

Features

- Wide 2 : 1 Input Voltage Range(4.5~9V,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:
Continuous & Auto Recovery
- Over Voltage Protection: Clamp Mode
- Meet EN55022, Class A (Radiation)
- Shielded Metal Case with Insulated Baseplate
- Lead Free Design, RoHS Compliant
- 24pin DIP Package with Industry-Standard Footprint
- Customer Design Available
- Safety Standard / Approval : IEC / EN 60950-1



Description

The BOB5 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 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

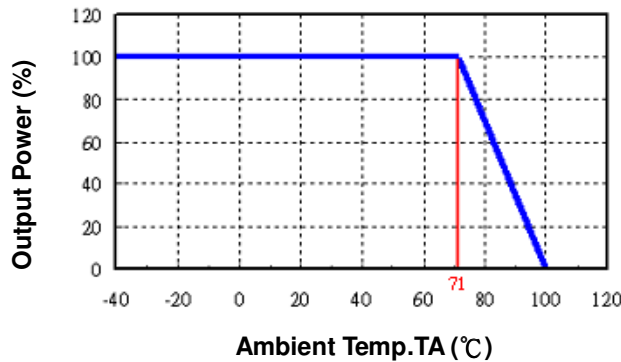
All specifications are typical at nominal input, full load and 25°C unless otherwise stated.

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		
BOB5-05S0	4.5~9V Nominal:5V	3.3	0	1200	46	1115	75	14700
BOB5-05S1		5	0	1000	45	1351	78	6900
BOB5-05S2		12	0	500	42	1558	81	1660
BOB5-05S3		15	0	400	65	1558	81	880
BOB5-05D1		±5	0	±500	55	1351	78	2200
BOB5-05D2		±12	0	±250	76	1600	79	330
BOB5-05D3		±15	0	±200	77	1579	80	330
BOB5-12S0	9~18V Nominal:12V	3.3	12	1200	21	440	79	4700
BOB5-12S1		5	10	1000	22	541	81	2630
BOB5-12S2		12	0	500	25	625	84	330
BOB5-12S3		15	0	400	27	617	85	220
BOB5-12D1		±5	0	±500	22	541	81	1100
BOB5-12D2		±12	0	±250	31	625	84	132
BOB5-12D3		±15	0	±200	32	617	85	69
BOB5-24S0	18~36V Nominal:24V	3.3	17	1200	10	223	78	3200
BOB5-24S1		5	0	1000	10	267	82	3080
BOB5-24S2		12	0	500	12	313	84	377
BOB5-24S3		15	0	400	14	313	84	230
BOB5-24D1		±5	0	±500	12	271	81	990
BOB5-24D2		±12	0	±250	17	316	83	122
BOB5-24D3		±15	0	±200	17	313	84	194
BOB5-48S0	36~75V Nominal:48V	3.3	0	1200	6	111	78	3750
BOB5-48S1		5	0	1000	6	135	81	2730
BOB5-48S2		12	0	500	7	156	84	277
BOB5-48S3		15	0	400	8	156	84	147
BOB5-48D1		±5	0	±500	7	135	81	1330
BOB5-48D2		±12	0	±250	9	156	84	230
BOB5-48D3		±15	0	±200	9	156	84	132

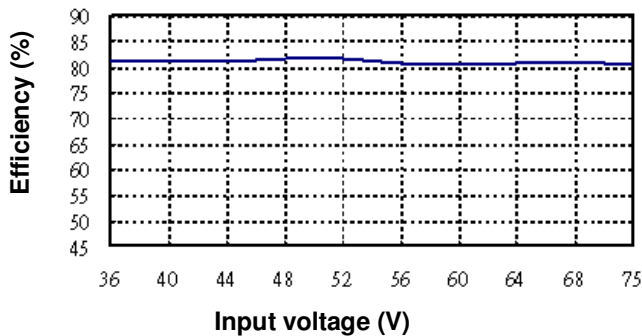
Input Specifications		
Input Voltage	5V nominal input	4.5-9V
	12V nominal input	9-18V
	24V nominal input	18-36V
	48V nominal input	36-75V
Input filter		Pi Type
	5V input	10V
	12V input	25V
Input surge voltage (100ms max.)	24V input	50V
	48V input	100V
Input reflected ripple current	Nominal Vin and full load	100mA _{p-p} typ.
Start up time	Nominal Vin and constant resistive load	730ms typ.
Remote ON/OFF	Converter: ON	Open or $3.5V < V_r < 12V$
	Converter: OFF	Short ⁽⁴⁾ or $0V < V_r < 1.2V$
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	±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
	±1%	
Ripple and Noise	Unbalanced load 25% to 100% full load	±0.5%
	±3%	
Over voltage protection (Zener Diode Clamp)	20MHz bandwidth	60mV _{p-p} max.
	3.3V _{out} models	3.9V
	5V _{out} models	6.2V
	12V _{out} models	15V
Capacitive load	15V _{out} models	18V
	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	490µs 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		280pF typ.
Switching frequency		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.	

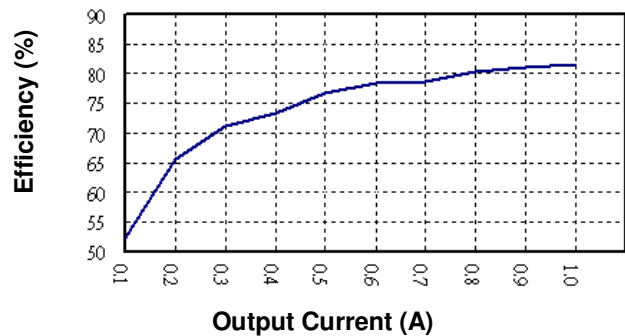
**BOB5 Series
Power Derating Curve(5)**



**BOB5-48S1
Input voltage vs. Efficiency**

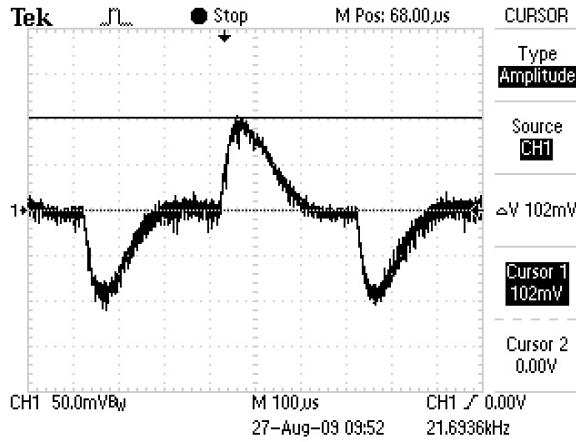


**BOB5-48S1
Output Current vs. Efficiency**



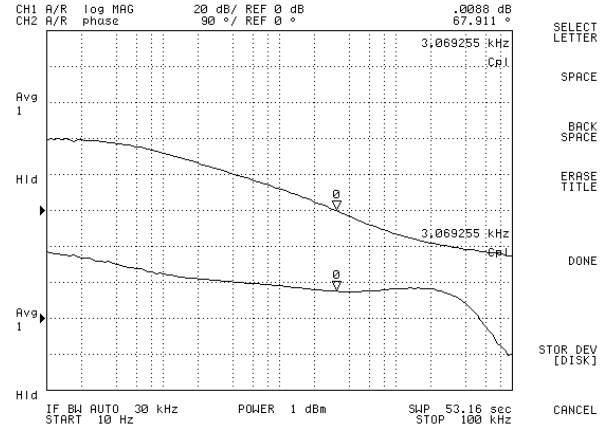
BOB5-48S1

Transient Response at 50%~100% Max Load



BOB5-48S1

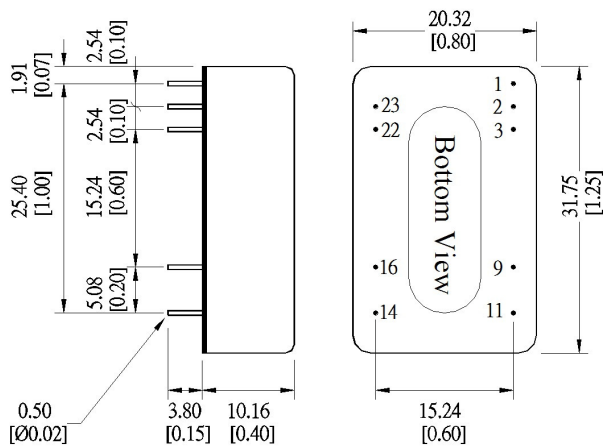
Loop Gain & Phase at Vi=48V, Full Load



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 2,3).
5. Based on BOB5-48S1.

Mechanical Dimensions



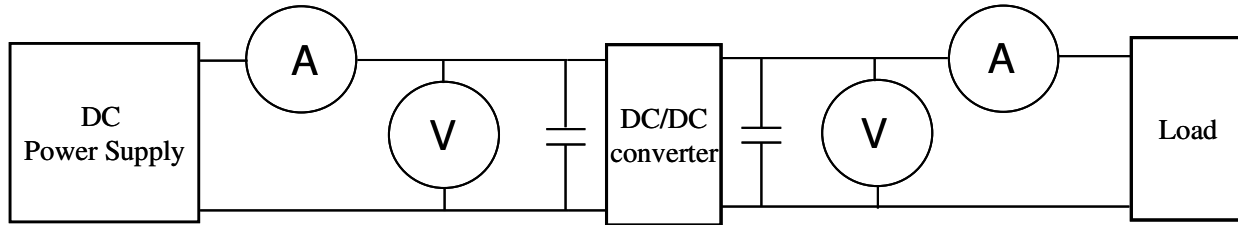
Unit: mm [inch]
Tolerance: ±0.5[0.02]

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

Specifications subject to change without notice.

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

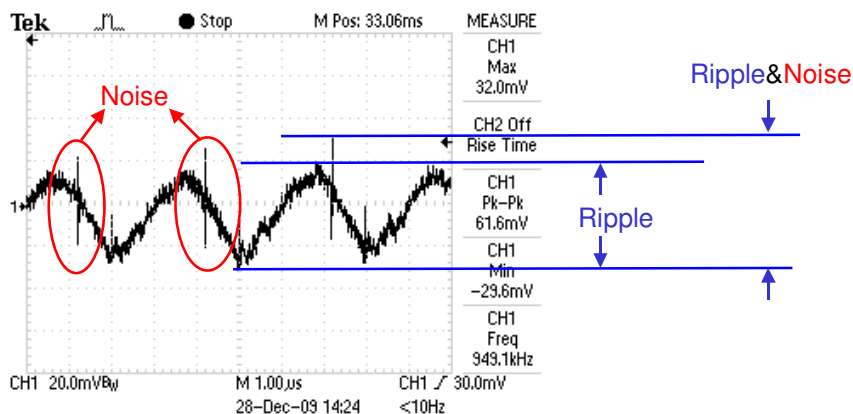
7. **Load regulation:**

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

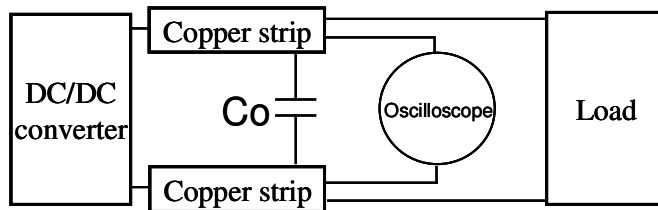
$V_{out(FL)}$: Output voltage at full load

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

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

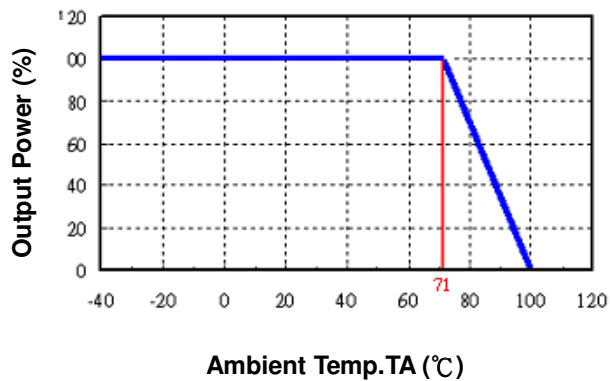


Output Ripple&Noise measurement test circuit: as shown below.



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.