

**PART NUMBER:** VBSD1-DIP series

**DESCRIPTION:** dc-dc converter

### description

Designed to convert fixed voltages into an isolated voltage, the VBSD1-DIP 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, data-com/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
- temperature range: -40°C~+85°C
- unregulated
- high efficiency to 80%
- single voltage output
- small footprint
- DIP package style
- industry standard pinout
- UL94-V0 package
- no heatsink required
- 1K Vdc isolation
- power density 0.85 W/cm<sup>3</sup>
- no external component required
- low cost



### MODEL

	input voltage		output voltage	output current		efficiency	UL60950-1
	nominal (V dc)	range (V dc)	(V dc)	max. (mA)	min. (mA)	typ. (%)	
VBSD1-S3.3-S3.3-DIP	3.3	3.00~3.60	3.3	303	31	72	NO
VBSD1-S3.3-S5-DIP	3.3	3.00~3.60	5	200	20	74	NO
VBSD1-S5-S3.3-DIP	5	4.5~5.5	3.3	303	30	72	NO
VBSD1-S5-S5-DIP	5	4.5~5.5	5	200	20	70	YES
VBSD1-S5-S9-DIP	5	4.5~5.5	9	111	12	78	YES
VBSD1-S5-S12-DIP	5	4.5~5.5	12	83	9	78	YES
VBSD1-S5-S15-DIP	5	4.5~5.5	15	67	7	80	YES
VBSD1-S12-S3.3-DIP	12	10.8~13.2	3.3	303	30	72	NO
VBSD1-S12-S5-DIP	12	10.8~13.2	5	200	20	71	YES
VBSD1-S12-S9-DIP	12	10.8~13.2	9	111	12	76	YES
VBSD1-S12-S12-DIP	12	10.8~13.2	12	83	9	78	YES
VBSD1-S12-S15-DIP	12	10.8~13.2	15	67	7	79	YES
VBSD1-S15-S3.3-DIP	15	13.5~16.5	3.3	303	31	73	NO
VBSD1-S15-S5-DIP	15	13.5~16.5	5	200	20	74	NO
VBSD1-S15-S9-DIP	15	13.5~16.5	9	111	12	75	NO
VBSD1-S15-S12-DIP	15	13.5~16.5	12	83	9	79	NO
VBSD1-S15-S15-DIP	15	13.5~16.5	15	67	7	75	NO
VBSD1-S24-S3.3-DIP	24	21.6~26.4	3.3	303	31	76	NO
VBSD1-S24-S5-DIP	24	21.6~26.4	5	200	20	73	YES
VBSD1-S24-S9-DIP	24	21.6~26.4	9	111	12	78	YES
VBSD1-S24-S12-DIP	24	21.6~26.4	12	83	9	78	YES
VBSD1-S24-S15-DIP	24	21.6~26.4	15	67	7	79	YES
VBSD1-S24-S24-DIP	24	21.6~26.4	24	42	4	78	NO

**PART NUMBER:** VBSD1-DIP series

**DESCRIPTION:** dc-dc converter

## OUTPUT

parameter	conditions/description	min	nom	max	units
output power		0.1		1	W
voltage accuracy	refer to tolerance envelope graph				
ripple	@ 20 MHz bandwidth		50	75	mVpp
noise	@ 20 MHz bandwidth		75	150	mVpp
line regulation	for Vin change of 1% (3.3 V output)			1.5	%
	for Vin change of 1% (other V output)			1.2	%
load regulation	10% to 100% full load 3.3 V		15	20	%
	5 V		12.8	15	%
	12 V		8.3	15	%
	9 V		6.8	15	%
	15 V		6.3	15	%
temperature coefficient	refer to recommended circuit			0.03	%/°C
switching frequency	100% load, nominal input		100		KHz

note: 1. All specifications measured at TA=25°C, humidity &lt;75%, normal input voltage and rated output load unless otherwise specified.

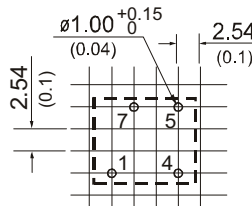
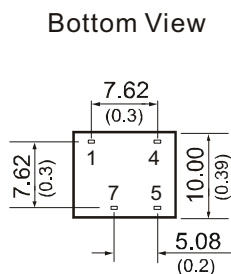
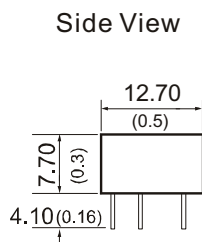
## GENERAL SPECIFICATIONS

parameter	conditions/description
output short circuit protection	1 second
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
storage humidity range	≤95%
case material	plastic (UL94-V0)
MTBF	>3,500,000 hours

## ISOLATION SPECIFICATIONS

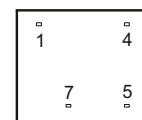
parameter	conditions/description	min	nom	max	units
isolation voltage	flash tested for 1 minute	1000			V dc
isolation resistance	test at 500 V dc	1000			MΩ

## DIMENSIONS (mm)



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)

Pin	Function
1	GND
4	Vin
5	+Vo
7	0V



**PART NUMBER:** VBSD1-DIP series

**DESCRIPTION:** dc-dc converter

### APPLICATION NOTES:

#### - Requirement on output load

To ensure this module can operate efficiently and reliably, the minimum output load should not be less than 10% of the full load. Also, this product should never be operated under no load conditions. If the actual output power is too small, please connect a resistor with proper resistance at the output end in parallel to increase the load.

#### - Overload protection

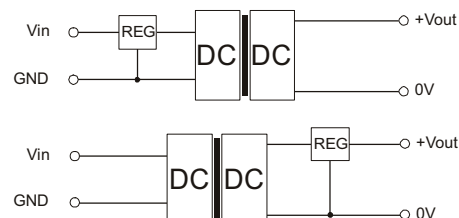
Under normal operating conditions, the output circuit of these products has no protection against overload. The simplest method is to connect a self-recovery fuse in series at the input end or to add a circuit breaker to the circuit.

#### - Recommended circuit

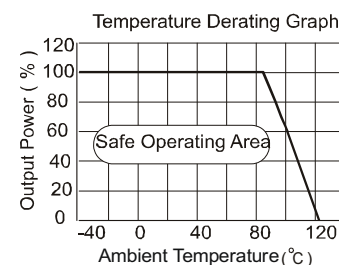
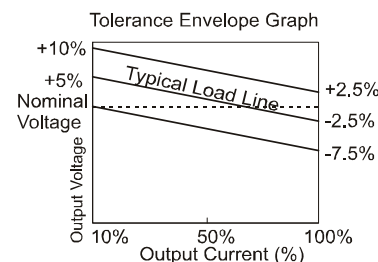
If you want to further decrease the input/output ripple, an "LC" filtering network may be connected to the input and output ends of the dc-dc converter, see (Figure 1).

- Output voltage regulation and over-voltage protection circuit  
 The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (Figure 2).

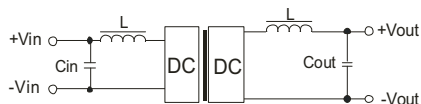
**FIGURE 2**



### TYPICAL CHARACTERISTICS



**FIGURE 1**



To ensure this module can operate efficiently and reliably, a minimum load is specified for this kind of dc-dc converter in addition to a maximum load (namely full load). During operation, make sure the specified range of input voltage is not exceeded, the minimum output load is not less than 10% of the full load, and that this product should never be operated under no load. If the actual output power is very small, please connect a resistor with proper resistance at the output end in parallel to increase the load, or use our company's products with a lower rated output power.

### EXTERNAL CAPACITOR TABLE

$V_{in}$	External capacitor	$V_{out}$	External capacitor
3.3/5VDC	4.7uF	3.3VDC	10uF
12VDC	2.2uF	5VDC	10uF
24VDC	1uF	9VDC	4.7uF
---	---	12VDC	2.2uF
--	--	15VDC	1uF

It is not recommended to connect any external capacitor in the application field with less than a 0.5 watt output.