CUI INC

SERIES: VFSD1-SIP Series | **DESCRIPTION:** DC-DC CONVERTER

FEATURES

• 1 W isolated output
• industry standard pinout
• unregulated
• single output (3.3~24 V)
• small footprint
• 3,000 V isolation
• short circuit protection
• temperature range (-40~85°C)
• high efficiency to 83%

RoHS C UL US CE

MODEL	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 (%)	UL60950
VFSD1-S3.3-S3.3-SIP	3 ~ 3.6	3.3	31	303	1	100	69	NO
VFSD1-S3.3-S5-SIP	3.3 ~ 3.6	5	20	200	1	100	74	NO
VFSD1-S5-S3.3-SIP	4.5 ~ 5.5	3.3	30	303	1	100	73	NO
VFSD1-S5-S5-SIP	4.5 ~ 5.5	5	20	200	1	100	72	YES
VFSD1-S5-S9-SIP	4.5 ~ 5.5	9	12	111	1	100	76	YES
VFSD1-S5-S12-SIP	4.5 ~ 5.5	12	9	83	1	100	79	YES
VFSD1-S5-S15-SIP	4.5 ~ 5.5	15	7	67	1	100	78	YES
VFSD1-S5-S24-SIP	10.8 ~ 13.2	24	5	42	1	150	79	NO
VFSD1-S12-S5-SIP	10.8 ~ 13.2	5	20	200	1	100	70	YES
VFSD1-S12-S9-SIP	10.8 ~ 13.2	9	12	111	1	100	75	YES
VFSD1-S12-S12-SIP	10.8 ~ 13.2	12	9	83	1	100	78	YES
VFSD1-S12-S15-SIP	10.8 ~ 13.2	15	7	67	1	100	79	YES
VFSD1-S12-S24-SIP	10.8 ~ 13.2	24	5	42	1	150	79	NO
VFSD1-S24-S3.3-SIP	21.6 ~ 26.4	3.3	31	303	1	100	70	NO
VFSD1-S24-S5-SIP	21.6 ~ 26.4	5	20	200	1	100	71	YES
VFSD1-S24-S9-SIP	21.6 ~ 26.4	9	12	111	1	100	76	YES
VFSD1-S24-S12-SIP	21.6 ~ 26.4	12	9	83	1	100	78	YES
VFSD1-S24-S15-SIP	21.6 ~ 26.4	15	7	67	1	100	80	YES
VFSD1-S24-S15-SIP-A	21.6 ~ 26.4	15	7	67	1	150	83	NO
VFSD1-S24-S24-SIP	21.6 ~ 26.4	24	5	42	1	150	77	NO

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

INPUT

parameter	conditions/description		min	typ	max	units
operating input voltage			3	3.3	3.6	Vdc
			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%, full load	3.3 V output			±1.5	%
		all other models			±1.2	%
load regulation	10% to 100% full load, nominal line	VFSD1-S24-S15-SIP-A	2		3	%
		all other models		±10	±15	%
voltage accuracy	See tolerance envelope graph			±1	±3	%
switching frequency	100% load, input voltage range			100		kHz
Temperature coefficient					0.03	%/°C

PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection	Supply voltage must be discontinued at end of short circuit duration				

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 / 1 V		1,000		pF
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

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

DERATING CURVES
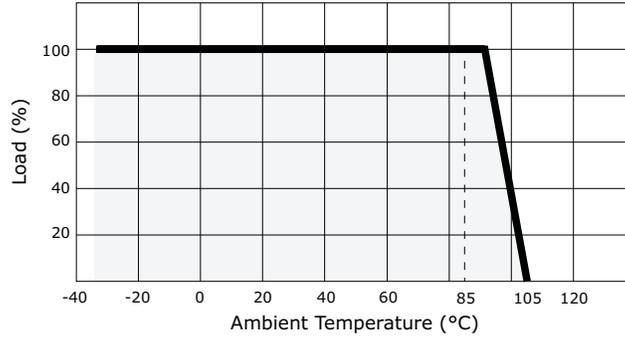
MECHANICAL

parameter	conditions/description	min	typ	max	units
dimensions	0.77 x 0.24 x 0.39 inch (19.6 x 6.0 x 10.0 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

Recommended Footprint
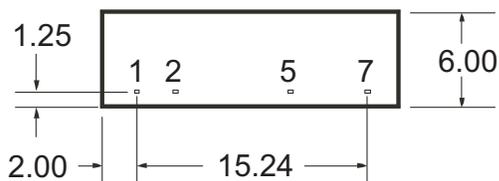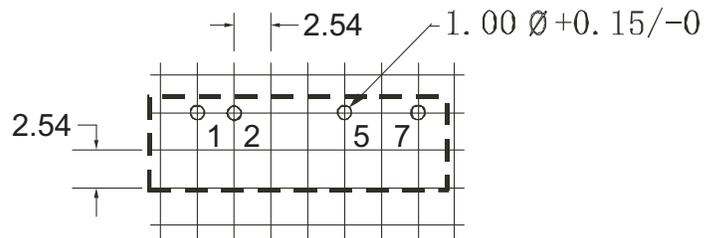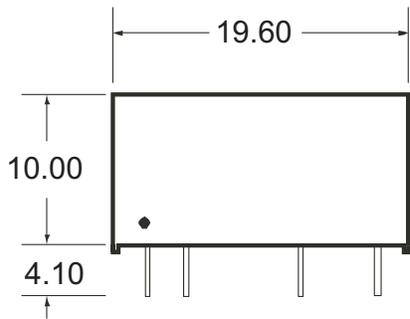
PIN CONNECTIONS	
1	+Vin
2	-Vin
5	-Vout
7	+Vout

BOTTOM VIEW

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 (E_S-W25&F_S-W25).

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
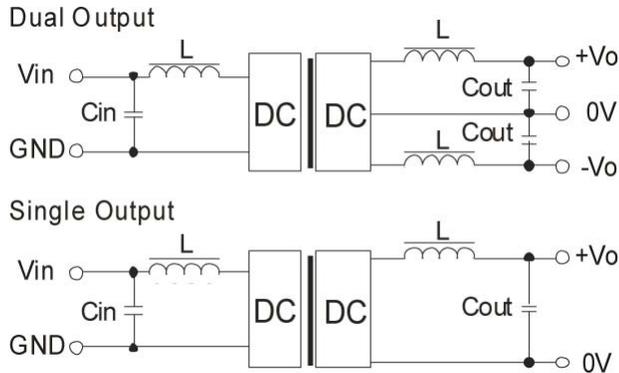
External Capacitor Table (Table 1)

Vin (Vdc)	Cin (µF)	Single Vout (Vdc)	Cout (µF)	Dual Vout (Vdc)	Cout (µF)
3.3, 5	4.7	3.3, 5	10	±5	4.7
12	2.2	9.0	4.7	±9	2.2
15	2.2	12	2.2	±12	1.0
24	1.0	15, 24	1.0	±15	0.47

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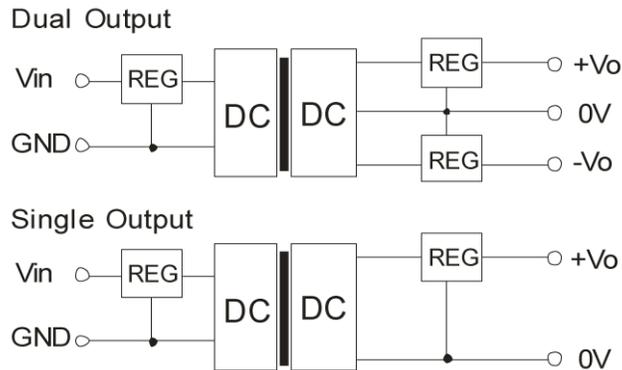
5. **No parallel connection or plug and play**

REVISION HISTORY

rev.	description	date
1.0	initial release	10/04/2007

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

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