

Features

- Wide 4 : 1 Input Voltage Range(9~36V,18~75V)
- High Efficiency up to 90%
- 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



Description

The BUC20W Series are isolated 20W 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, over voltage protection and over temperature 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		
BUC20-24S0W	9~36V Nominal:24V	3.3	0	5500	70	945	84	33000
BUC20-24S1W		5.1	0	4000	86	1012	88	18000
BUC20-24S2W		12	150	1670	38	1006	87	3300
BUC20-24S3W		15	80	1330	49	990	88	2200
BUC20-24D1W		±5	0	±2000	91	992	88	8200
BUC20-24D2W		±12	±25	±835	45	1006	87	1000
BUC20-24D3W		±15	0	±665	95	1002	87	900
BUC20-48S0W	18~75V Nominal:48V	3.3	0	5500	25	461	86	33000
BUC20-48S1W		5.1	0	4000	38	500	89	18000
BUC20-48S2W		12	90	1670	40	491	89	3300
BUC20-48S3W		15	55	1330	37	489	89	2200
BUC20-48D1W		±5	0	±2000	39	484	90	8200
BUC20-48D2W		±12	±10	±835	42	491	89	1000
BUC20-48D3W		±15	0	±665	43	495	88	900

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	100mAp-p typ.
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 $0V < V_r < 0.7V$
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	95% RH max.	
Temperature coefficient	±0.02% / °C max.	
Output Specifications		
Output power	20.4 Watts max.	
Voltage accuracy	Full load and nominal Vin	±1%
Minimum load	See table	
Line regulation	LL to HL at full load	
	±0.5%	
Load Regulation	25% load to full load	Single
	Balanced load	Dual
	Unbalanced load 25% to 100% full load	
		±0.5%
		±3%
Ripple and Noise	20MHz bandwidth	85mVp-p max.
	(Measured with a 2.2uF/50V MLCC)	
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	300µs typ.
		(1.8ms for 3.3Vout)
Transient response over shoot	di/dt=0.8A/µs	≤ ±5% of Vo
		(≤ ±8% for 3.3Vout)

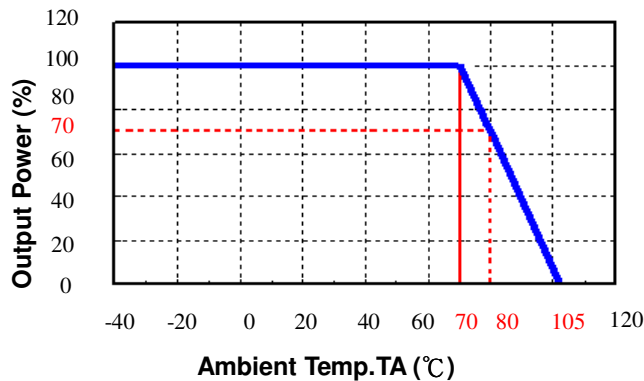
General Specifications

Efficiency	Nominal input	See table
Isolation voltage	Input to output	1500VDC
Isolation resistance	500VDC	10 ⁹ Ohms min.
Isolation capacitance		1200pF typ.
Switching frequency		300kHz typ.
Reliability, calculated MTBF		1.06 × 10 ⁶ Hrs

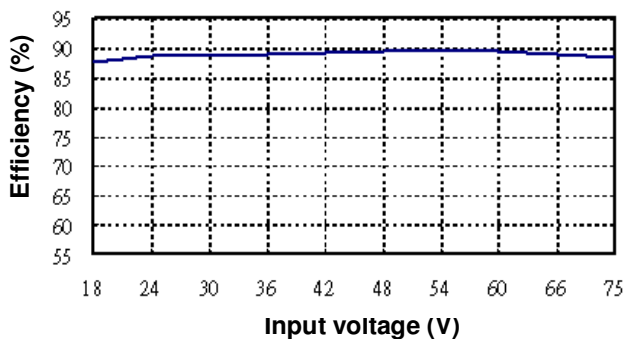
Physical Specifications

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.

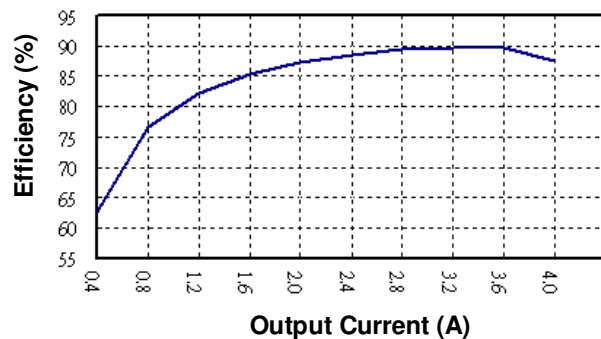
**BUC20W Series
Power Derating Curve(5)**



**BUC20-48S1W
Input voltage vs. Efficiency**

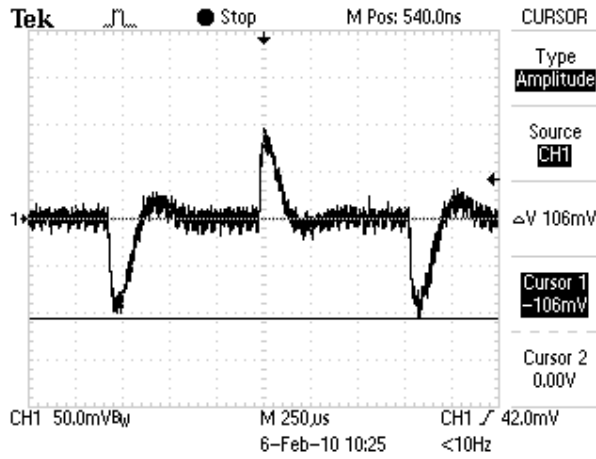


**BUC20-48S1W
Output Current vs. Efficiency**



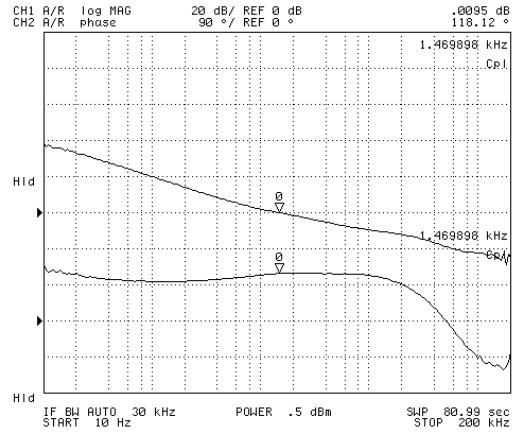
BUC20-48S1W

Transient Response at 50%~100% Max Load



BUC20-48S1W

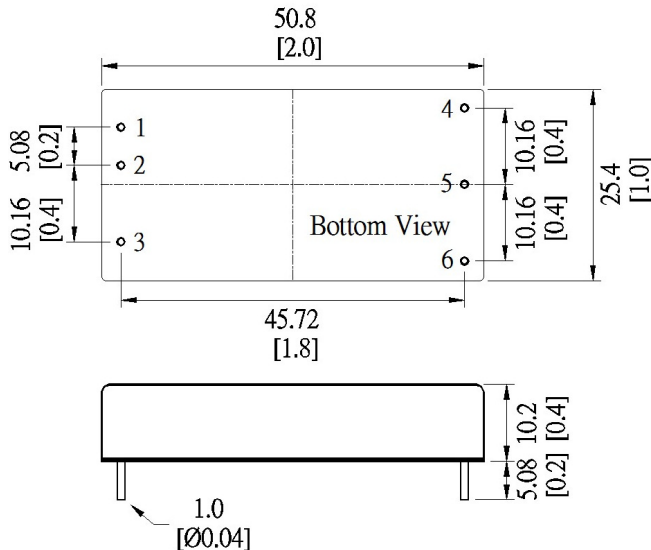
Loop Gain & Phase at Vi=48V, Full Loa



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 BUC20-48S1W.

Mechanical Dimensions

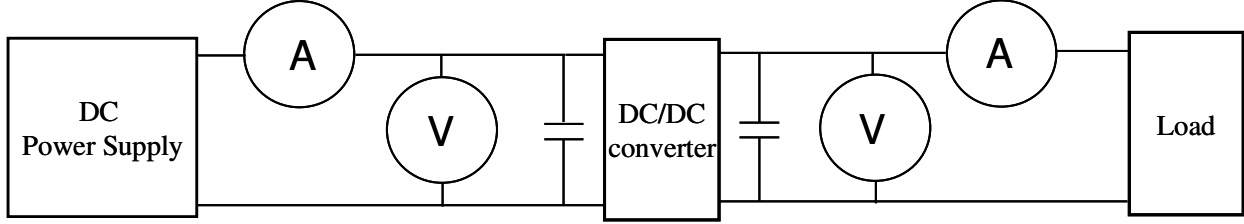


Pin Assignment		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	Remote On/Off	
4	+Vout	+Vout
5	-Vout	Common
6	Trim	-Vout

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

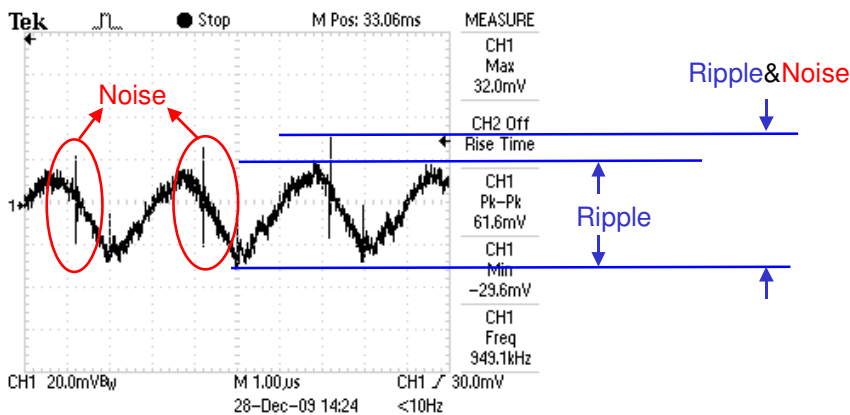
7. **Load regulation :**

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

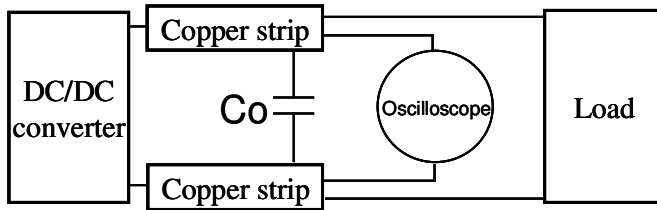
$V_{out(FL)}$: Output voltage at full load

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

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

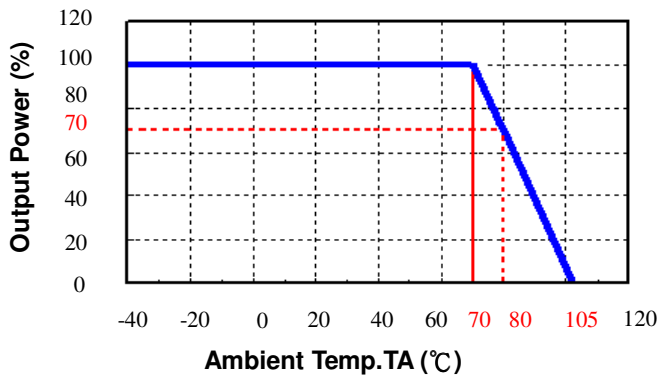


Output Ripple&Noise measurement test circuit: as shown below.



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.