

Features

- Wide 4 : 1 Input Voltage Range(9~36V,18~75V)
- Remote On/Off
- Input / Output Isolation Voltage: 1.5kVDC
- Extended Operating Temperature Range: -40°C to +85°C
- Output Short Circuit Protection:
Continuous & Auto Recovery
- Over Voltage Protection: Clamp Mode
- Shielded Metal Case with Insulated Baseplate
- Lead Free Design, RoHS Compliant
- 24pin DIP Package with Industry-Standard Footprint
- Customer Design Available
- EMI Standard / Approval: EN55022, Class A
- EMS Standard / Approval: EN55024
- Safety Standard / Approval: IEC / EN60950-1



Description

The BOB5W Series are isolated 5W DC/DC converters. Designed with highly efficiency, allow the operating temperature range of these units to be -40°C to +85°C in a 24 pin DIP package with industry-standard footprint. Further features include wide 4 : 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

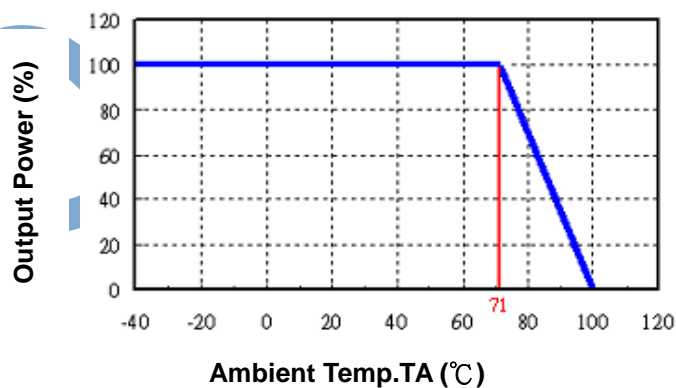
All specifications are typical at nominal input, full load and 25°C unless otherwise stated.

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		
BOB5-24S0W	9~36V Nominal:24V	3.3	34	1200	4.6	226	77	6800
BOB5-24S1W		5	4	1000	9.7	274	80	7030
BOB5-24S2W		12	0	500	7.1	316	83	1220
BOB5-24S3W		15	0	400	10	321	82	430
BOB5-24D1W		±5	0	±500	9.2	271	81	4620
BOB5-24D2W		±12	0	±250	11.7	316	83	330
BOB5-24D3W		±15	0	±200	13	316	83	200
BOB5-48S0W	18~75V Nominal:48V	3.3	49.4	1200	2.8	116	75	4400
BOB5-48S1W		5	0	1000	4.9	139	79	5460
BOB5-48S2W		12	0	500	5	160	82	660
BOB5-48S3W		15	0	400	5.2	160	82	330
BOB5-48D1W		±5	0	±500	5.4	139	79	1660
BOB5-48D2W		±12	0	±250	6.8	160	82	220
BOB5-48D3W		±15	0	±200	7.4	160	82	147

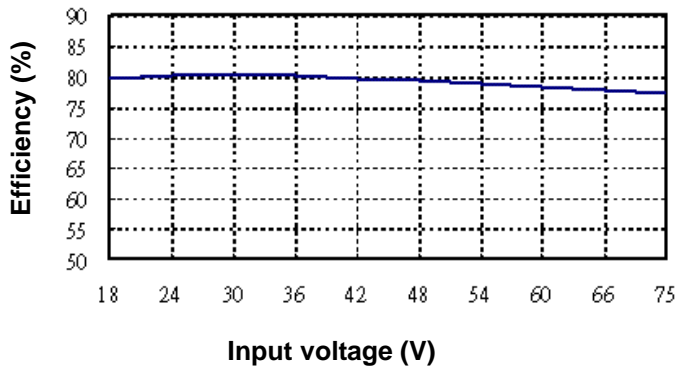
Input Specifications		
Input Voltage	24V nominal input	9-36V
	48V nominal input	18-75V
Input filter		Pi Type
Input surge voltage (100ms max.)	24V input	50V
	48V input	100V
Input reflected ripple current	Nominal Vin and full load	160mA _{p-p} typ.
Start up time	Nominal Vin and constant resistive load	530ms typ.
Remote ON/OFF	Converter: ON	Open or 3.5V < Vr < 12V
	Converter: OFF	Short ⁽⁴⁾ or 0V < Vr < 1.2V
Sourcing current of remote control pin	Nominal Vin	< 0.2 mA
Idle input current (at Remote OFF state)	Nominal Vin	< 2.5 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.	
EMC Characteristics		
EMI	EN55022 (radiation)	Meet class A
Output Specifications		
Output power	6 Watts max.	
Voltage accuracy	Full load and nominal Vin	±2%
Minimum load	See table	
Line regulation	LL to HL at full load	±0.5%
	25% load to full load	Single ±1%
Load Regulation	Balanced load	Dual ±1%
	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)	5V _{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	150% typ.
Short circuit protection	Continuous, automatic recovery	
Transient response settling time	50% load step change	560μs typ.
Transient response over shoot	di/dt=0.8A/μs	≤ ±5% of Vo

General Specifications		
Efficiency	Nominal input	See table
Isolation voltage	Input to output	1500VDC
Isolation resistance	500VDC	10 ⁹ Ohms min.
Isolation capacitance		300pF typ.
Switching frequency (Fixed)	Pulse width modulation (PWM)	300kHz typ.
Reliability, calculated MTBF		2.40 × 10 ⁶ Hrs
Physical Specifications		
Case material		Nickel-coated copper
Base material		Non-conductive black plastic
Potting material		Silicon rubber (UL94V-0)
Dimensions		1.25 × 0.80 × 0.40 Inch (31.75 × 20.32 × 10.16 mm)
Weight		17.2g (0.59oz) typ.
EMC Characteristics		
	Standard	
Radiated(Below 1GHz)	EN 55022:2010	Class A
ESD	IEC 61000-4-2:2008	Performance Criterion A
RS	IEC 61000-4-3:2010	Performance Criterion A
EFT ⁽⁶⁾	IEC 61000-4-4:2004+A1:2010	Performance Criterion A
Surge ⁽⁶⁾	IEC 61000-4-5:2005	Performance Criterion A
CS	IEC 61000-4-6:2008	Performance Criterion A
PFMF	IEC 61000-4-8:2009	Performance Criterion A

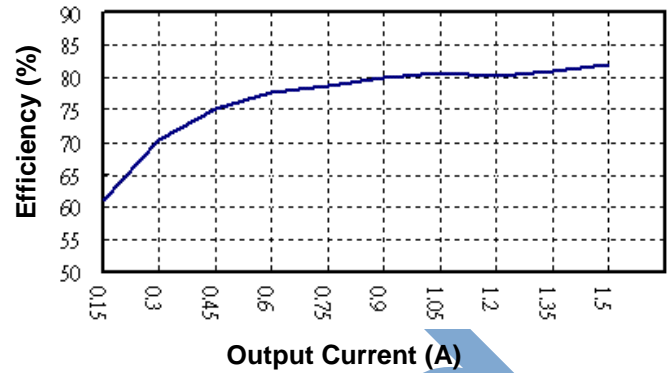
**BOB5W Series
Power Derating Curve(5)**



BOB5-48S1W
Input voltage vs. Efficiency

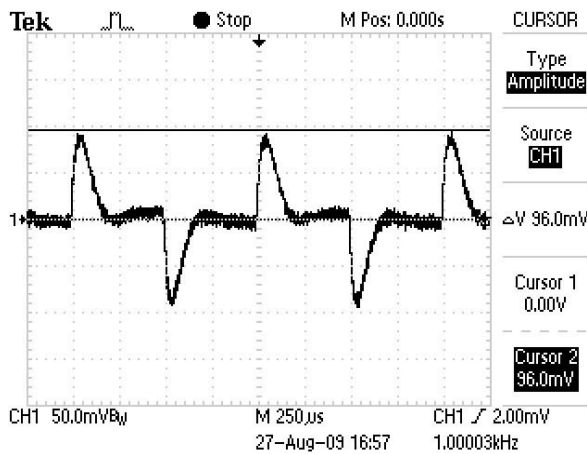


BOB5-48S1W
Output Current vs. Efficiency



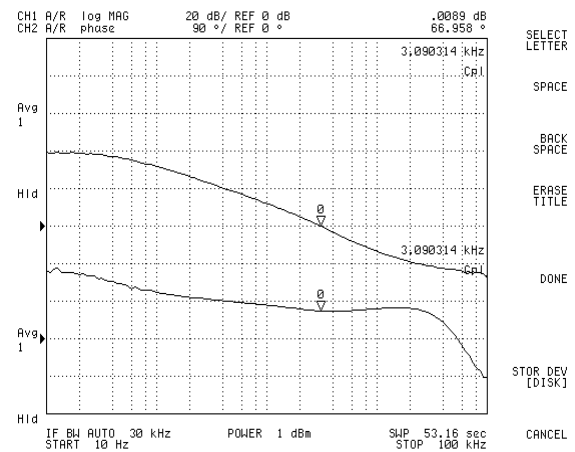
BOB5-48S1W

Transient Response at 50%~100% Max Load



BOB5-48S1W

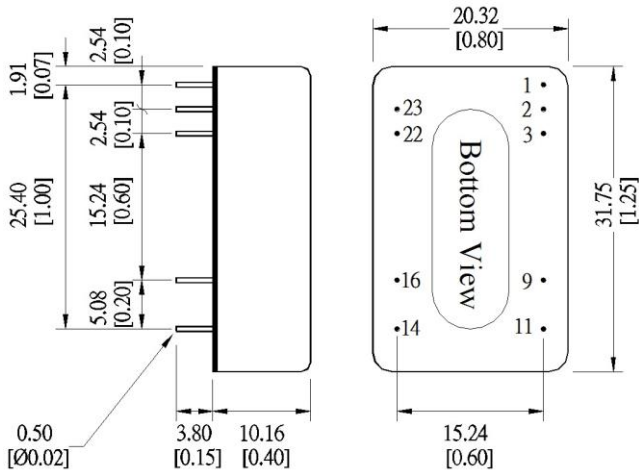
Loop Gain & Phase at $V_i=48V$, Full Load



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 2,3).
5. Based on BOB5-48S1W.
6. An external filter capacitor is required if the module has to meet EN61000-4-4 and EN61000-4-5. The filter capacitor suggest: Nippon chemi-con KY series, 470uF/100V.
7. Specifications subject to change without notice.

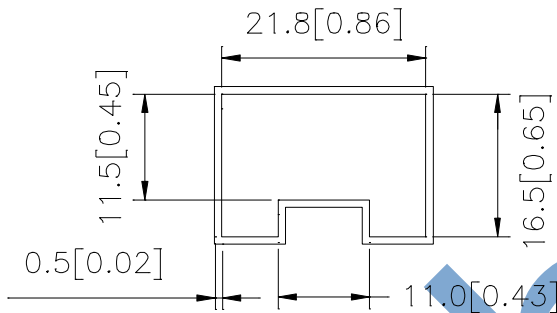
Mechanical Dimensions



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

Pin Assignment		
Pin	Single	Dual
1	Remote On/Off	Remote On/Off
2	-Vin	-Vin
3	-Vin	-Vin
9	No pin	Common
11	No function	-Vout
14	+Vout	+Vout
16	-Vout	Common
22	+Vin	+Vin
23	+Vin	+Vin

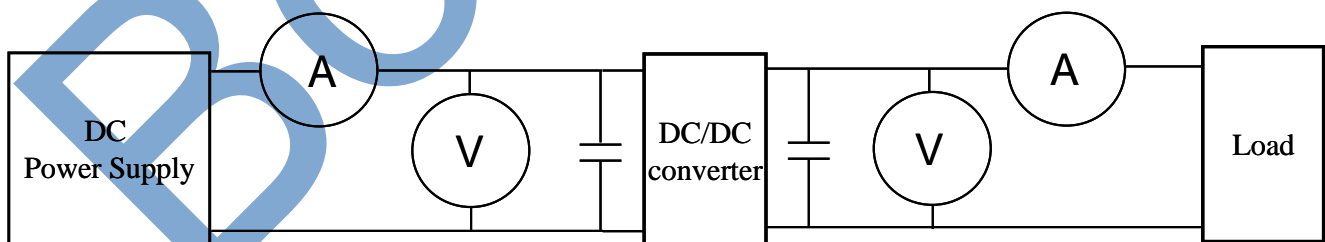
Package Information



PS:
 Unit: mm [inch]
 L= 350 mm [13.78 inch] ; ONE TUBE = 10 PCS
 L= 520 mm [20.47 inch] ; ONE TUBE = 15 PCS

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 ($\pm 10\%$) - 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:

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

V_{out} : Output voltage
 $V_{out(nominal)}$: Nominal output voltage

6. Line regulation: 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

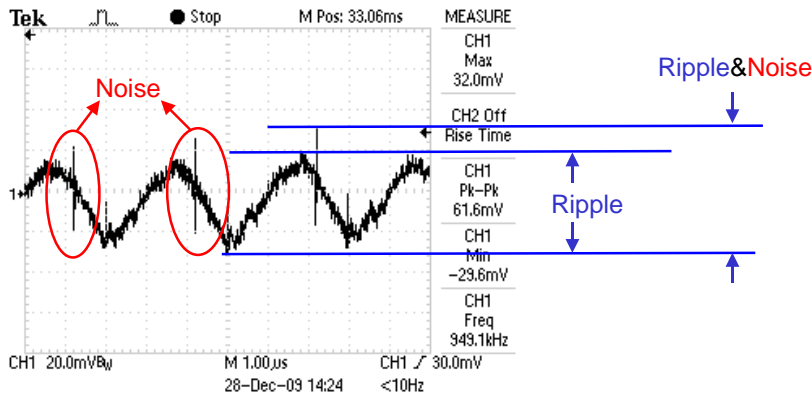
7. Load regulation :

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

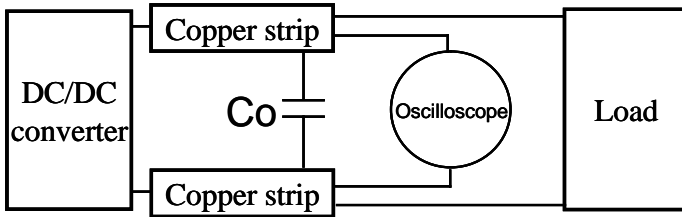
$V_{out(FL)}$: Output voltage at full load

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

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

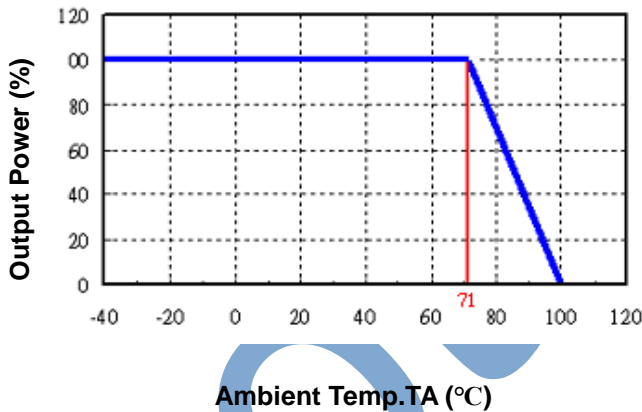


Output Ripple&Noise measurement test circuit: as shown below.



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.