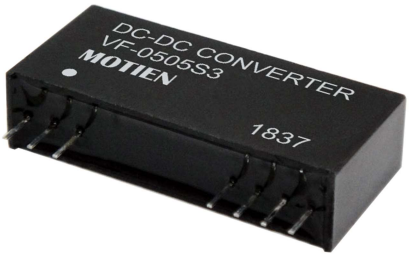
VF-3W Series

3W Regulated Single output

Features

- SIP12 Package
- 1000 VDC Isolation
- Up to 5200 VDC Isolation
- Continuous Short Circuit Protection
- Efficiency up to 73%
- Operation Temperature Range -25 ~ 99°C max.



PART NUMBER STRUCTURE

VF - 24 05 S 3 H

(1) (2) (3) (4) (5) (6)

(1) Series

(2) Input Voltage Range
- **05 -** 4.5-5.5 V
- **12 -** 10.8-13.2 V
- **24 -** 21.6-26.4 V

(3) Output Voltage
- **3R3 -** 3.3 V
- **05 -** 5.0 V
- **7R2 -** 7.2 V
- **09 -** 9.0 V
- **12 -** 12 V
- **15 -** 15 V
- **18 -** 18 V
- **24 -** 24 V

(4) Case & Output Type
- **S -** SIP Case, Single Output

(5) Watt

(6) Isolation Voltage (Optional)
- **Blank -** 1 KVDC
- **H -** 3 KVDC
- **H4 -** 4 KVDC
- **H5 -** 5.2 KVDC

ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED

Model Number	Input Voltage Range (VDC)	Input Current		Output Voltage (VDC)	Output Current Full Load (mA)	Efficiency @FL (%, typ.)	Capacitive Load @ FL (μF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)				
VF-053R3S3	4.5-5.5	98	720	3.3	600	55	470
VF-0505S3	4.5-5.5	70	938	5	600	64	470
VF-057R2S3	4.5-5.5	120	882	7.2	417	68	470
VF-0509S3	4.5-5.5	90	870	9	333	69	470
VF-0512S3	4.5-5.5	95	857	12	250	70	470
VF-0515S3	4.5-5.5	95	870	15	200	69	470
VF-0518S3	4.5-5.5	125	882	18	167	68	470
VF-0524S3	4.5-5.5	135	882	24	125	68	470
VF-123R3S3	10.8-13.2	35	321	3.3	700	60	470
VF-1205S3	10.8-13.2	60	397	5	600	63	470
VF-127R2S3	10.8-13.2	55	352	7.2	417	71	470
VF-1209S3	10.8-13.2	45	357	9	333	70	470
VF-1212S3	10.8-13.2	55	347	12	250	72	470
VF-1215S3	10.8-13.2	65	352	15	200	71	470
VF-1218S3	10.8-13.2	35	342	18	167	73	470
VF-1224S3	10.8-13.2	45	352	24	125	71	470
VF-243R3S3	21.6-26.4	35	169	3.3	700	57	470
VF-2405S3	21.6-26.4	30	198	5	600	63	470
VF-247R2S3	21.6-26.4	30	187	7.2	417	67	470
VF-2409S3	21.6-26.4	30	176	9	333	71	470
VF-2412S3	21.6-26.4	35	179	12	250	70	470
VF-2415S3	21.6-26.4	30	174	15	200	72	470
VF-2418S3	21.6-26.4	40	171	18	167	73	470
VF-2424S3	21.6-26.4	30	171	24	125	73	470

INPUT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	5 V Input	4.5	5	5.5	VDC
	12 V Input	10.8	12	13.2	
	24 V Input	21.6	24	26.4	
Input Filter		Capacitor			
Input Reflected Ripple Current (1)			20		mApk-pk
Start up Time	Nominal Vin and constant resistive load		20		ms
Recommended input fuse (slow blow)	5 V Input	2.5			A
	12 V Input	1			
	24 V Input	0.5			

Note：
1. Measured with a simulated source inductance of 12μH and a source capacitor Cin (47μF, ESR<1.0Ω at 100kHz).

OUTPUT SPECIFICATIONS

Parameter	Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy			-2		+2	%
Line Regulation			-0.5		+0.5	%
Load Regulation	From 0% to 100% Load	Other Output	-1.0		+1.0	%
		3.3V Output	-1.5		+1.5	
Ripple & Noise	20MHz bandwidth				75	mVpk-pk
Short Circuit Protection			Indefinite (Automatic Recovery)			
Temperature Coefficient			-0.02		+0.02	%/°C
Maximum Capacitive Load	Minimum Vin and constant resistive load		See Table			

ABSOLUTE MAXIMUM RATINGS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)	5 V Input			7	VDC
	12 V Input			15	
	24 V Input			28	
Soldering Temperature	1.5mm from case 10sec max.			260	°C

Note：These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

GENERAL SPECIFICATIONS

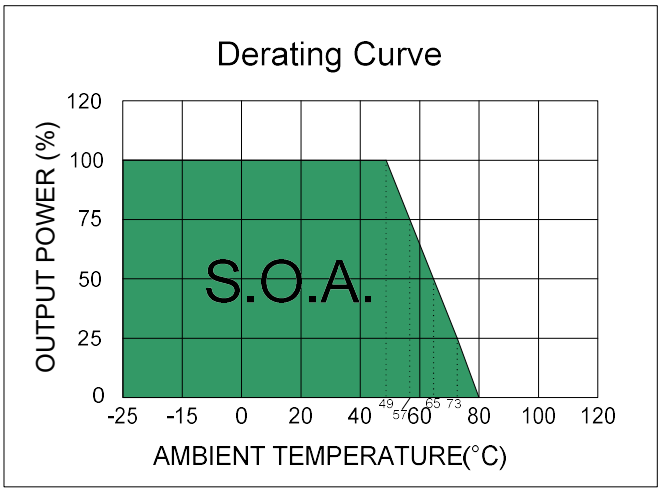
Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, and rated for 60sec	Standard Type	1000			VDC
		Suffix “H”	3000			
		Suffix “H4”	4000			
		Suffix “H5”	5200			
Isolation Resistance	Input-output		1000			MΩ
Isolation Capacitance	Input-output			60		pF
Switching Frequency				50		kHz
MTBF	MIL-HDBK-217 F @ 25°C		1.121			M hours
Safety Standard	IEC / EN / UL 62368-1		Designed to meet			
Environmental compliance			RoHS			

ENVIRONMENT SPECIFICATIONS					
Parameter	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Operating Ambient Temperature	See the Derating Curve	-25		99	°C
Maximum Case Temperature				100	°C
Thermal Impedance	3.3V output	29.14			°C/W
	Others	30.42			
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30-65 LFM			

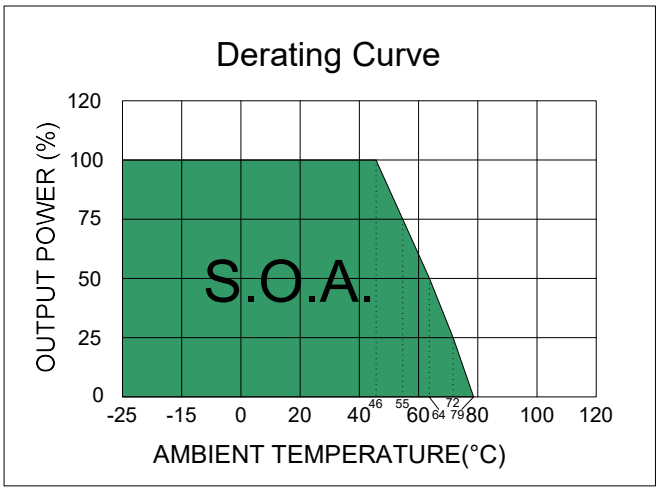
EMC SPECIFICATIONS			
Parameter	**Standard**	**Condition**	Criterion
Conducted Emissions	EN55032	with external components	B
Radiated Emissions	EN55032		B
ESD	IEC 61000-4-2	Air: ±8kV / Indirect: ±6kV	A
RS	IEC 61000-4-3	10V/m	A
EFT	IEC 61000-4-4	±2.0kV with external components	A
Surge	IEC 61000-4-5	±1.0kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	1A/m	A

PHYSICAL SPECIFICATIONS	
Parameter	**Value**
Case Material	Nonconductive Black Plastic (UL94V-0 rated)
Pin Material	Alloy 42
Potting Material	Epoxy (UL94V-0 rated)
Weight	7.0 g, typ.
Dimensions	1.26" x 0.32" x 0.57"

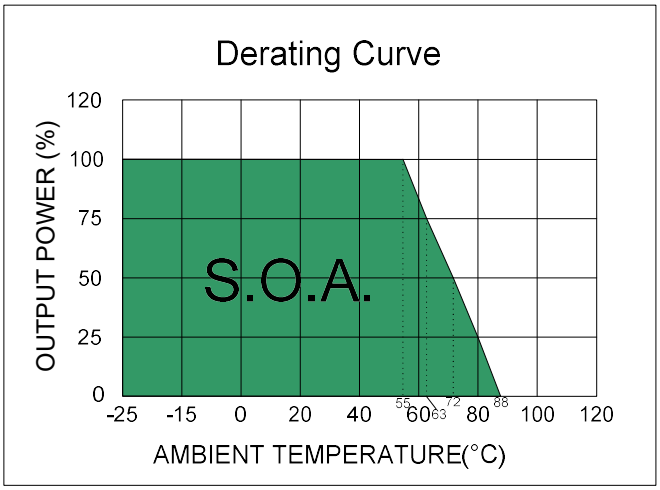
ELECTRICAL CHARACTERISTIC CURVES



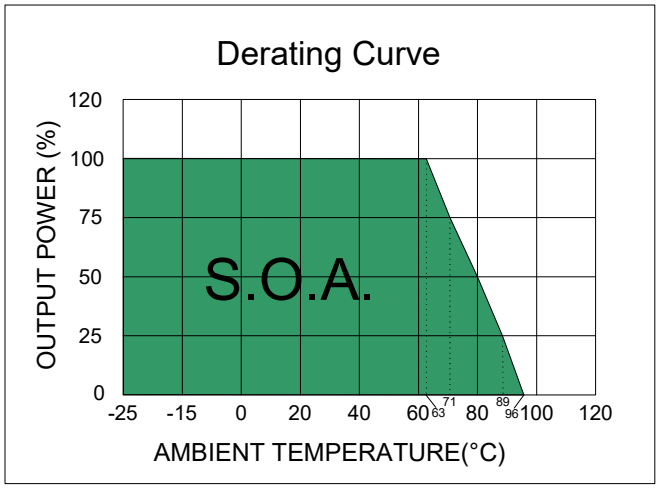
Vo 3.3V



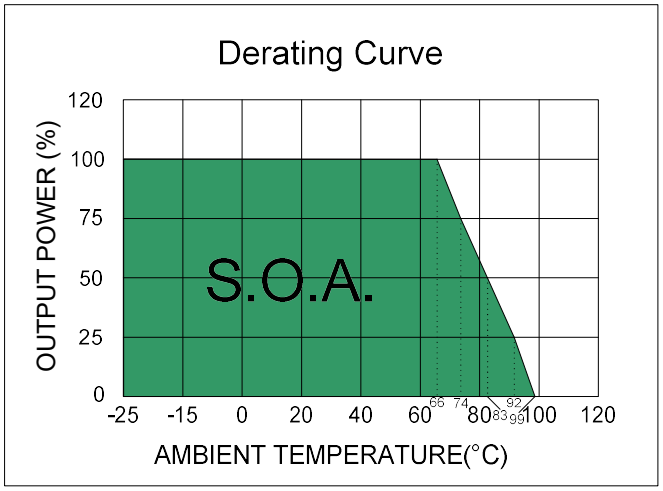
Efficiency : 63 ~ 66%



Efficiency : 67 ~ 70%



Efficiency : 71 ~ 72%

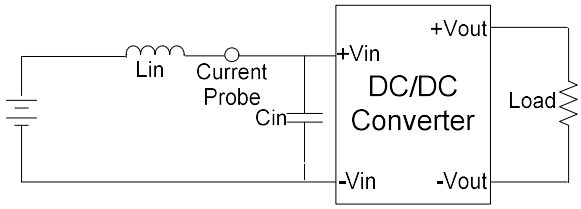


Efficiency : 73%

TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

Input reflected ripple current is measured with a source inductor Lin (12μH) and a source capacitor Cin (47μF, ESR<1.0Ω at 100kHz) at nominal input and full load.



DESIGN & FEATURE CONFIGURATIONS

Isolation Voltage

This series is designed to meet the functional insulation of UL, both input and output should be maintained within SELV limits (less than 42.4V peak, or 60VDC).

The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with hundreds of volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

Repeated High-Voltage Isolation Testing

Repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment.

This series has isolation transformers without additional insulation between primary and secondary windings of enameled wire.

While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation.

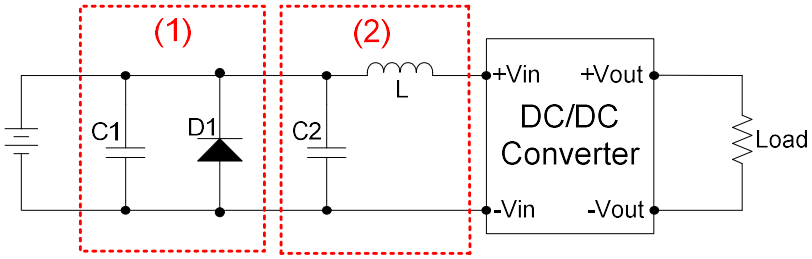
Any material including the enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltage, thus implying that the number of tests should be strictly limited.

We strongly advise against repeated high voltage isolation testing, but if it is absolutely required, the isolation test voltage should be reduced by 20% from specified test voltage.

DESIGN & FEATURE CONFIGURATIONS

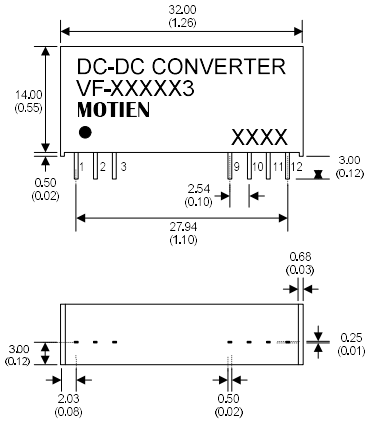
EMC Filter

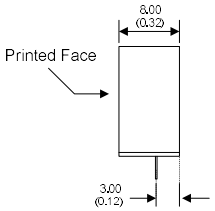
The part (1) Circuit is used to meet Surge & EFT test, and the part (2) Circuit is used to meet EMI test.



	C1	D1	C2	L
VF-05XXX3	NIPPON Chemi-con KY series 1000μF, 50V	SMAJ9A	NIPPON Chemi-con KY series 220μF, 100V	12μH
VF-12XXX3		SMAJ14A		
VF-24XXX3		SMAJ26A		

MECHANICAL SPECIFICATIONS





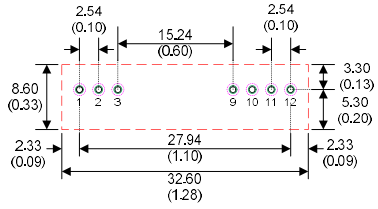
Notes : All dimensions are typical in millimeters (inches).

1. Pin dimension tolerance: ±0.05 (±0.002)
2. Pin pitch and length tolerance: ±0.35 (±0.014)
3. Pin to case tolerance: ±0.5 (±0.02)
4. Case Tolerance: ±0.5 (±0.02)
5. Stand-off tolerance: ±0.1 (±0.004)

PIN CONNECTIONS		
PIN NUMBER	SINGLE	SINGLE-H
1	+Vin	+Vin
2	N.C.	-Vin
3	N.C.	N.C.
9	N.C.	N.C.
10	-Vout	-Vout
11	+Vout	+Vout
12	-Vin	N.C.

*N.C. : No Connection

RECOMMENDED FOOTPRINT DETAILS



Notes : 1. All dimensions are typical in millimeters (inches).
Through hole (black) 1 ~ 12: Ø0.80 (0.031)
Top view pad (green) 1 ~ 12: Ø1.00 (0.039)
Bottom view pad (pink) 1 ~ 12: Ø1.60 (0.063)

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ISO 9001 . ISO 14001 . IECQ QC080000

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