PRELIMINARY

BOTHHAND USA

Isolated DC-DC Converters
BYB100 Series -- 100Watt

Features

- Wide 2：1 Input Voltage Range (36~75V)
- Remote On/Off
- Input / Output Isolation Voltage: 1.5kVDC
- Operating Temperature Range: -40℃ to +85℃(with derating)
- Output Short Circuit Protection:
  Hiccup & Auto Recovery
- Over Voltage Protection: Clamp Mode
- Over Temperature Protection
- Lead Free Design, RoHS Compliant
- Adjustable Output Voltage
- Customer Design Available
- Meet Safety Standard : IEC / EN60950-1

Description

The BYB100 Series are isolated 100W DC/DC converters. Designed with highly efficiency, allow the operating temperature range of these units to be -40℃ to +85℃ (with derating) in a five-sided shielded metal case. Further features include wide 2：1 input voltage range, remote on/off control, 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℃ unless otherwise stated.

Model Number	Input Voltage Range	Output Voltage (V)	Output Current (A)		Input Current (mA)		Eff.(2) (%)	Capacitive Load, max. (uF)
			Min. Load (1)	Full. Load	No Load	Full Load		
BYB100-48S2	36~75V Nominal:48V	12	0	8.4	95	2367	92	10000
BYB100-48S5		24	0	4.2	58	2395	91	3300
BYB100-48S4		28	0	3.6	69	2395	91	2000
BYB100-48S6		48	0	2.1	57	2367	92	1000

Input Specifications		
Input voltage	48V nominal Vin	36-75V
Input filter		Pi type
Input surge voltage (100ms max.)	48V nominal Vin	100V
Input reflected ripple current	Nominal Vin and full load	600mAp-p typ.
Start up time	Nominal Vin and constant resistive load	68ms typ.
Remote ON/OFF	Converter: ON	Open or 3.5V＜Vr＜12V
	Converter: OFF	Short (3) 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	＜20 mA
Environmental Specifications		
Operating ambient temperature		-40℃ to +85℃ (with derating)
Maximum case temperature		+105℃
Storage temperature range		-40℃ to +105℃
Relative humidity		95% RH max.
Temperature coefficient		±0.02% / ℃ max.
Output Specifications		
Output power		100 Watts max.
Voltage accuracy	Full load and nominal Vin	±1%
Minimum load		0mA
Line regulation	LL to HL at full load	±1%
Load Regulation	25% load to full load	±1%
Ripple and Noise (20MHz Bandwidth)	12Vout (Measured with a 2.2uF/50V MLCC)	100mVp-p max.
	24Vout and 28Vout (Measured with a 10uF/50V MLCC)	200mVp-p max.
	48Vout (Measured with a 2.2uF/100V MLCC)	300mVp-p max.
Over voltage protection (Zener Diode Clamp)	12Vout	15V
	24Vout	33V
	28Vout	36V
	48Vout	58V
Capacitive load		See table
Over load protection	% of full load at nominal input	110% min.
Thermal shutdown		110℃ typ.
Short circuit protection		Hiccup, automatic recovery
Transient response settling time	50% load step change	480μs typ.
Transient response over shoot	di/dt=0.8A/μs	≤ ±5% of Vo

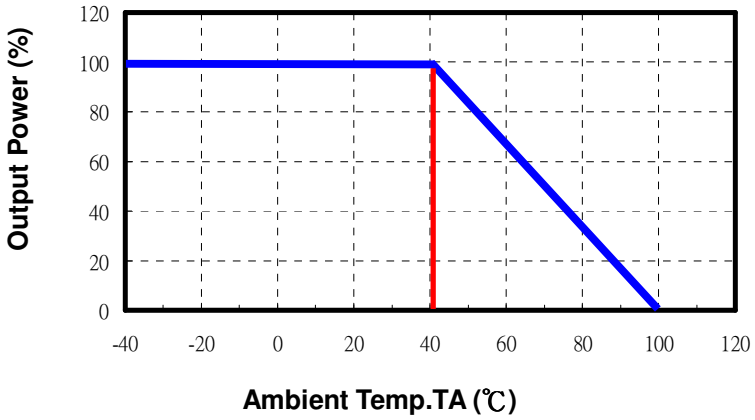
General Specifications

Efficiency	Nominal input	See table
Isolation voltage	Input to output	1500VDC
Isolation resistance	500VDC	10^9 Ohms min.
Isolation capacitance		1200pF typ.
Switching frequency (Fixed)	Pulse width modulation (PWM)	300kHz typ.
Reliability, calculated MTBF		4.5×10^5 Hrs

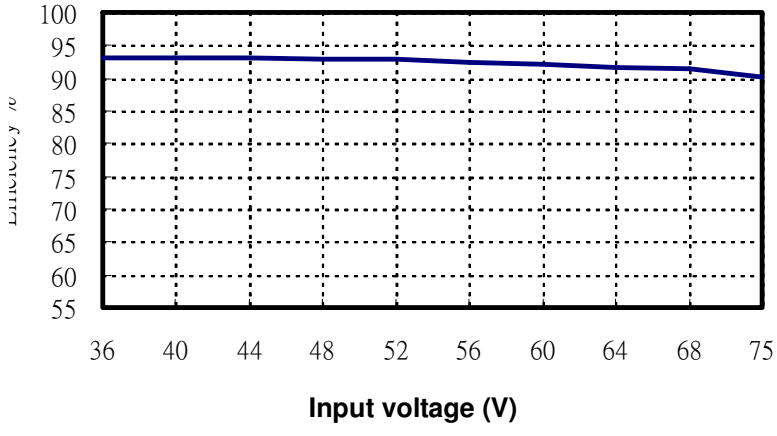
Physical Specifications

Case material		Aluminum
Potting material		Silicon rubber (UL94V-0)
Dimensions		2.40 × 2.28 × 0.5 Inch (61.0 × 57.9 × 12.7 mm)
Weight		97g (3.42oz) (typical)
Soldering temperature	Lead-free wave soldering	260℃/10Sec (maximum)

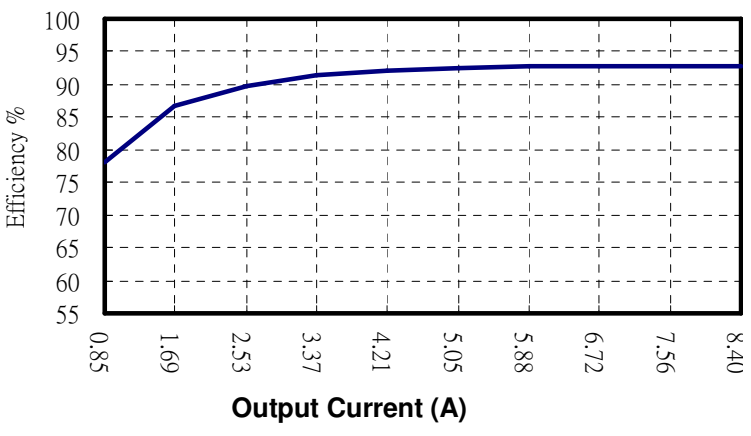
BYB100-48S2
Power Derating Curve without Heatsink



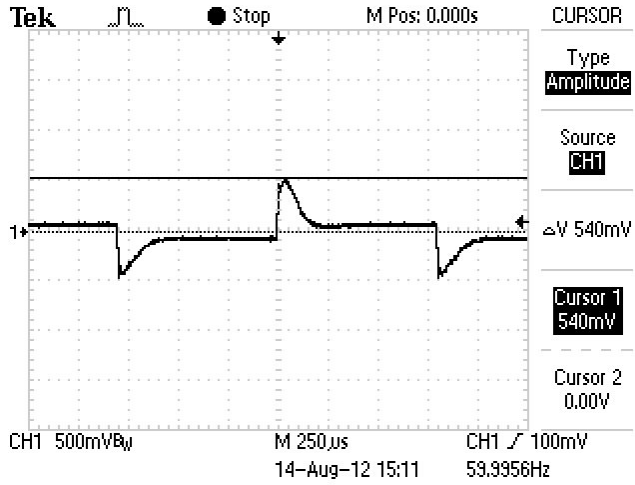
BYB100-48S2
Input voltage vs. Efficiency



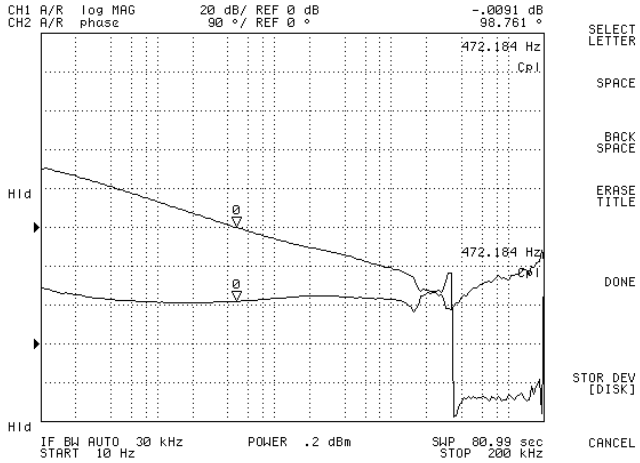
BYB100-48S2
Output Current vs. Efficiency



BYB100-48S2
Transient Response at 50%~100% Max. Load



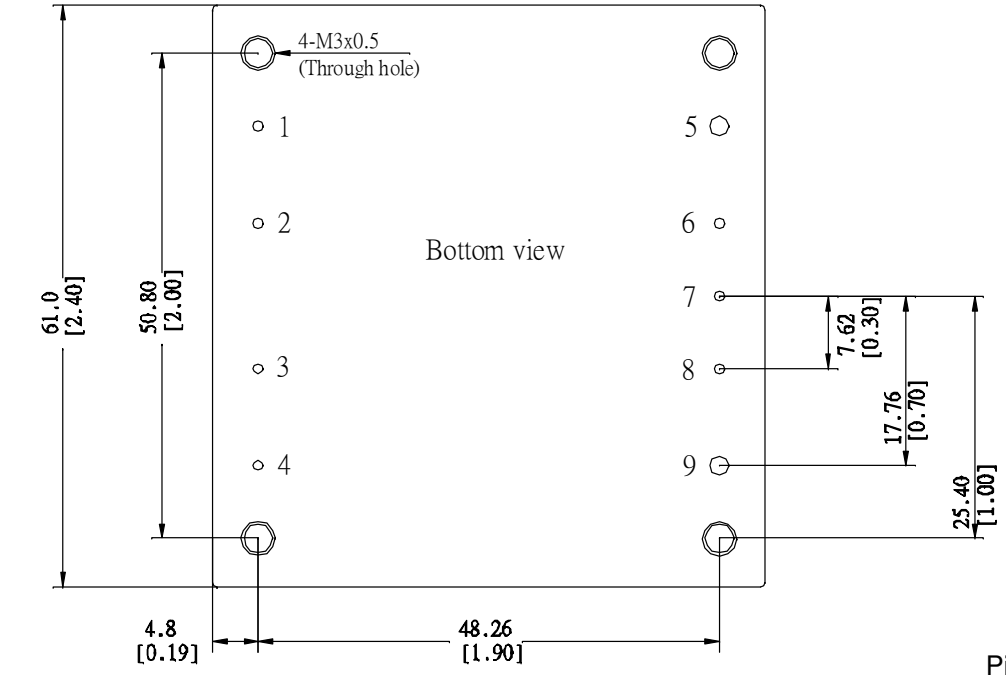
BYB100-48S2
Loop Gain & Phase at Vin=48V, Full Load

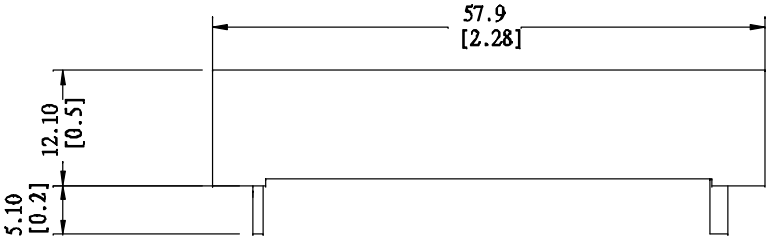


Note

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. Short to -Vin (Pin 2).
4. Specifications subject to change without notice.

Mechanical Dimensions





Pin Assignment	
Pin	Single
1	-Vin
2	Case
3	Remote On/Off
4	+Vin
5	-Vout
6	-Sense
7	Trim
8	+Sense
9	+Vout

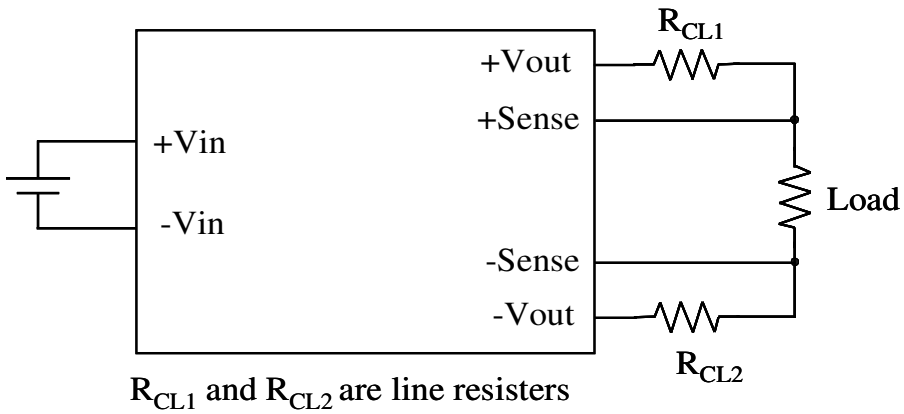
Pin 5&9 diameter: 2.0 [0.08]
Other pins diameter: 1.0 [0.04]

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

Remote Sense Application circuit

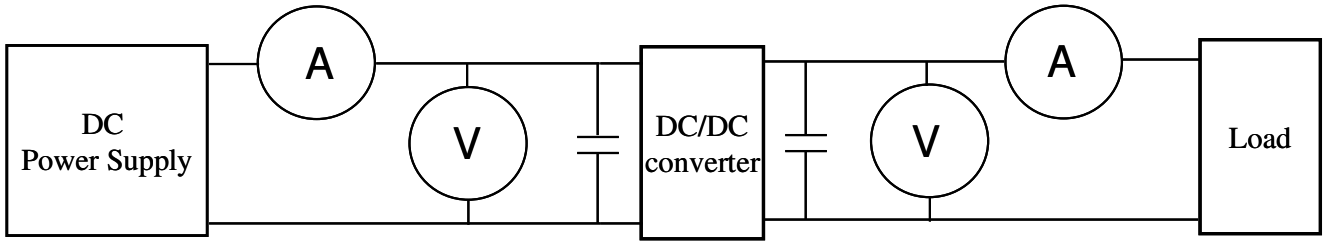
The Remote Sense function is used to compensate for the voltage drop incurred when the load is located physically far away from the DC/DC converter providing its power. The Remote Sense pins are connected as close to the load as possible. The DC/DC converter's regulation specification is maintained across the points where the Remote Sense wires are connected at the load. This will remove the effect of the voltage drop caused by the resistance of the wires used to conduct the power from the DC/DC converter to the load. This is represented by R_{CL1} and R_{CL2}. With the use of Remote Sense, the effects of R_{CL1} and R_{CL2} are eliminated.

If the Remote Sense function is not used, the **+Sense** has to be connected to **+Vout** and the **–Sense** has to be connected to **–Vout** as close to the DC/DC converter as possible.



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 :

$Pin = Vin \times Iin$

Vin：Input voltage
Iin：Input current

3. Output power :

$Pout = Vout \times Iout$

Vout：Output voltage
Iout：Output current

4. Efficiency :

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

Pout: Output power
Pin: Input power

5. Voltage accuracy:

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

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

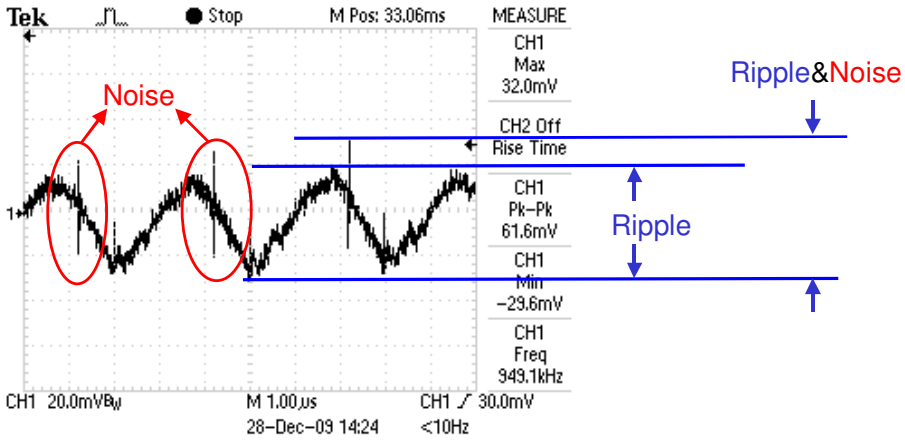
7. Load regulation :

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

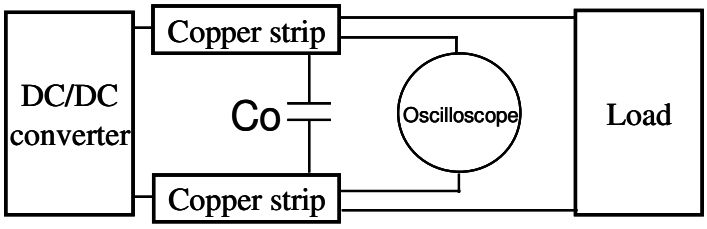
Vout(FL): Output voltage at full load

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

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

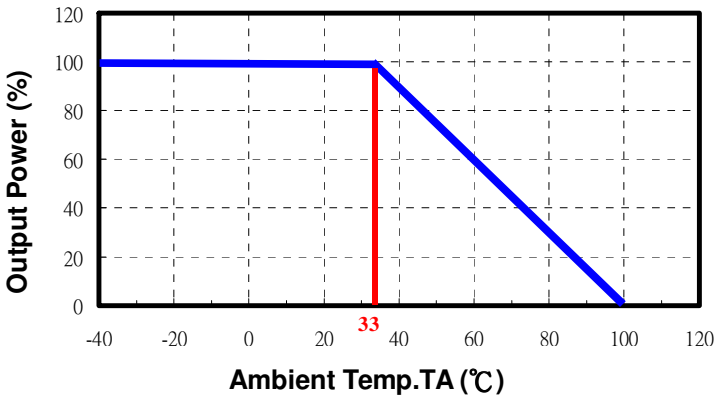


Output Ripple&Noise measurement test circuit: as shown below.



Co: 2.2uF

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.