

## EP-BS Series -1W unregulated DC-DC Converter

### Features

DUAL IN LINE PACKAGE  
UP TO 1W UNREGULATED OUTPUT  
POWER  
100% BURN IN  
HIGH EFFICIENCY  
INTERNAL SMD TECHNOLOGY  
LOW COST  
UL 94V-0 PACKAGE MATERIAL  
CUSTOM SOLUTIONS AVAILABLE  
MTBF>2,000,000 HOURS  
RoHS COMPLIANT



### Specification

#### Output Specification

|   |                  |
|---|------------------|
| Voltage Setpoint Accuracy                 | +/-2% max.       |
| Temperature Coefficient                   | +/-0.05%/°C      |
| Ripple & Noise(20MHz BW) <sup>1</sup>     | 100mVp-p max.    |
| Line Regulation <sup>2</sup>              | +/-1.2% max.     |
| Load Regulation <sup>3</sup> (other Vout) | +/-8% max.       |
| Load Regulation <sup>4</sup> (3.3V Vout)  | +/-12% max.      |
| Minimum Load                              | 10% of Full Load |
| Short Circuit Protection                  | Momentary        |
| Maximum Capacitive Load                   | 470uf / ±220uf   |
| Start up time(Nominal input)              | 10ms             |

#### Input Specification

|                     |                                  |
|---------------------|----------------------------------|
| Input Voltage Range | +/-10% max.                      |
| Input Filter        | Capacitor Type                   |
| Protection          | Fuse Recommended                 |
| Fuse Rated          | 1A~1.5A<br>(Built-in ,Suffix"F") |

#### Environmental Specifications

|                       |                     |
|-----------------------|---------------------|
| Operating Temperature | -40 °C to +85 °C    |
| Case Temperature      | +100°C max.         |
| Storage Temperature   | -55 °C to +125 °C   |
| Humidity              | 95% max.            |
| Cooling               | Free-Air Convection |

#### General Specifications

|                                |  |
|--------------------------------|--|
| Efficiency                     | 70%-82%  |
| Isolation Voltage <sup>5</sup> | 1500 VDC min.<br>(also available with 3000VDC , Suffix"K") |
| Isolation Resistance           | 109 ohms min.  |
| Isolation Capacitance          | 80pF max.  |
| Switching Frequency            | 100KHz typ.  |
| MTBF <sup>6</sup>              | >2,900,000 Hours   |
| Weight                         | 1.7g typ.  |
| Case Material                  | Non-Conductive Plastic                                     |
| Case Size                      | 12.7mm*10.16mm*7.10mm                                      |
| Case Size(for 24V Input)       | 12.7mm*10.16mm*7.62mm                                      |
| Conducted Emissions            | EN55022 Class A  |
| Radiated Emissions             | EN55022 Class B  |

ALL SPECIFICATIONS TYPICAL AT NOMINAL LINE, FULL LOAD, AND 25 °C UNLESS OTHERWISE NOTED

<sup>1</sup> Measured with 1uF ceramic capacitor connect to the output pins

<sup>2</sup> Line Regulation is for a 1.0% change in input Voltage

<sup>3</sup> Load Regulation is for output load current change from 20% to 100%.

<sup>4</sup> Load Regulation is for output load current change from 20% to 100% when input voltage is 3.3V.

<sup>5</sup> 1500VDC for 10 seconds,3000VDC for 3 seconds

<sup>6</sup> MIL-HDBK-217F @25 °C , Ground Benign

## Selection Guide 1W Output

| MODEL NUMBER       | INPUT<br>VOLTAGE<br>(VDC) | OUTPUT<br>VOLTAGE<br>(VDC) | OUTPUT<br>CURRENT<br>(mA) | INPUT <sup>7</sup> |      | EFF<br>(%) <sup>8</sup> | ISOLATION<br>(VDC) <sup>9</sup> |
|--------------------|---------------------------|----------------------------|---------------------------|--------------------|------|-------------------------|---------------------------------|
|                    |                           |                            |                           | CURRENT(mA)        | NO   |                         |                                 |
|                    |                           |                            |                           | FULL<br>LOAD       | LOAD |                         |                                 |
| BS-03.303.3(F)L(K) | 3.3                       | 3.3                        | 303                       | 403                | 43   | 75                      | 1500 (3000)                     |
| BS-03.305(F)L(K)   | 3.3                       | 5                          | 200                       | 403                | 45   | 75                      | 1500 (3000)                     |
| BS-0505(F)L(K)     | 5                         | 5                          | 200                       | 260                | 30   | 77                      | 1500 (3000)                     |
| BS-0509(F)L(K)     | 5                         | 9                          | 110                       | 260                | 30   | 77                      | 1500 (3000)                     |
| BS-0512(F)L(K)     | 5                         | 12                         | 84                        | 256                | 30   | 78                      | 1500 (3000)                     |
| BS-0515(F)L(K)     | 5                         | 15                         | 67                        | 253                | 30   | 79                      | 1500 (3000)                     |
| BS-0505D(F)L(K)    | 5                         | +/-5                       | +/-100                    | 263                | 30   | 76                      | 1500 (3000)                     |
| BS-0512D(F)L(K)    | 5                         | +/-12                      | +/-42                     | 250                | 30   | 80                      | 1500 (3000)                     |
| BS-0515D(F)L(K)    | 5                         | +/-15                      | +/-34                     | 260                | 30   | 77                      | 1500 (3000)                     |
| BS-1205(F)L(K)     | 12                        | 5                          | 200                       | 105                | 14   | 79                      | 1500 (3000)                     |
| BS-1209(F)L(K)     | 12                        | 9                          | 110                       | 106                | 14   | 78                      | 1500 (3000)                     |
| BS-1212(F)L(K)     | 12                        | 12                         | 84                        | 104                | 14   | 80                      | 1500 (3000)                     |
| BS-1215(F)L(K)     | 12                        | 15                         | 67                        | 105                | 14   | 79                      | 1500 (3000)                     |
| BS-1205D(F)L(K)    | 12                        | +/-5                       | +/-100                    | 109                | 15   | 76                      | 1500 (3000)                     |
| BS-1212D(F)L(K)    | 12                        | +/-12                      | +/-42                     | 105                | 15   | 79                      | 1500 (3000)                     |
| BS-1215D(F)L(K)    | 12                        | +/-15                      | +/-34                     | 108                | 15   | 77                      | 1500 (3000)                     |
| BS-2405(F)L(K)     | 24                        | 5                          | 200                       | 54                 | 9    | 77                      | 1500 (3000)                     |
| BS-2409(F)L(K)     | 24                        | 9                          | 110                       | 55                 | 9    | 76                      | 1500 (3000)                     |
| BS-2412(F)L(K)     | 24                        | 12                         | 84                        | 53                 | 9    | 78                      | 1500 (3000)                     |
| BS-2415(F)L(K)     | 24                        | 15                         | 67                        | 54                 | 10   | 77                      | 1500 (3000)                     |
| BS-2405D(F)L(K)    | 24                        | +/-5                       | +/-100                    | 56                 | 9    | 75                      | 1500 (3000)                     |
| BS-2412D(F)L(K)    | 24                        | +/-12                      | +/-42                     | 54                 | 9    | 77                      | 1500 (3000)                     |
| BS-2415D(F)L(K)    | 24                        | +/-15                      | +/-34                     | 55                 | 10   | 76                      | 1500 (3000)                     |

Note: Other input to output voltages may be available. Please contact factory.

## Part Numbers Structure

### Model Name

BS - x1x2 D (F) L (K)

### Difference

BS=Series Name

x1=input voltage(03.3 ; 05 ; 12 ; 24)

x2=Output voltage(03.3 ; 05 ; 09 ; 12 ; 15 ; +/-5 ; +/-12 ; +/-15)

D= Dual Output

F= Fuse (Optional, if Suffix" F")

L= Operating Temperature=-40 °C to +85 °C

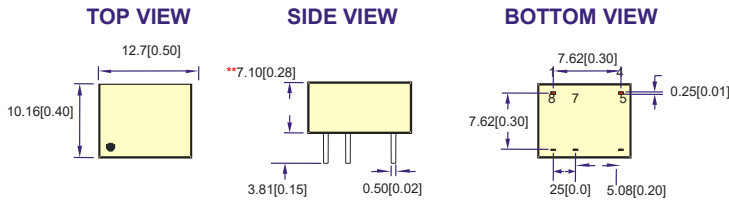
K= Isolation Voltage 3KVDC (Optional, if Suffix" K")

<sup>7</sup> NOMINAL INPUT VOLTAGE.

<sup>8</sup> NOMINAL INPUT VOLTAGE, FULL LOAD.

<sup>9</sup> 1500VDC for 10 seconds,3000VDC for 3 seconds.

# Mechanical Dimensions & Recommended Footprint Details

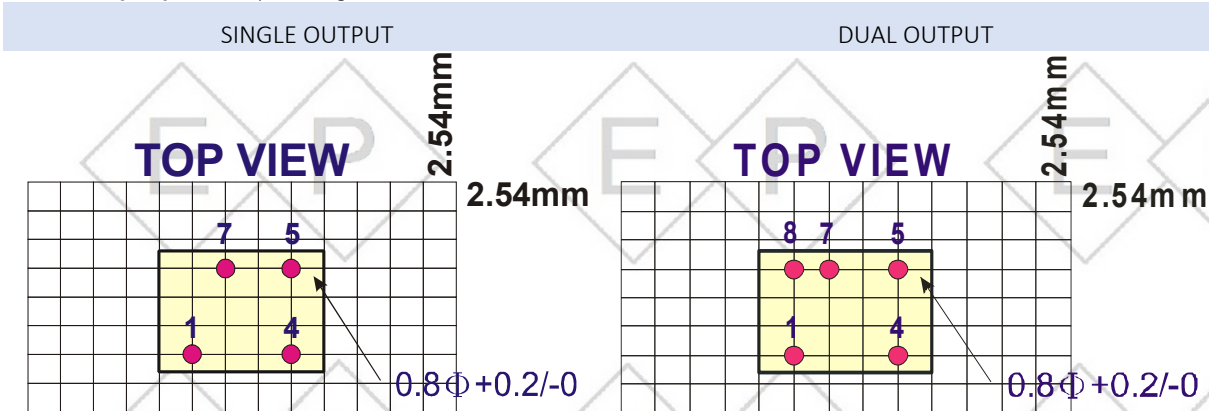


**All dimensions are in mm[inches]**

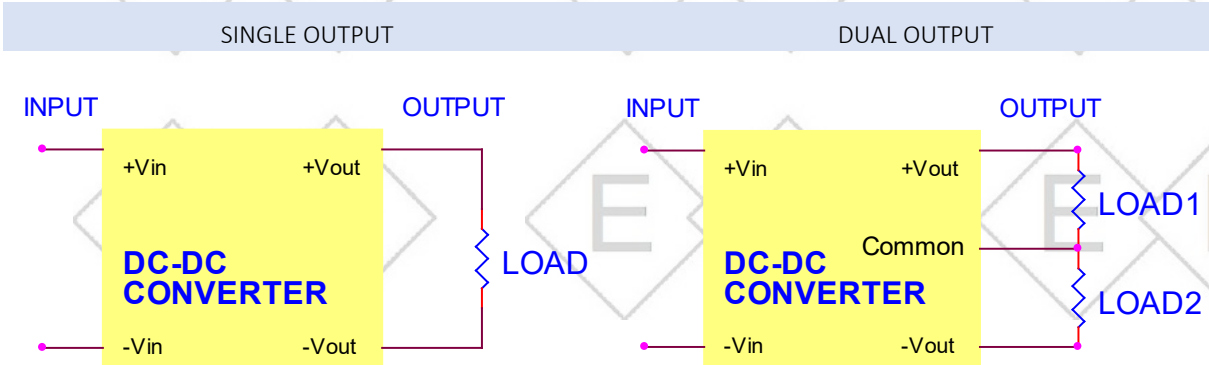
| PIN | SINGLE | DUAL   |
|-----|--------|--------|
| 1   | -Vin   | -Vin   |
| 4   | +Vin   | +Vin   |
| 5   | +Vout  | +Vout  |
| 7   | -Vout  | COMMON |
| 8   | NP     | -Vout  |

NOTE: Pin Size is Tolerance 0.50Φ ±0.05mm, All dimensions are in mm(Inches), Tolerance .X or .XX= ±0.5mm

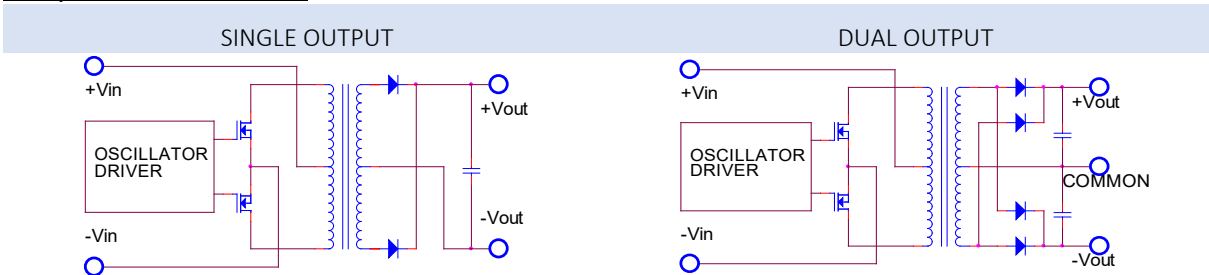
Note: \*\*7.62[0.30] for 24V input Voltage



## Typical Applications



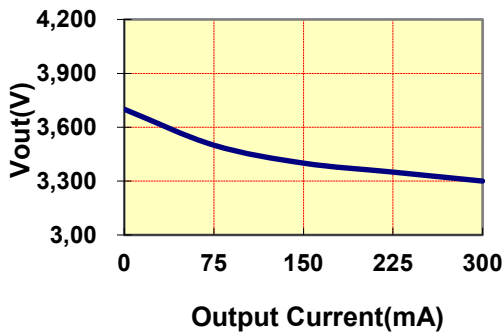
## Simplified Schematic



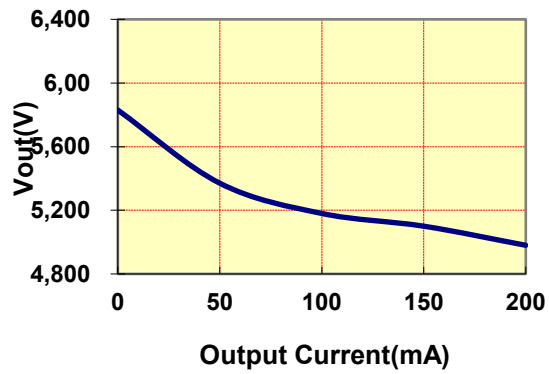
## Typical Performance Curves

Specifications typical at TA=25 °C, nominal input voltage, rated output current unless otherwise specified.

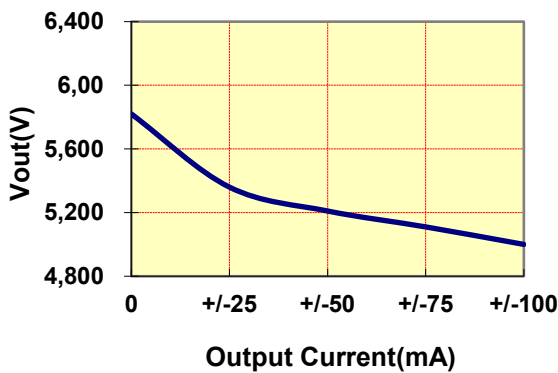
VOUT VS LOAD(3.3Vout Models)



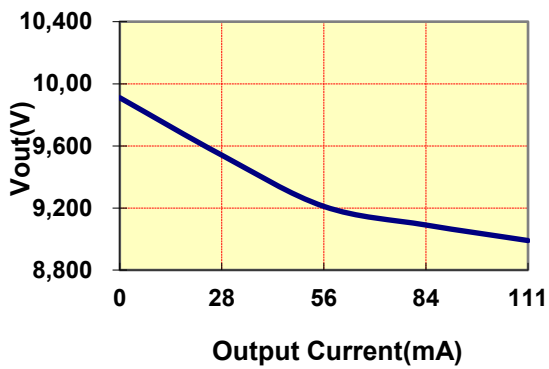
VOUT VS LOAD(5Vout Models)



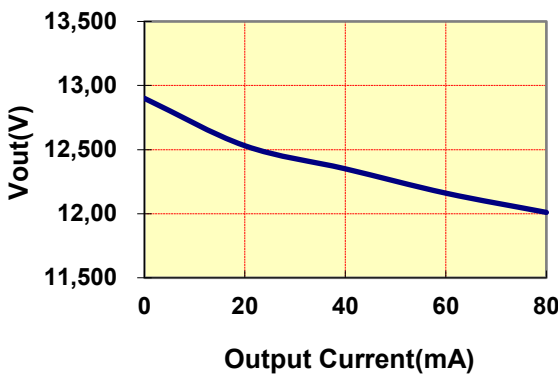
VOUT VS LOAD(+/-5Vout Models)



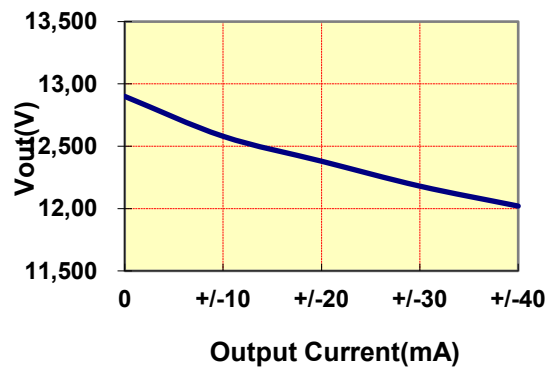
VOUT VS LOAD(9Vout Models)



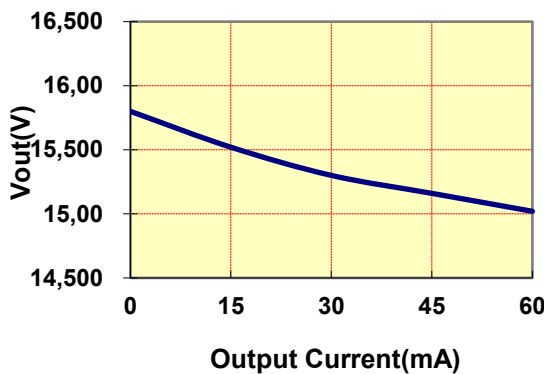
VOUT VS LOAD(12Vout Models)



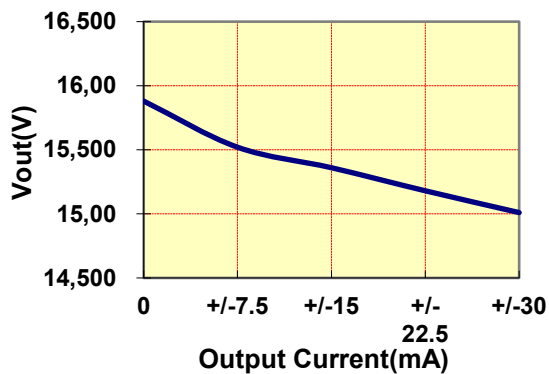
VOUT VS LOAD(+/- 12Vout Models)



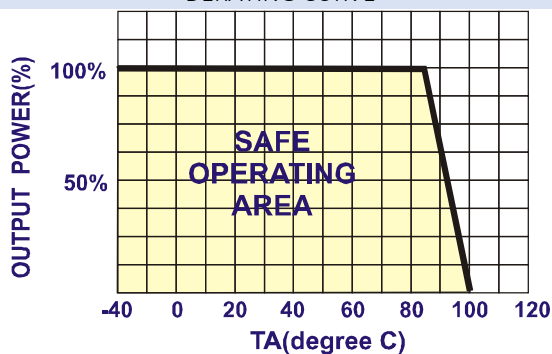
VOUT VS LOAD(15Vout Models)



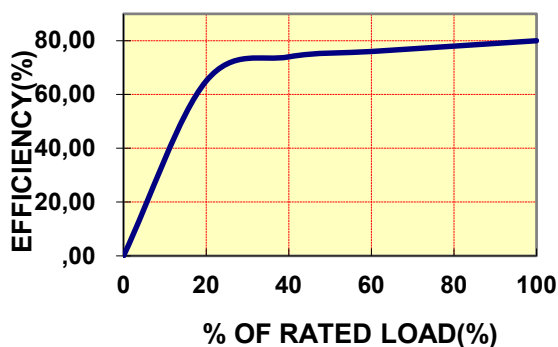
VOUT VS LOAD(+/- 15Vout Models)



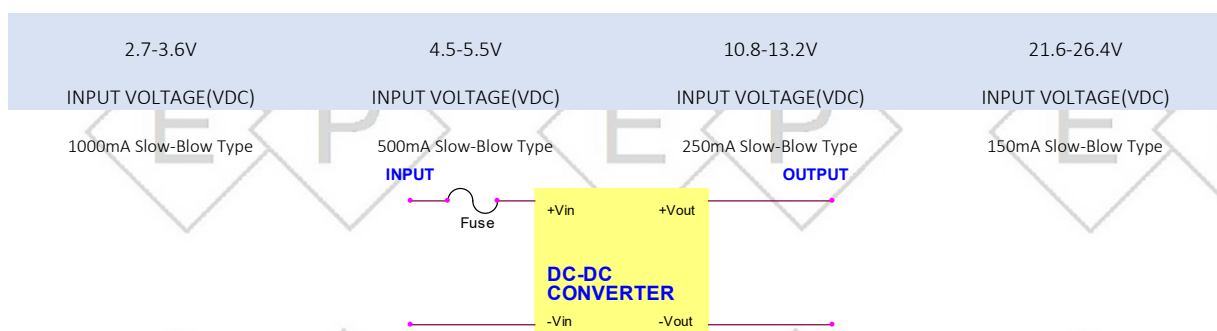
DERATING CURVE



EFFICIENCY VS LOAD



## Input Fuse Selection Guide



Note: Certain applications may require the installation of external fuse in front of the input.

### EP BS Series Application Notes:

#### EXTERNAL CAPACITANCE REQUIREMENTS:

Output filtering is required for operation. A minimum of 10uF is needed. Output capacitance may be increased for additional filtering, not to exceed 220uF.

To meet the reflected ripple requirements of the converter, an input impedance of less than 0.5 ohm from DC to 250KHz is required.

We Can Offer EMC-Filter According To EN55011/22 Class B.

#### Negative Outputs:

A negative output voltage may be obtained by connecting the +OUT to circuit ground and connecting -OUT as the negative output.

Spezifikationen können sich ohne Vorankündigung ändern.

Für etwaige fehlerhafte Angaben oder unvollständige Bezeichnungen kann keine Haftung übernommen werden.