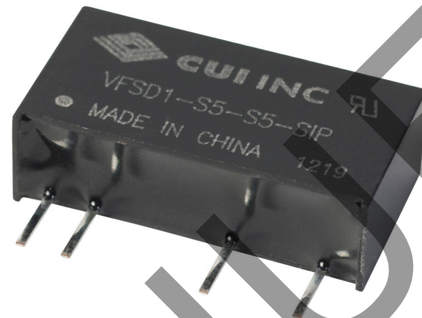
CUI INC

SERIES: VFSD1-SIP │ DESCRIPTION: DC-DC CONVERTER

FEATURES

- 1 W isolated output
- industry standard pinout
- unregulated
- single output (5~24 V)
- small footprint
- 3,000 V isolation
- short circuit protection
- temperature range (-40~85°C)
- efficiency up to 81%



RoHS c US CE

MODEL

MODEL	input voltage typ (Vdc)	input voltage range (Vdc)	output voltage (Vdc)	output current min (mA)	output current max (mA)	output power max (W)	ripple noise max (mVp-p)	efficiency typ (%)
VFSD1-S3.3-S3.3-SIP	3.3	3.0 ~ 3.6	3.3	31	303	1	100	69
VFSD1-S3.3-S5-SIP	3.3	3.0 ~ 3.6	5	20	200	1	100	74
VFSD1-S5-S5-SIP	5	4.5 ~ 5.5	5	20	200	1	30	80
VFSD1-S5-S12-SIP	5	4.5 ~ 5.5	12	9	83	1	30	80
VFSD1-S5-S15-SIP	5	4.5 ~ 5.5	15	7	67	1	60	81
VFSD1-S5-S24-SIP	5	4.5 ~ 5.5	24	5	42	1	60	81
VFSD1-S12-S5-SIP	12	10.8 ~ 13.2	5	20	200	1	30	80
VFSD1-S12-S12-SIP	12	10.8 ~ 13.2	12	9	83	1	30	80
VFSD1-S12-S15-SIP	12	10.8 ~ 13.2	15	7	67	1	60	81
VFSD1-S15-S5-SIP	15	13.5 ~ 16.5	5	20	200	1	30	80
VFSD1-S15-S15-SIP	15	13.5 ~ 16.5	15	7	67	1	60	81
VFSD1-S24-S5-SIP	24	21.6 ~ 26.4	5	20	200	1	30	79
VFSD1-S24-S12-SIP	24	21.6 ~ 26.4	12	9	83	1	30	81
VFSD1-S24-S15-SIP	24	21.6 ~ 26.4	15	7	67	1	60	82

Note: 1. Ripple and noise measured at 20 mHz BW

PART NUMBER KEY

VFSD1-S XX -S XX -SIP

Base Number　Input Voltage　Output Voltage

INPUT

parameter	conditions/description	min	typ	max	units
operating input voltage	5 V model 12 V model 15 V model 24 V model	4.5 10.8 13.5 21.6	5 12 15 24	5.5 13.2 16.5 26.4	Vdc Vdc Vdc Vdc
input surge voltage	1 second max.	-0.7 -0.7 -0.7 -0.7		9 18 21 30	Vdc Vdc Vdc Vdc
input filter	C filter				

OUTPUT

parameter	conditions/description	min	typ	max	units
voltage accuracy	see derating curves				
line regulation	for Vin change of ±1%			±1.2	%
load regulation	10 ~ 100% full load 5 V model 12 V model 15 V model 24 V model		10 8 7 6	15 15 15 15	% % % %
switching frequency	100% load, nominal input voltage		100	300	kHz
temperature coefficient	100% load			±0.03	%/°C

PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection	continuous, automatic recovery				

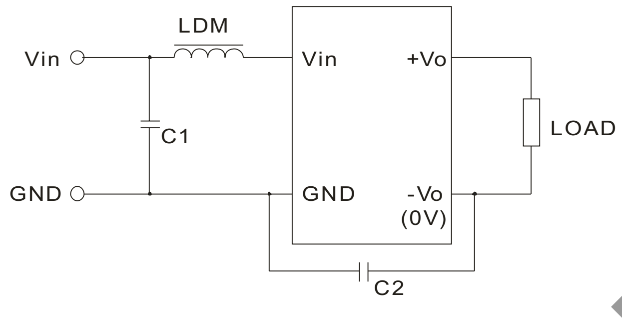
SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	tested for 1 minute at 1 mA max.	3,000			Vdc
isolation resistance	at 500 Vdc	1,000			MΩ
isolation capacitance	input to output, 100 kHz / 0.1 V		20		pF
EMI/EMC	CISPR22/EN 55022 Class B, IEC/EN 61000-4-2				
RoHS compliant	yes				
MTBF	MIL-HDBK-217F, 25°C	3,500,000			hours

ENVIRONMENTAL

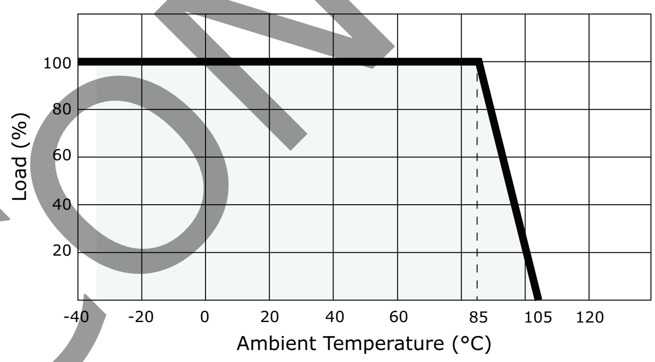
parameter	conditions/description	min	typ	max	units
operating temperature		-40		105	°C
storage temperature		-55		125	°C
storage humidity	non-condensing			95	%
temperature rise	100% load		25		°C
lead temperature	1.5 mm from the case for 10 seconds			300	°C

EMC RECOMMENDED CIRCUIT



RECOMMENDED EXTERNAL CIRCUIT PARAMETERS	Vin = 5V	Vin = 12V	Vin = 15V	Vin = 24V
C1	475 k / 50 V			
LDM	6.8 µH			
C2	---		470 pF / 2 kV	

DERATING CURVES

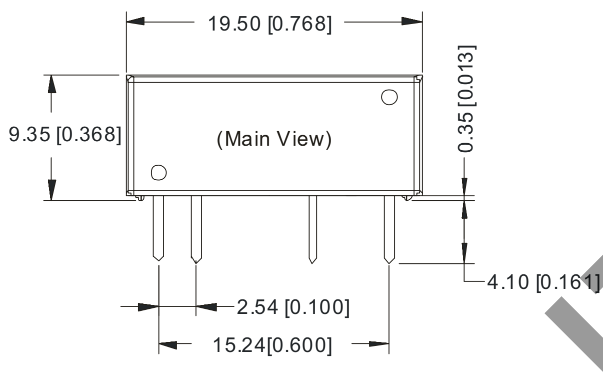


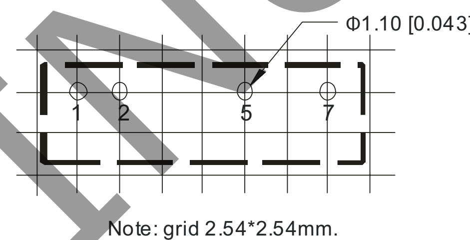
MECHANICAL

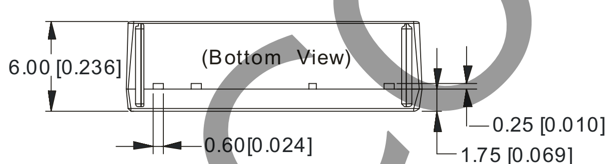
parameter	conditions/description	min	typ	max	units
dimensions	0.768 x 0.236 x 0.39 (19.50 x 6.00 x 10.0 mm)				inch
case material	Plastic (UL94-V0)				
weight			2.4		g

MECHANICAL DRAWING

units: mm [inches]
tolerance: ±0.25 [±0.010]
pin section tolerance: ±0.10 mm [±0.004]







PIN CONNECTIONS	
PIN	FUNCTION
1	Vin
2	GND
5	0 V
7	+Vo

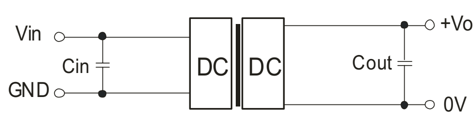
APPLICATION NOTES

1. **Requirement on output load**
   To ensure this module can operate efficiently and reliably, During operation, the minimum output load could not be less than 10% of the full 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.

2. **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 add a circuit breaker to the circuit.

3. **Recommended testing and application 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). 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 the safe and reliable operation is ensured, the recommended capacitance of its filter capacitor sees (Table 1).

Figure 1

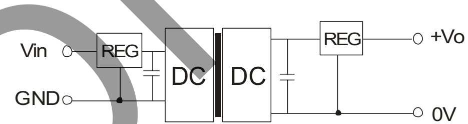


External Capacitor Table (Table 1)

Vin (Vdc)	Cin (μF)	Vout (Vdc)	Cout (μF)
5	4.7	5	10
12	2.2	9.0	4.7
15	2.2	12	2.2
24	1.0	15, 24	1.0

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. **No parallel connection or plug and play**

REVISION HISTORY

rev.	description	date
1.0	initial release	10/04/2007
1.01	updated drawings and data	05/31/2012
1.02	V-Infinity branding removed	09/05/2012
1.03	added 2 models to datasheet	01/28/2013

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

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