SERIES: VESD1-SIP | DESCRIPTION: DC-DC CONVERTER

FEATURES

- 1 W isolated output
- industry standard 7 pin SIP package
- dual unregulated outputs
- 3,000 V isolation
- short circuit protection
- UL safety approvals (some models)
- wide temperature (-40~85°C)
- efficiency up to 81%

MODEL	input voltage		output voltage	output current		efficiency	UL 60950
	typ (Vdc)	range (Vdc)	(Vdc)	min (mA)	max (mA)	typ (%)	
VESD1-S5-D5-SIP	5	4.5 ~ 5.5	±5	±10	±100	72	YES
VESD1-S5-D9-SIP	5	4.5 ~ 5.5	±9	±6	±56	75	YES
VESD1-S5-D12-SIP	5	4.5 ~ 5.5	±12	±5	±42	78	YES
VESD1-S5-D15-SIP	5	4.5 ~ 5.5	±15	±4	±33	79	YES
VESD1-S12-D5-SIP	12	10.8 ~ 13.2	±5	±10	±100	74	YES
VESD1-S12-D9-SIP	12	10.8 ~ 13.2	±9	±6	±56	76	YES
VESD1-S12-D12-SIP	12	10.8 ~ 13.2	±12	±5	±42	79	YES
VESD1-S12-D15-SIP	12	10.8 ~ 13.2	±15	±4	±33	80	YES
VESD1-S15-D5-SIP	15	13.5 ~ 16.5	±5	±10	±100	74	NO
VESD1-S15-D9-SIP	15	13.5 ~ 16.5	±9	±6	±56	75	NO
VESD1-S15-D12-SIP	15	13.5 ~ 16.5	±12	±5	±42	79	NO
VESD1-S15-D15-SIP	15	13.5 ~ 16.5	±15	±4	±33	79	NO
VESD1-S24-D5-SIP	24	21.6 ~ 26.4	±5	±10	±100	74	YES
VESD1-S24-D9-SIP	24	21.6 ~ 26.4	±9	±6	±56	76	YES
VESD1-S24-D12-SIP	24	21.6 ~ 26.4	±12	±5	±42	80	YES
VESD1-S24-D15-SIP	24	21.6 ~ 26.4	±15	±4	±33	81	YES

INPUT

parameter	conditions/description	min	typ	max	units
operating input voltage		4.5	5	5.5	Vdc
		10.8	12	13.2	Vdc
		13.5	15	16.5	Vdc
		21.6	24	26.4	Vdc

OUTPUT

parameter	conditions/description	min	typ	max	units
line regulation	for Vin change of 1%			1.2	%
load regulation	measured from 10% to full load		10	15	%
voltage accuracy	see tolerance envelope graph				
output ripple	20 MHz bandwidth		100	150	mVp-p
switching frequency	100% load, input voltage range	100		200	kHz
temperature coefficient				±0.03	%/°C

PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection				1	s

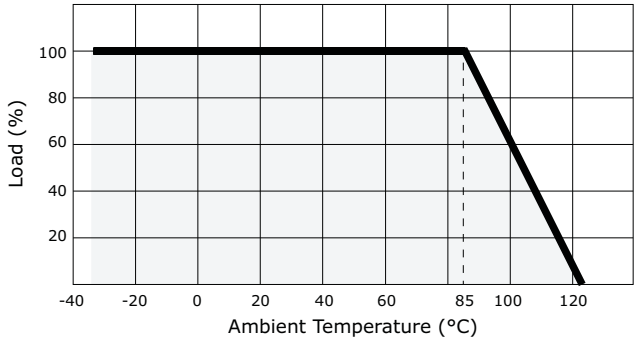
SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	tested for 1 minute	3,000			Vdc
safety approvals	UL 60950				
insulation resistance	at 500 Vdc	1,000			MΩ
RoHS compliant	yes				
MTBF		3,500,000			hours

ENVIRONMENTAL

parameter	conditions/description	min	typ	max	units
case operating temperature		-40		85	°C
storage temperature		-55		125	°C
storage humidity	non-condensing			95	%
temperature rise	100% load		15	25	°C
lead temperature	1.5 mm from the case for 10 seconds			300	°C

DERATING CURVES



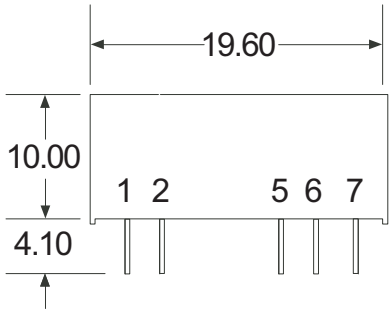
MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	0.77 x 0.39 x 0.24 inch (19.60 x 10.00 x 6.0 mm)				
case material	plastic UL94-V0				
weight			2.1		g

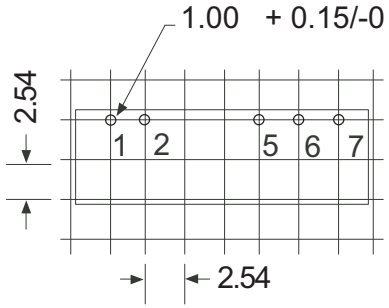
MECHANICAL DRAWING

Units: mm
All pins on a 2.54mm pitch
All pin diameters are 0.50mm

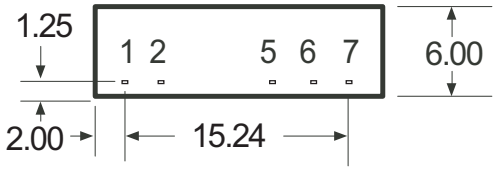
Side View



Recommended Footprint



PIN CONNECTIONS	
1	+Vin
2	-Vin
5	-Vout
6	COM
7	+Vout



Bottom View

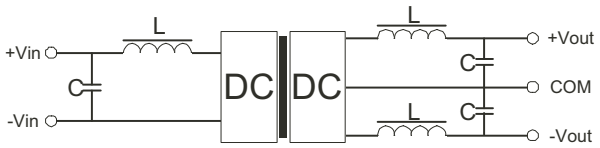
APPLICATION NOTES

1. **Requirement on Output Load**
   In order to ensure the product operates efficiently and reliably, make sure the specified range of input voltage is not exceeded and the minimum output load is not less than 10% load. If the actual load is less than the specified minimum load, the output ripple may increase sharply while its efficiency and reliability will reduce greatly. If the actual output power is very small, please add an appropriate resistor as extra loading.

2. **Overload Protection**
   Under normal operating conditions, the output circuit of these products has no protection against over-current and short-circuits. The simplest method is to connect a self-recovery fuse in series at the input end or add a circuit breaker to the circuit.

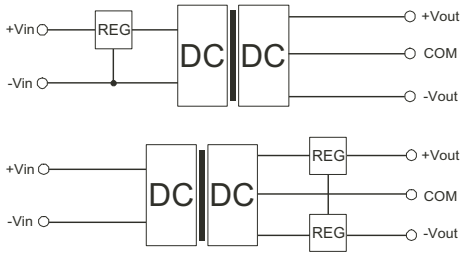
3. **Filtering**
   In some circuits which are sensitive to noise and ripple, a filtering capacitor may be added to the DC/DC output end and input end to reduce the noise and ripple. However, the capacitance of the output filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the greatest capacitance of its filter capacitor sees the external capacitor table. To get an extremely low ripple, an "LC" filtering network may be connected to the input and output ends of the DC/DC converter, which may produce a more significant filtering effect. 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 (Figure 1).

Figure 1



4. **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



5. **External Capacitor Table**
   It is not recommended to connect any external capacitor in the application field with less than 0.5 W output.

Table 1

Vin (Vdc)	Cout (µF)	Vout (Vdc)	Cout (µF)
5	4.7	5	4.7
12	2.2	9	2.2
24	1	12	1
--	--	15	0.47

REVISION HISTORY

rev.	description	date
1.0	initial release	12/09/2010
1.01	template update	02/02/2012

The revision history provided is for informational purposes only and is believed to be accurate.

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