

# VF-1.5W Series



## 1.5W Regulated Single output

### Features

- 12 Pin SIL Package
- 1000 VDC Isolation
- Up to 5200 VDC Isolation
- Continuous Short Circuit Protection
- Efficiency up to 67%
- -25 ~ 71°C Operation Temperature Range



The VF series is a family of cost effective 1.5W single output DC-DC converters. These converters combine miniature package in a 12-pin SIL compatible case with high performance features such as 1000 VDC~5200 VDC input/output isolation voltage, continuous short circuit protection with automatic restart and high line / load regulation. Devices are encapsulated using flame retardant resin. Input voltages of 5, 12, 24 with output voltage of 3.3, 5, 7.2, 9, 12, 15, 18, 24 Vdc. High performance features include high efficiency operation up to 67% and output voltage accuracy of  $\pm 2\%$  maximum. Standard features include an input range of  $\pm 10\%$  tolerance and low output noise and ripple.

All specifications typical at  $T_a=25^\circ\text{C}$ , nominal input voltage and full load unless otherwise specified

OUTPUT SPECIFICATIONS	
Voltage accuracy	$\pm 2\%$
Line regulation	$\pm 0.5\%$
Load regulation	(From 0% to 100% Load) $\pm 0.5\%$ (Output 3.3V Model) $\pm 1.5\%$
Ripple & noise (20 MHz bandwidth)(1)	75mV pk-pk
Short Circuit Protection	Indefinite(Automatic Recovery)
Temperature coefficient	$\pm 0.02\%/^\circ\text{C}$
Capacitor load(2)	See table

INPUT SPECIFICATIONS	
Voltage Range	$\pm 10\%$
Max. Input Current	See table
No-Load Input Current	See table
Input Filter	Capacitor
Input Reflected Ripple Current(3)	20mA pk-pk

GENERAL SPECIFICATIONS	
Efficiency	See table
I/O Isolation Voltage(60sec)	1000~5200Vdc
Input/Output	1000~5200Vdc
I/O Isolation Capacitance	60 pF Typ.
I/O Isolation Resistance	1000M Ohm
Switching Frequency	50kHz typ
Humidity	95% rel H
Reliability Calculated MTBF(MIL-HDBK-217 F)	>1.12 Mhrs
Safety Standard : (designed to meet)	IEC 60950-1

PHYSICAL SPECIFICATIONS	
Case Material	Non-conductive Black Plastic(UL94V-0 rated)
Pin Material	0.5mm Alloy42 Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	7.2g
Dimensions	1.26"x0.32"x0.57"

ENVIRONMENT SPECIFICATIONS	
Operating Temperature	$-25^\circ\text{C} \sim 71^\circ\text{C}$ (See Derating Curve)
Maximum Case Temperature	100°C
Storage Temperature	$-40^\circ\text{C} \sim 125^\circ\text{C}$
Cooling	Nature Convection

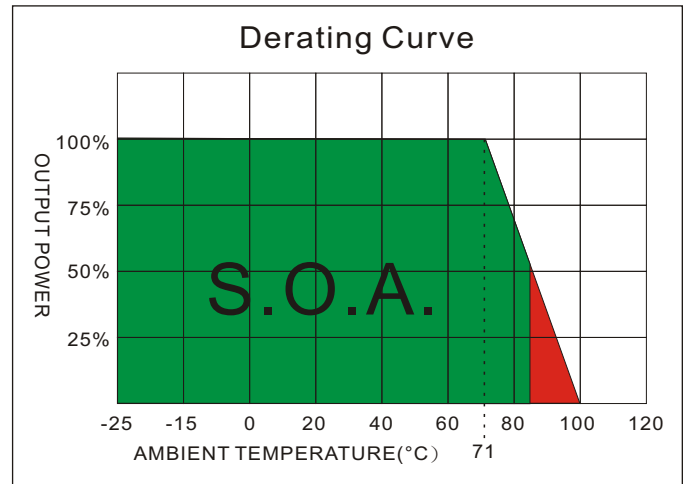
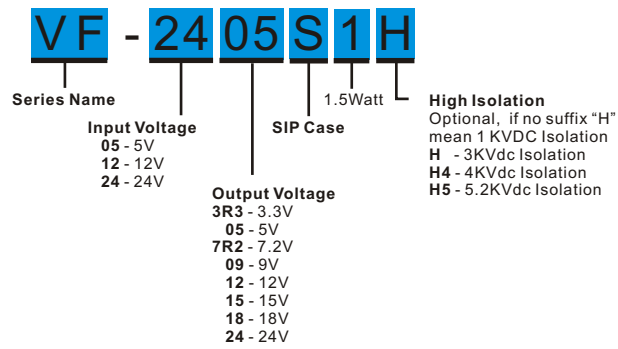
ABSOLUTE MAXIMUM RATINGS(4)	
These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Input Surge Voltage(100mS)	
5 Models	7 Vdc ,max.
12 Models	15 Vdc ,max.
24 Models	28 Vdc ,max.
Soldering Temperature (1.5mm from case 10 sec. max.)	260°C ,max.

EMC SPECIFICATIONS		
Radiated Emissions	EN55022	CLASS B
Conducted Emissions (6)	EN55022	CLASS B
ESD	IEC 61000-4-2	Perf. Criteria A
RS	IEC 61000-4-3	Perf. Criteria A
EFT (7)	IEC 61000-4-4	Perf. Criteria A
Surge (7)	IEC 61000-4-5	Perf. Criteria A
CS	IEC 61000-4-6	Perf. Criteria A
PFMF	IEC 61000-4-8	Perf. Criteria A

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### PART NUMBER STRUCTURE



### MODEL SELECTION GUIDE

MODEL NUMBER	INPUT	INPUT Current		OUTPUT	OUTPUT Current	EFFICIENCY @FL(%)	Capacitor Load(μF)
	Voltage Range (Vdc)	No-Load (mA)	Full Load (mA)	Voltage (Vdc)	Full load (mA)		
VF-053R3S1	5	70	489	3.3	400	54	220
VF-0505S1	5	43	448	5	300	67	220
VF-057R2S1	5	70	469	7.2	208.3	64	220
VF-0509S1	5	70	462	9	166.6	65	220
VF-0512S1	5	80	448	12	125	67	220
VF-0515S1	5	85	462	15	100	65	220
VF-0518S1	5	100	478	18	83.3	67	220
VF-0524S1	5	130	500	24	62.5	60	220
VF-123R3S1	12	70	227	3.3	400	55	220
VF-1205S1	12	30	198	5	300	63	220
VF-127R2S1	12	40	198	7.2	208.3	63	220
VF-1209S1	12	40	195	9	166.6	64	220
VF-1212S1	12	33	195	12	125	64	220
VF-1215S1	12	36	189	15	100	66	220
VF-1218S1	12	40	187	18	83.3	67	220
VF-1224S1	12	55	187	24	62.5	67	220
VF-243R3S1	24	25	116	3.3	400	54	220
VF-2405S1	24	17	98	5	300	64	220
VF-247R2S1	24	25	96	7.2	208.3	65	220
VF-2409S1	24	25	96	9	166.6	65	220
VF-2412S1	24	25	93	12	125	67	220
VF-2415S1	24	25	98	15	100	64	220
VF-2418S1	24	25	96	18	83.3	65	220
VF-2424S1	24	19	95	24	62.5	66	220

Suffix "H" means 3 KVdc isolation

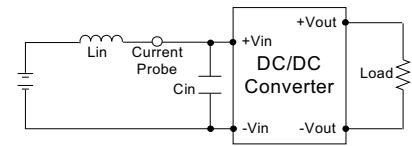
Suffix "H4" means 4 KVdc isolation

Suffix "H5" means 5.2 KVdc isolation

## TEST CONFIGURATIONS

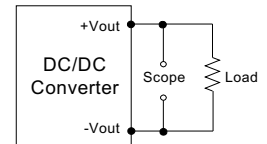
### Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor  $L_{in}$  (12 $\mu$ H) and a source capacitor  $C_{in}$  (47 $\mu$ F, ESR<1.0 $\Omega$  at 100KHz) at nominal input and full load.



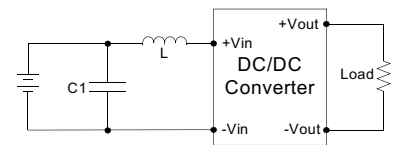
### Output Ripple & Noise Measurement Test

The Scope measurement bandwidth is 20MHz .



### EMI Filter

Input filter components ( $C_1$ ,  $L$ ) are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.

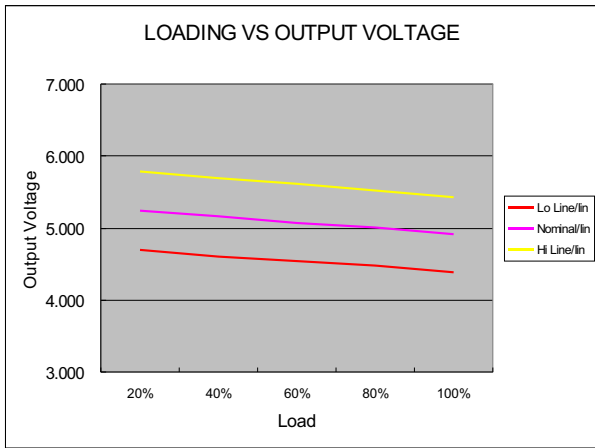


	C1	L
VF-05XXXXXX	220 $\mu$ F/100V	12 $\mu$ H
VF-12XXXXXX	220 $\mu$ F/100V	12 $\mu$ H
VF-24XXXXXX	220 $\mu$ F/100V	12 $\mu$ H

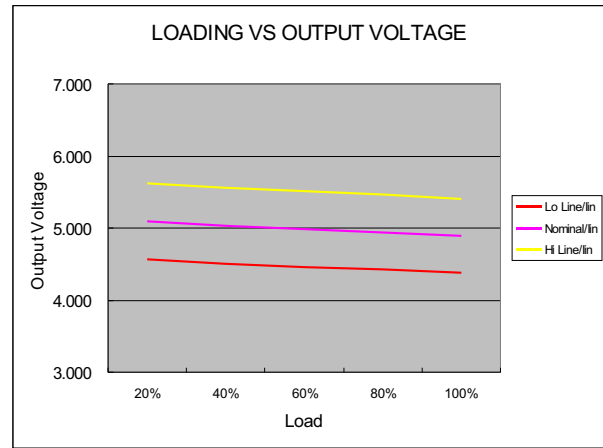
## NOTE

1. Ripple/Noise measured with 20MHz bandwidth.
2. Tested by minimal  $V_{in}$  and constant resistive load.
3. Measured Input reflected ripple current with a simulated source inductance of 12 $\mu$ H.
4. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.
5. Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.
6. Input filter components are required to help meet conducted emission class B, which application refer to the EMI Filter of design & feature configuration.
7. An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.  
The filter capacitor Motien suggest: Nippon - chemi - con KY series, 470 $\mu$ F/100V.

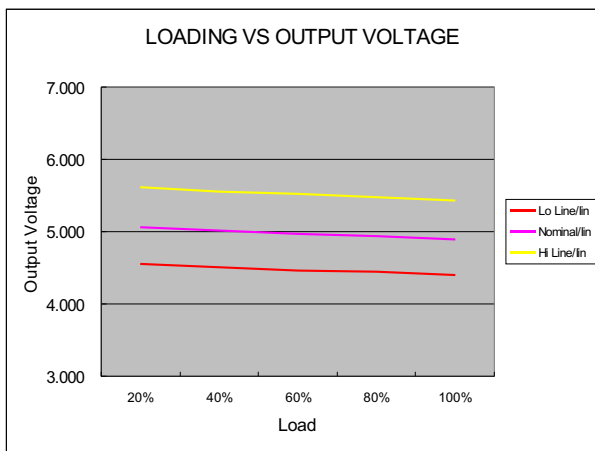
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05 Models

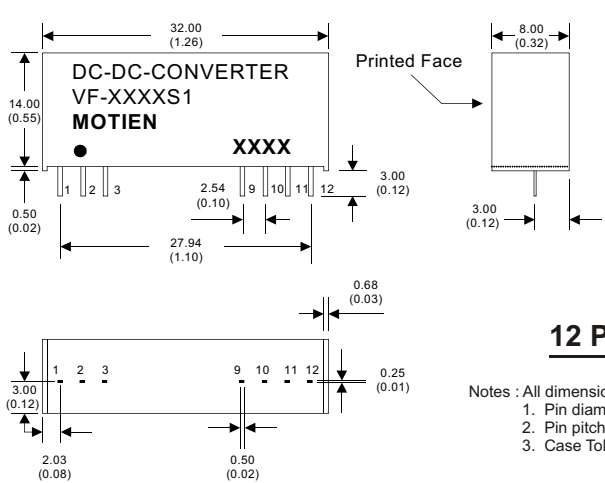


12 Models



24 Models

## MECHANICAL SPECIFICATIONS



### 12 Pin SIL Package

- Notes : All dimensions are typical in millimeters ( inches ).
1. Pin diameter: 0.5±0.05 ( 0.02±0.002 )
  2. Pin pitch and length tolerance: ±0.35 ( ±0.014 )
  3. Case Tolerance: ±0.5 ( ±0.02 )

PIN CONNECTIONS		
PIN NUMBER	SINGLE	SINGLE-H
1	+V Input	+V Input
2	N.C.	-V Input
3	N.C.	N.C.
9	N.C.	N.C.
10	-V Output	-V Output
11	+V Output	+V Output
12	-V Input	N.C.