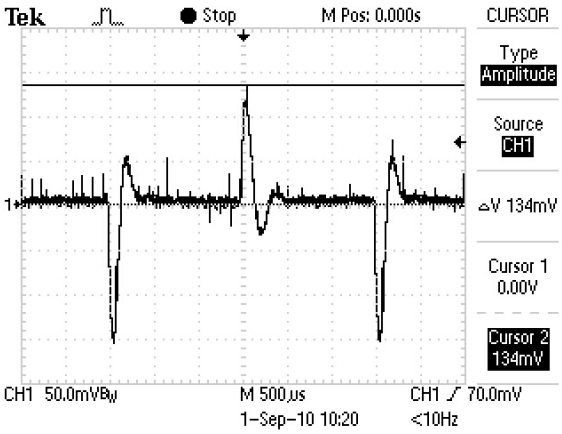

**BUB15-48S1W**
**Output Current vs. Efficiency**



**Input voltage (V)** **Output Current (A)**

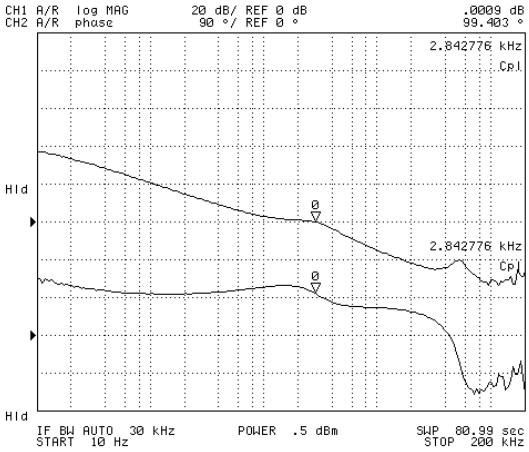
### BUB15-48S1W

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




### BUB15-48S1W

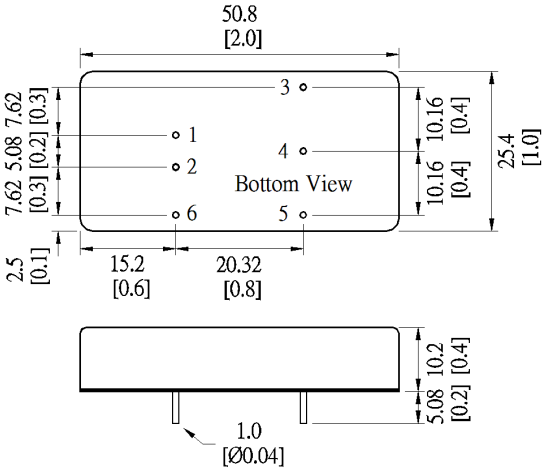
**Loop Gain & Phase at Vi=48V,Full Loa**




## 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



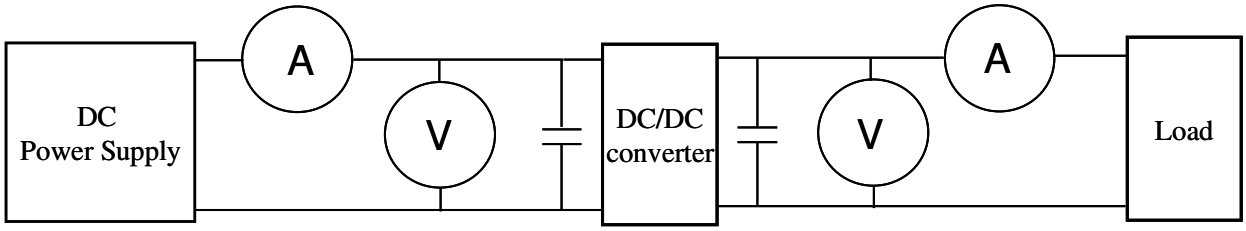

Unit: mm [inch]
Tolerance:±0.5[0.02]

| 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℃ 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 :

Pin = Vin x Iin

Vin：Input voltage
Iin：Input current

3. Output power :

Pout = Vout x Iout

Vout：Output voltage
Iout：Output current

4. Efficiency :

$$\text{Efficiency} = \frac{\text{Pout}}{\text{Pin}} \times 100\%$$

Pout: Output power
Pin: Input power

5. Voltage accuracy:

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

Vout：Output voltage
Vout(nominal)：Nominal output voltage

6. Line regulation: (1) Wide input voltage range and regulated output voltage series.

$$\frac{|\,Vout(LL)-Vout(HL)\,|}{Vout(LL)} \times 100\%$$

LL: Low Line input voltage
HL: High Line input voltage

(2) Narrow input voltage range（±10%）and unregulated output voltage series.

$$\text{Line regulation} = \left| \frac{\Delta Vout}{\Delta Vin} \right|$$

$$\Delta Vout = \frac{Vout(+10\%)-Vout(-10\%)}{Vout} \times 100\%$$

Vout(+10%)：Output voltage at Vin = 1.1xVin(nominal)&full load

Vout(-10%)：Output voltage at Vin = 0.9xVin(nominal)&full load

Vout：Output voltage at Vin = Vin(nominal)&full load

$$\Delta Vin = \frac{Vin(+10\%)-Vin(-10\%)}{Vin(nominal)} \times 100\%$$

Vin(+10%)：Input voltage = 1.1xVin(nominal)

Vin(-10%)：Input voltage = 0.9xVin(nominal)

Vin(nominal)：Nominal Input voltage

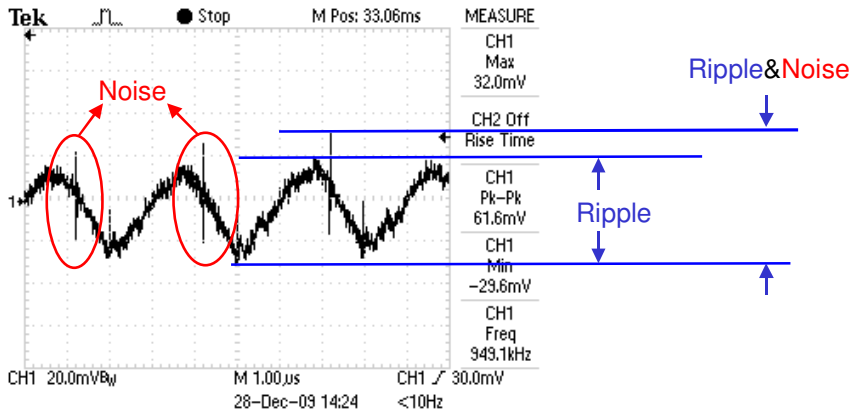
7. Load regulation :

$$\frac{|\,Vout(FL)-Vout(NL)\,|}{Vout(FL)} \times 100\%$$

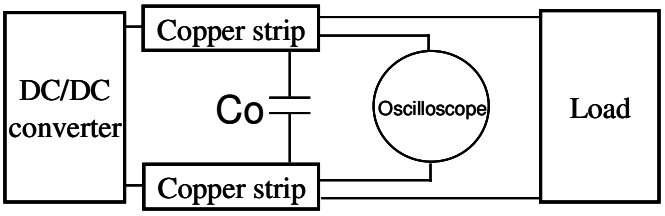
Vout(FL): Output voltage at full load

Vout(NL): Output voltage at 25% full load or 10% full load

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

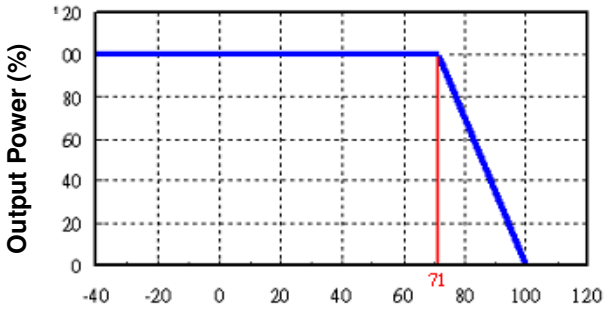


Output Ripple&Noise measurement test circuit: as shown below.




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.