



**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 (V dc)	output current		efficiency typ. (%)	UL60950-1
	nominal (V dc)	range (V dc)		max. (mA)	min. (mA)		
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	73	NO
VBSD1-S5-S3.3-DIP	5	4.5~5.5	5	100	10	68	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	31	73	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



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## OUTPUT

parameter	conditions/description	min	nom	max	units
output power		0.1		1	W
voltage accuracy	refer to recommended circuit		±1	±2	%
ripple	@ 20MHz Bandwidth	3.3/5/12/15V	75	100	mVpp
	24 V		100	150	mVpp
line regulation	input voltage from low to high			1.2	%
load regulation	10% to 100% full load	3.3V	12	20	%
		5V	10.5	15	%
		12V	6.8	15	%
		15V	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.

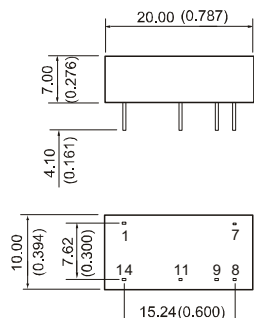
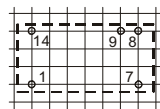
## GENERAL SPECIFICATIONS

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)

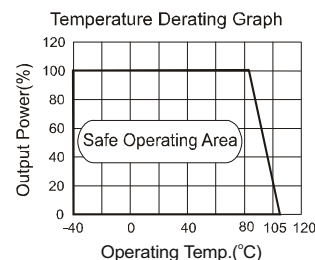
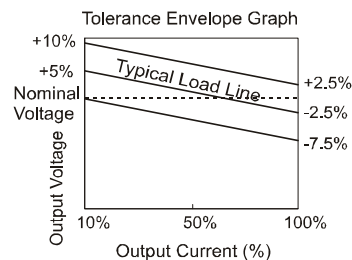

 First Angle Projection   
 RECOMMENDED FOOTPRINT  
 Top view, grid: 2.54mm (0.1inch),  
 diameter: 1.00mm


### FOOTPRINT DETAILS

Pin	Single
1	-Vin
7	NC
8	-Vout
9	+Vout
11	No Pin
14	+Vin

 Note:  
 Unit:mm(inch)  
 Pin section: 0.50\*0.30mm(0.020\*0.012inch)  
 Pin tolerances: ±0.10mm(±0.004inch)  
 General tolerances: ±0.25mm (±0.010inch)

## TYPICAL CHARACTERISTICS



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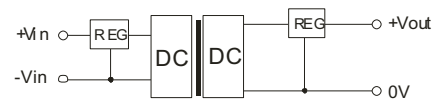
**DESCRIPTION:** dc-dc converter

**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).

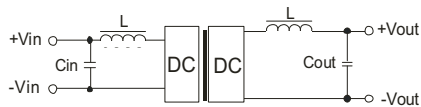
- Output voltage regulation and over-voltage protection circuit  
The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (Figure 2).

**FIGURE 2**



No parallel connection or plug and play.

**FIGURE 1**



It should also be noted that the inductance and the frequency of the "LC" filtering network should be staggered with the dc-dc frequency to avoid mutual interference. However, the capacitance of the output filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided that safe and reliable operation is ensured, the recommended capacitance of its filter capacitor see (Table 1).

**TABLE 1**

Vin (VDC)	Cin (uF)	Single Vout (VDC)	Cout (uF)
5	4.7	5	10
12	2.2	9	4.7
15	2.2	12	2.2
24	1	15	1

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