BOTHHAND ENTERPRISE INC.
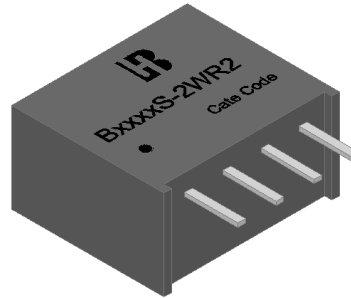
Features

- 4 pin SIP package
- Input / Output Isolation Voltage: 1.5kVDC
- High Efficiency
- Lead Free Design, RoHS Compliant
- Operating temperature: -40°C to +85°C
- Optional Continuous Short Circuit Protection
- Continuous Short Circuit Protection
- Meet Safety Standard / Approval: IEC / EN60950-1

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(V)	Output Voltage (V)	Output Current (mA) Full Load	Efficiency .[2] (%)	Capacitive Load, max. (uF)
B0505S-2WR2	4.5 ~ 5.5 Nominal: 5	5	200	79	470
B0512S-2WR2		12	80	82	220
B0515S-2WR2		15	65	82	220
B0524S-2WR2		24	65	82	100
B1205S-2WR2	10.8 ~ 13.2 Nominal: 12	5	200	79	470
B1212S-2WR2		12	80	82	220
B1215S-2WR2		15	65	82	220
B1224S-2WR2		24	65	82	100
B2405S-2WR2	21.6 ~ 26.4 Nominal: 24	5	200	79	470
B2412S-2WR2		12	80	82	220
B2415S-2WR2		15	65	82	220
B2424S-2WR2		24	65	82	100

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. In case of long input lines or hot plug-in requirements, we recommended to use an external low ESR capacitor (22uF) near to the converter's input pins.
5. Specifications subject to change without notice.

Input Specifications

Input voltage	5 Vin models	4.5~5.5V
	12Vin models	10.8~13.2V
	24Vin models	21.6~26.4V
Input current at no load	5 Vin models	35mA(typ.)
	12Vinmodels	18mA(typ.)
	24Vinmodels	10mA(typ.)
Surge voltage (1 s max.)	5 Vin models	9V(Max.)
	12Vin models	18V(Max.)
	24Vin models	30V(Max.)
Recommended input fuse	5 Vin models	1A (slow-blow fuse)
	12Vin models	0.4A (slow-blow fuse)
	24Vin models	0.2A (slow-blow fuse)
Input filter		Capacitor

Environmental Specifications

Operating ambient temperature	Natural convection	-40°C to +85°C
Maximum case temperature		+95°C
Storage temperature range		-55°C to +125°C
Relative humidity		95% RH max.

Output Specifications

Output power		2 Watts max.
Voltage accuracy (Nominal Vin and full load)	5VDC models	±3% at 60% load
	Other models	±3% at 80% load
Minimum load		0A
Regulation	Input variation	±1.5% max.for Vin Change of 1%
	Load variation	See graphs below
Ripple and Noise (20MHz Bandwidth)		120mVp-p typ. 250mVp-p max.
Maximum capacitive load		See table
Temperature coefficient		±0.02%/°C max.
Short Circuit Protection	Automatic recovery	Continuous

General Specifications

Efficiency	Nominal input and full load	See table
Isolation voltage(60s)	Input to output	1500VDC
Isolation resistance	500VDC	1GΩ min.
Isolation capacitance		＜20pF.
Switching frequency		30K-200KHz.
Start-up time	Nominal Vin and full load	≤10ms

Reliability, calculated MTBF	2×10^6 Hrs

Physical Specifications	
Case material	Plastic (UL94 V-0)
Potting material	Epoxy (UL94 V-0)
Dimensions	0.46 × 0.295 × 0.4 Inch
	(11.6 × 7.5 × 10.2 mm)
Weight	1.6g (0.057oz) typ.
Pin material	Tinned copper

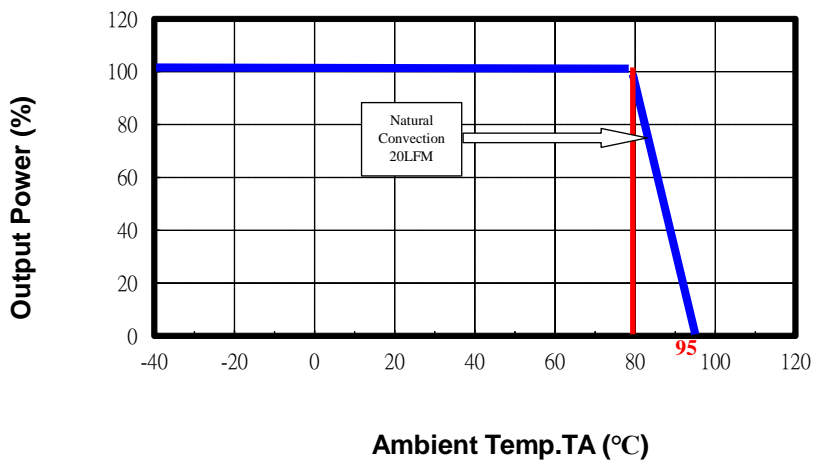## Output voltage variation dependent on load (at nominal input voltage)
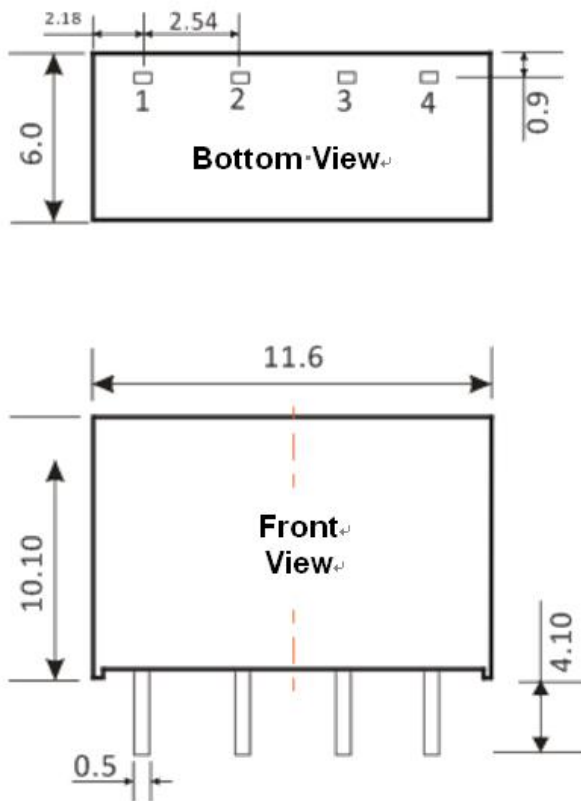
5VDC Output

Other Output
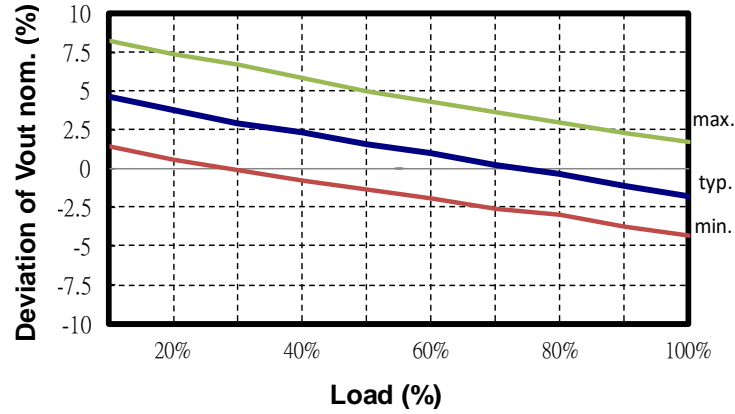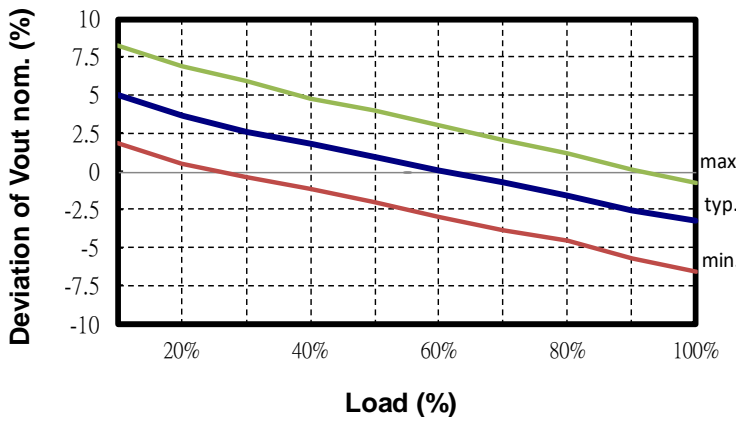
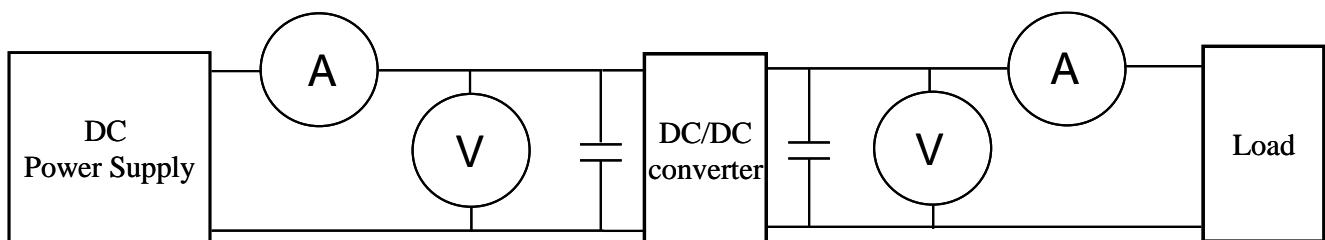## Power Derating Curve

Power Derating Curve

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Mechanical Dimensions

Pin Assignment	
Pin	Single
1	-Vin
2	+Vin
3	-Vout
4	+Vout

Unit: mm (inch)
Pin section tolerances:±0.1(±0.004)
General tolerances:±0.5(±0.02)

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. <u>Input voltage range:</u> Narrow input voltage range（±10%）、wide input voltage range (2:1 and 4:1）。

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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. <u>Input power</u> :

$$P_{in} = V_{in} \times I_{in}$$

V_{in}：Input voltage
I_{in}：Input current

3. <u>Output power</u> :

$$P_{out} = V_{out} \times I_{out}$$

V_{out}：Output voltage
I_{out}：Output current

4. <u>Efficiency</u> :

$$Efficiency = \frac{P_{out}}{P_{in}} \times 100\%$$

P_{out}: Output power
P_{in}: Input power

5. <u>Voltage accuracy</u>:

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

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

6. <u>Line regulation</u>:

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

$$Line\ regulation = \frac{\Delta V_{out}}{\Delta V_{in}}$$

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

$V_{out}(+10\%)$：Output voltage at V_{in} = 1.1xV_{in}(nominal)&full load

$V_{out}(-10\%)$：Output voltage at V_{in} = 0.9xV_{in}(nominal)&full load

V_{out}：Output voltage at V_{in} = V_{in}(nominal)&full load

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

$V_{in}(+10\%)$：Input voltage = 1.1xV_{in}(nominal)

$V_{in}(-10\%)$：Input voltage = 0.9xV_{in}(nominal)
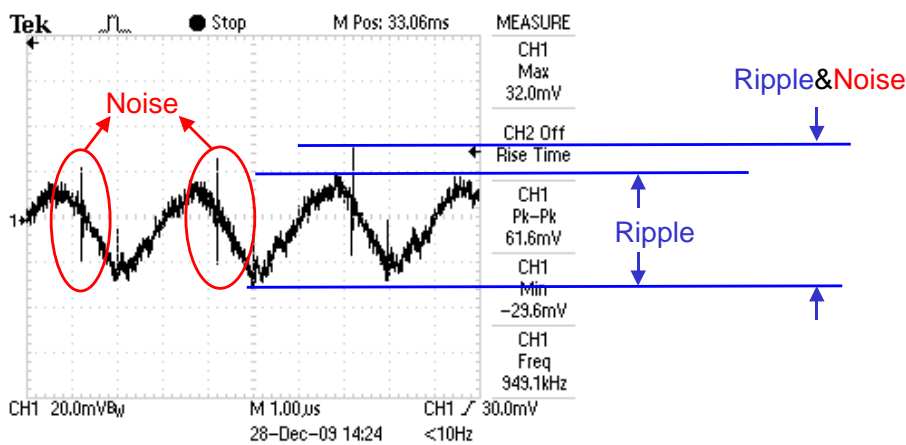
Vin(nominal)：Nominal Input voltage

7. Load regulation :

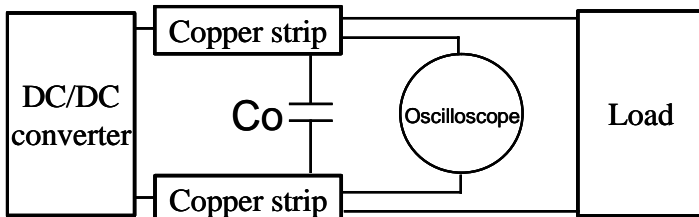$$\frac{|\ Vout(FL)-Vout(NL)\ |}{Vout(FL)} \times 100\%$$

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. <u>Temperature derating curve</u>: 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.
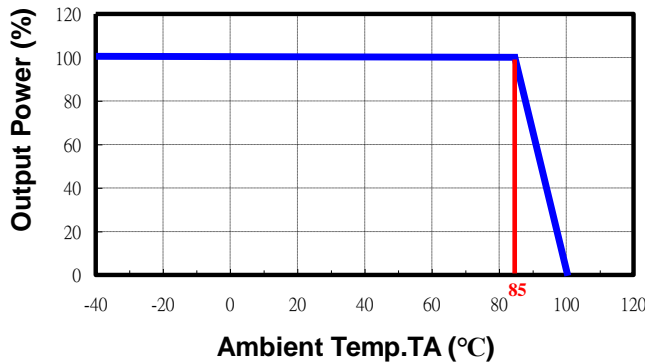
10. <u>Switching frequency</u>: The nominal operating frequency of the DC-DC converters.

11. <u>Input to output isolation</u>: 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.

12. <u>Input souce impedance</u>: The power module should be connected to low ac-impedance input souce.

   Highly inductive souce impedances can affect the stability of   the power module. In applications where power is supplied over long lines and output loading is high , it maybe necessary to use a capacitor at the input to ensure startup. Capacitor mounted close to the power module helps ensure stability of the unit , it is commended to use a good quality low Equivalent Series Resistance (ESR < 0.1Ω at 100KHz) capacitor of a 22uF for the power module.
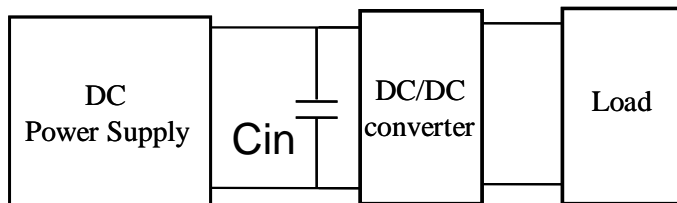
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