PART NUMBER: VBSD1-SIP Series **DESCRIPTION:** dc-dc converter

description

Designed to convert fixed voltages into isolated voltages, the VBSD1-SIP series is well suited for providing board-mount local supplies in a wide range of applications, including mixed analog/digital circuits, test & measurement equip., process/machine controls, datacom/telecom fields, etc...

The semi-regulated output can be followed by 3-terminal regulators to provide output protection, in addition to output regulation

features

- **isolated 1 W output**
- **SIP package**
- **unregulated**
- **temperature range: -40°C~+85°C**
- **high efficiency to 80%**
- **single voltage output**
- **small footprint**
- **industry standard pinout**
- **UL94-V0 package**
- **no heatsink required**
- **1K Vdc isolation**
- **power density 0.85 W/cm**
- **no external component required**
- **low cost**

RoHS

MODEL

	input voltage		output voltage	output current		efficiency	
	nominal (V dc)	range. (V dc)	max. (V dc)	max. (mA)	min. (mA)	(%)	UL60950-1
VBSD1-S3.3-S3.3-SIP	3.3	3.0~3.6	3.3	300	30	72	NO
VBSD1-S3.3-S5-SIP	3.3	3.0~3.6	5	200	20	73	NO
VBSD1-S5-S3.3-SIP	5	4.5~5.5	5	300	30	74	NO
VBSD1-S5-S5-SIP	5	4.5~5.5	5	200	20	78	YES
VBSD1-S5-S9-SIP	5	4.5~5.5	9	111	12	79	YES
VBSD1-S5-S12-SIP	5	4.5~5.5	12	83	9	80	YES
VBSD1-S5-S15-SIP	5	4.5~5.5	15	67	7	78	YES
VBSD1-S12-S3.3-SIP	12	10.8~13.2	3.3	300	30	75	NO
VBSD1-S12-S5-SIP	12	10.8~13.2	5	200	20	78	YES
VBSD1-S12-S9-SIP	12	10.8~13.2	9	111	12	80	YES
VBSD1-S12-S12-SIP	12	10.8~13.2	12	83	9	81	YES
VBSD1-S12-S15-SIP	12	10.8~13.2	15	67	7	79	YES
VBSD1-S15-S3.3-SIP	15	13.5~16.5	3.3	300	30	73	NO
VBSD1-S15-S5-SIP	15	13.5~16.5	5	200	20	74	NO
VBSD1-S15-S9-SIP	15	13.5~16.5	9	111	12	75	NO
VBSD1-S15-S12-SIP	15	13.5~16.5	12	83	9	79	NO
VBSD1-S15-S15-SIP	15	13.5~16.5	15	67	7	79	NO
VBSD1-S24-S3.3-SIP	24	21.6~26.4	5	300	30	76	NO
VBSD1-S24-S5-SIP	24	21.6~26.4	5	200	20	79	YES
VBSD1-S24-S9-SIP	24	21.6~26.4	9	111	12	80	YES
VBSD1-S24-S12-SIP	24	21.6~26.4	12	83	9	81	YES
VBSD1-S24-S15-SIP	24	21.6~26.4	15	67	7	79	YES
VBSD1-S24-S24-SIP	24	21.6~26.4	24	42	4	80	NO

notes: 1. All specifications measured at TA=25°C, humidity <75%, nominal input voltage and rated output load unless otherwise specified.
2. Unbalanced load: ±5%

OUTPUT

parameter	conditions/description	min	nom	max	units
output power		0.1		1	W
line regulation	for Vin change of 1%			±1.2	%
load regulation	10% to 100% full load		10	15	%
output voltage accuracy	refer to recommended circuit				
temperature drift	@ 100% load			0.03	%/°C
output ripple	20MHz Bandwidth		50	75	mVp-p
switching frequency	100% load, nominal input		100		KHz

PART NUMBER: VBSD1-SIP Series **DESCRIPTION:** dc-dc converter

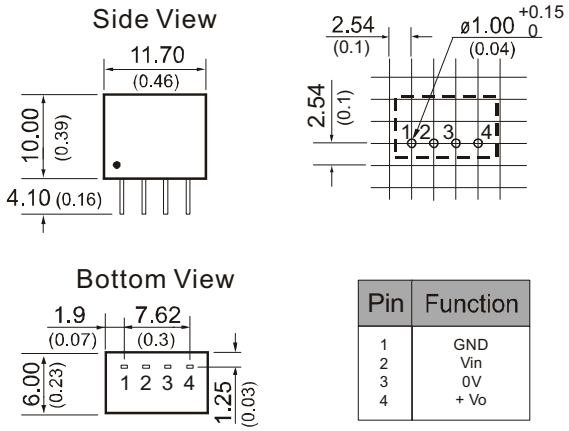
GENERAL SPECIFICATIONS

parameter	conditions/description
output short circuit protection	1 second max.
temperature rise at full load	15°C typ., 25°C max.
cooling	free air convection
operating temp. range	-40°C ~ +85°C
storage temp. range	-55°C ~ +125°C
reflow soldering temp.	300°C (1.5mm from case for 10 seconds)
storage humidity range	≤95%
case material	plastic (UL94-V0)
safety	approved to UL60950-1 (E222736)
MTBF	>3,500,000 hours
burn-in	full load at +85°C, for 4 hours at no-load and 4 hours at full load.

ISOLATION SPECIFICATIONS

parameter	conditions/description	min	nom	max	units
isolation voltage	flash tested for 1 minute	1000			V dc
isolation resistance	test at 500 V dc	1000			MΩ

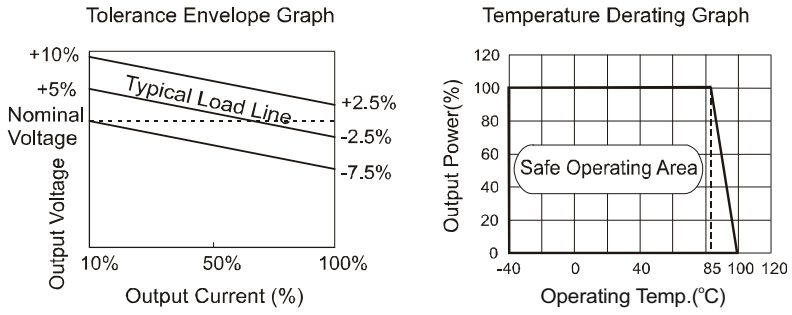
OUTLINE DIMENSIONS & RECOMMENDED LAYOUT PATTERN



Pin	Function
1	GND
2	Vin
3	0V
4	+ Vo

Note: All Pins on a 2.54mm(0.1) pitch; All Pin diameters are 0.50 mm(0.02);
Tolerances: ±0.25mm(0.01); Unit: mm(inch).

TYPICAL CHARACTERISTICS



PART NUMBER: VBSD1-SIP Series

DESCRIPTION: dc-dc converter

APPLICATION NOTES:

- Input filtering

To reduce the reflected ripple current and minimize EMI, especially when the converter input is more than 2" away from the DC source, it is recommended to connect a low ESR electrolytic capacitor between Vin and Gnd. The values suggested are as shown in Table 1. If additional filtering is required, the capacitance may be increased, or expanded to an LC network as shown in Figure 1.

TABLE 1

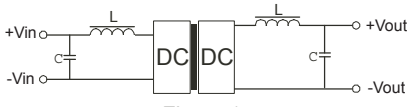
Input Voltage	External Input Capacitance
3.3, 5 V	4.7 µF
12 V	2.2 µF
15 V	2.2 µF
24 V	1.0 µF

- Output filtering

An output capacitor is needed to meet output ripple requirements as shown in Table 2.Output capacitance may be increased for additional filtering, but should not exeed 10µF or expanded to an LC network as in Figure 1.

TABLE 2

Vout	External Ouput Capacitance
3.3, 5 V	4.7 µF
9 V	2.2 µF
12 V	1.0 µF
15 V	0.47 µF
24 V	0.33 µF



<Figure 1>

- Minimum loading

The converter needs a minimum of 10% loading to maintain output regulation. Operation under no-load conditions will not cause immediate damages but may reduce reliability, and cause performance not to meet specifications.

- Regulation

With a semi-regulated design, the converter's output voltage varies with load current and will change proportionally to the input voltage. If regulated output is needed, an external regulator can be used as shown in Figure 2.

- Protection

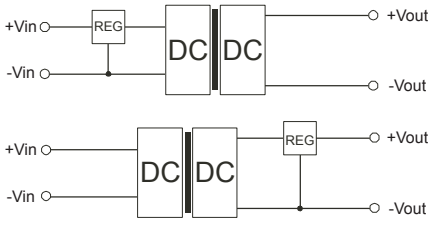
The converter has minimal protection against input over-voltage or output over-load, and may be permanently damaged if exposed to these conditions. An input clamping device can be used for input voltage limiting. An input fuse or an output fuse also be used to protect against over-loading.

- Dual outputs used as a single output

The +Vout and -Vout can be used to obtain a single output that is the sum of the two outputs. In this case, the COM pin shouldn't be used.

- External Regulator

An external 3-terminal regulator can be connected to the output of the converter to achieve full regulation. Make sure the converter's output voltage provides sufficient head room for the regulator. An additional benefit is that the built-in protection features in the regulator, such as OCP, OTP, etc, will protect the converter also. In a complimentory supply, a negative output regulator must be used to achieve the negative regulated output.



<Figure 2>