

VA-1W Series



1W Unregulated Single output

Features

- SIP4 / DIP8 Package
- 1000 VDC Isolation, Up to 3000 VDC
- Efficiency up to 83%
- Operation Temperature Range -40 ~ 90°C max.
- Non-Conductive Black Plastic Case
- EMI Complies With EN55032 Class B



PART NUMBER STRUCTURE

VA - **12** **05** **S** **1** **H**
(1) (2) (3) (4) (5) (6)

(1) Series

(2) Input Voltage Range

3R3 - 2.97-3.63 V
05 - 4.5-5.5 V
12 - 10.8-13.2 V
15 - 13.5-16.5 V
24 - 21.6-26.4 V

(4) Case Type

S - SIP Case
D - DIP Case

(5) Watt

(6) Isolation Voltage (Optional)

Blank - 1 KVDC
H - 3 KVDC

(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

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.)				
VA-3R33R3S1	2.97-3.63	25	421	3.3	303	72	220
VA-3R305S1	2.97-3.63	25	394	5	200	77	220
VA-3R37R2S1	2.97-3.63	40	375	7.2	138.9	81	220
VA-3R309S1	2.97-3.63	30	399	9	111.1	76	220
VA-3R312S1	2.97-3.63	45	485	12	100	75	220
VA-3R315S1	2.97-3.63	35	389	15	66.6	78	220
VA-3R318S1	2.97-3.63	40	375	18	55.5	81	220
VA-3R324S1	2.97-3.63	53	461	24	50	79	220
VA-053R3S1	4.5-5.5	20	254	3.3	303	79	220
VA-0505S1	4.5-5.5	25	250	5	200	80	220
VA-057R2S1	4.5-5.5	16	239	7.2	138.9	84	220
VA-0509S1	4.5-5.5	25	250	9	111.1	80	220
VA-0512S1	4.5-5.5	25	300	12	100	80	220
VA-0515S1	4.5-5.5	25	244	15	66.6	82	220
VA-0518S1	4.5-5.5	25	244	18	55.5	82	220
VA-0524S1	4.5-5.5	35	290	24	50	83	220
VA-123R3S1	10.8-13.2	15	109	3.3	303	77	220
VA-1205S1	10.8-13.2	18	106	5	200	79	220
VA-127R2S1	10.8-13.2	16	103	7.2	138.9	81	220
VA-1209S1	10.8-13.2	15	106	9	111.1	79	220
VA-1212S1	10.8-13.2	20	125	12	100	80	220
VA-1215S1	10.8-13.2	16	106	15	66.6	79	220
VA-1218S1	10.8-13.2	20	103	18	55.5	81	220
VA-1224S1	10.8-13.2	25	125	24	50	80	220
VA-153R3S1	13.5-16.5	12	86	3.3	303	78	220
VA-1505S1	13.5-16.5	9	83	5	200	81	220
VA-157R2S1	13.5-16.5	12	88	7.2	138.9	76	220
VA-1509S1	13.5-16.5	10	87	9	111.1	77	220
VA-1512S1	13.5-16.5	15	100	12	100	80	220
VA-1515S1	13.5-16.5	15	88	15	66.6	76	220
VA-1518S1	13.5-16.5	15	85	18	55.5	79	220
VA-1524S1	13.5-16.5	15	99	24	50	81	220
VA-243R3S1	21.6-26.4	8	55	3.3	303	76	220
VA-2405S1	21.6-26.4	8	53	5	200	80	220
VA-247R2S1	21.6-26.4	10	57	7.2	138.9	74	220
VA-2409S1	21.6-26.4	10	55	9	111.1	76	220
VA-2412S1	21.6-26.4	8	63	12	100	80	220
VA-2415S1	21.6-26.4	8	52	15	66.6	81	220
VA-2418S1	21.6-26.4	8	52	18	55.5	81	220
VA-2424S1	21.6-26.4	9	62	24	50	81	220

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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.)				
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VA-3R315D1	2.97-3.63	35	389	15	66.6	78	220
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VA-3R324D1	2.97-3.63	55	461	24	50	79	220
VA-053R3D1	4.5-5.5	20	254	3.3	303	79	220
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VA-0509D1	4.5-5.5	25	250	9	111.1	80	220
VA-0512D1	4.5-5.5	25	300	12	100	80	220
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VA-2424D1	21.6-26.4	9	62	24	50	81	220

INPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	3.3 V Input	2.97	3.3	3.63	VDC
	5 V Input	4.5	5	5.5	
	12 V Input	10.8	12	13.2	
	15 V Input	13.5	15	16.5	
	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)	3.3 V Input	0.63			A
	5 V Input	0.4			
	12 V & 15 V Input	0.16			
	24 V Input	0.1			
Note :					
1. Measured with a simulated source inductance of 12μH and a source capacitor C _{in} (47μF, ESR<1.0Ω at 100kHz).					

OUTPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		-3		+3	%
Line Regulation	For 1% Vin Change	-1.2		+1.2	%
Load Regulation	From 20% to 100% Load	VA-3R33R3S/D1		22	%
		3.3V Input		15	
		VA-053R3S/D1		13	
		Other Output		8	
Ripple & Noise	20MHz bandwidth			100	mVpk-pk
Short Circuit Protection		Short Term (1sec)			
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)	3.3 V Input			6	VDC
	5 V Input			7	
	12 V Input			15	
	15 V Input			18	
	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			
Isolation Resistance	Input-output		1000			MΩ
Isolation Capacitance	Input-output			60		pF
Switching Frequency				80		kHz
MTBF	MIL-HDBK-217 F @ 25°C		1121			k hours
Safety Standard	IEC / EN / UL 62368-1		Designed to meet			
Environmental compliance			RoHS			

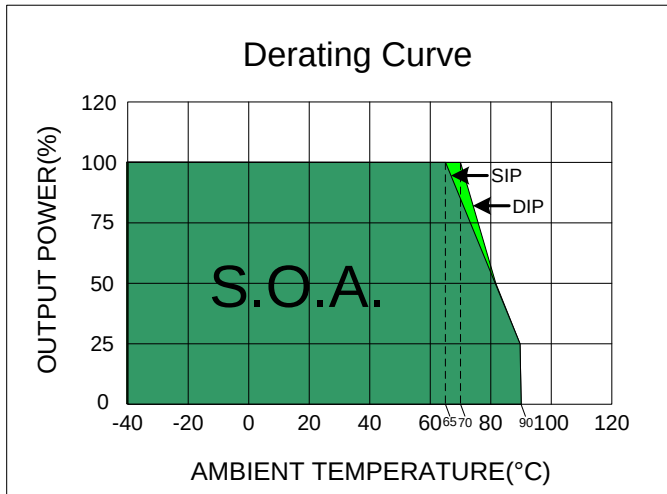
ENVIRONMENT SPECIFICATIONS							
Parameter		Conditions		Min.	Typ.	Max.	Unit
Operating Ambient Temperature		See the Derating Curve		-40		90	°C
Maximum Case Temperature						100	°C
Thermal Impedance	SIP Case			65			°C/W
	DIP Case			55			
Storage Humidity						95	% rel. H
Storage Temperature				-55		125	°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	±0.5kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	1A/m	A

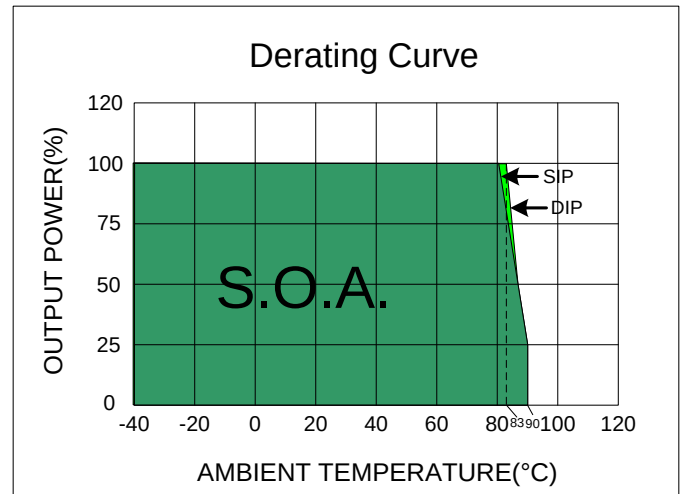
PHYSICAL SPECIFICATIONS		
Parameter	Value	
Case Material	Nonconductive Black Plastic (UL94V-0 rated)	
Pin Material	SIP Case	Alloy 42
	DIP Case	Ø0.5mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)	
Weight	SIP Case	1.5 g, typ.
	DIP Case	1.8 g, typ.
Dimensions	SIP Case	0.46" x 0.24" x 0.40"
	DIP Case	0.50" x 0.40" x 0.27"

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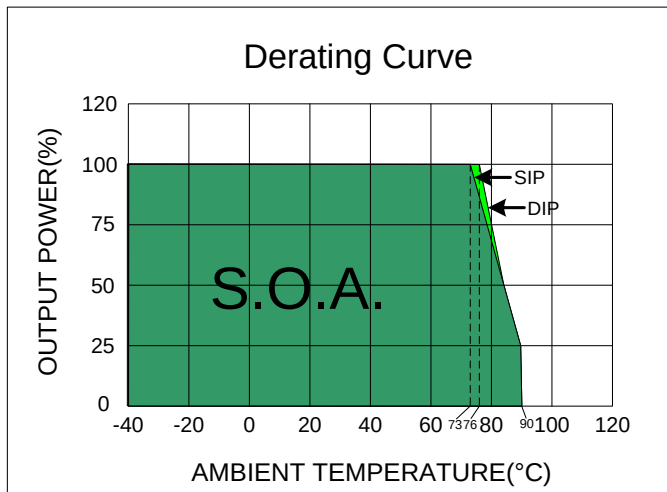
ELECTRICAL CHARACTERISTIC CURVES



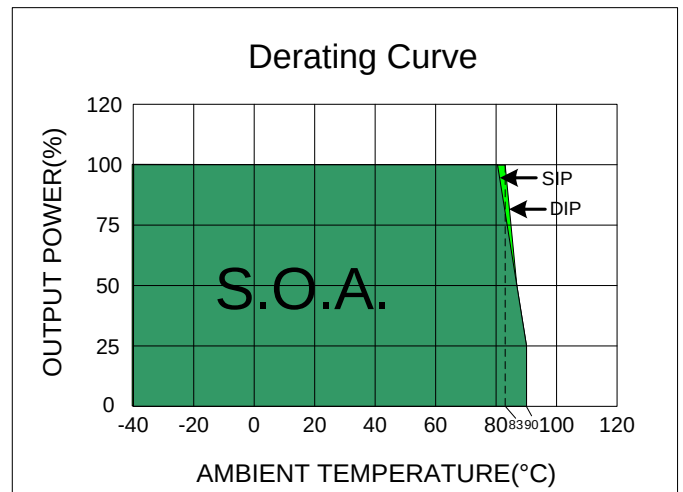
VA-3R33R3S/D1



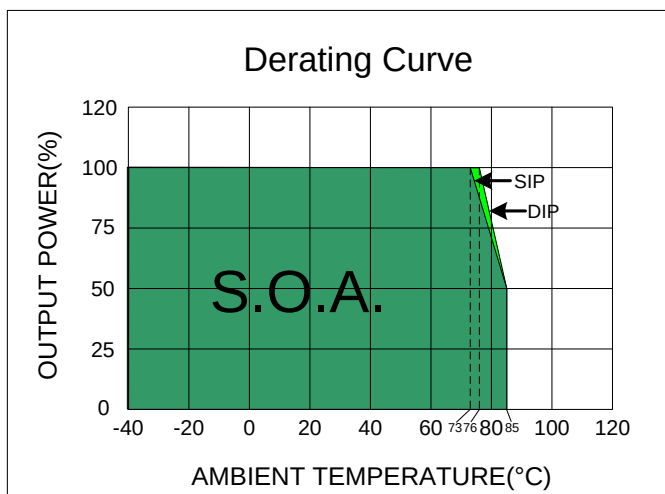
3.3V, 5V Output



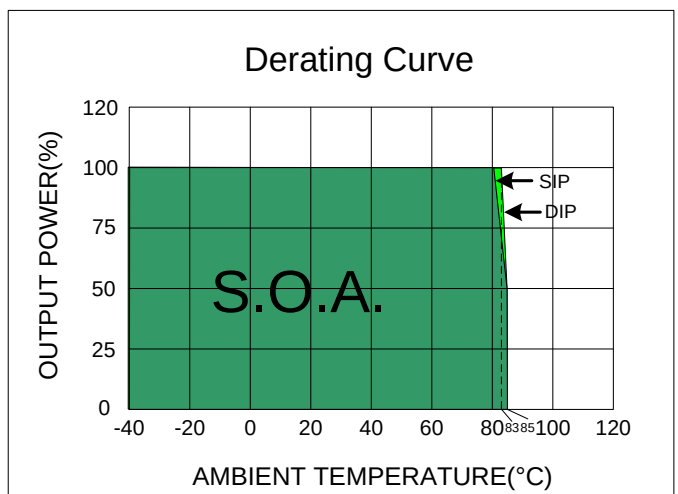
7.2V, 9V, 12V Output & 74~79% Models



7.2V, 9V, 12V Output & 80~84% Models



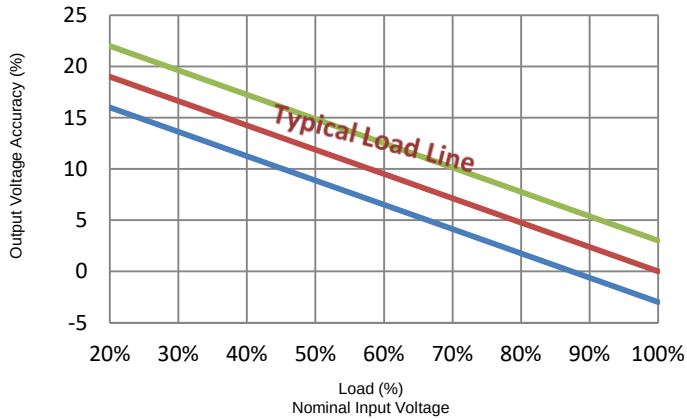
15V, 18V, 24V Output & 76~79% Models



15V, 18V, 24V Output & 80~83% Models

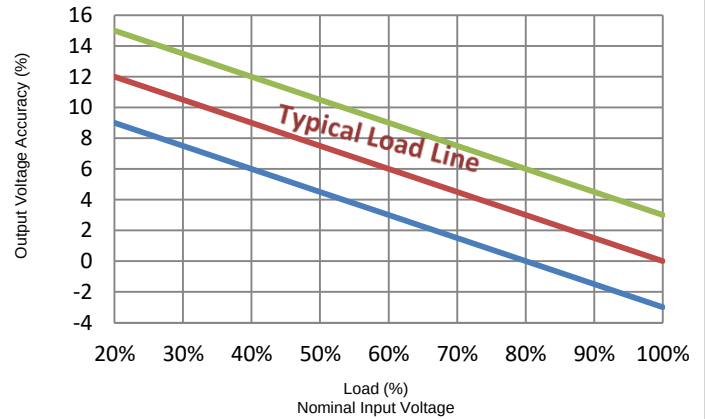
ELECTRICAL CHARACTERISTIC CURVES

Output Voltage Tolerance Envelope Curve



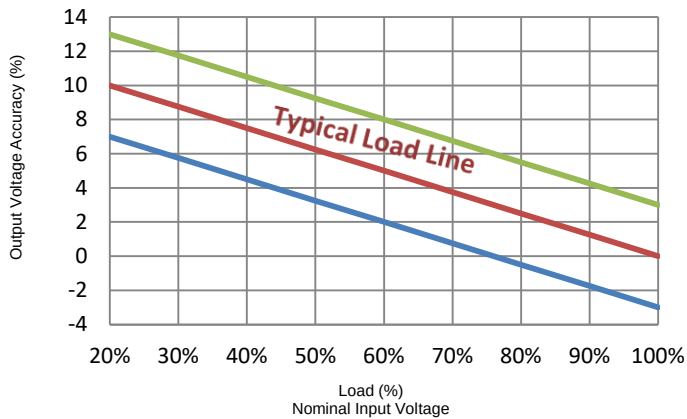
Load Regulation 22% Models

Output Voltage Tolerance Envelope Curve



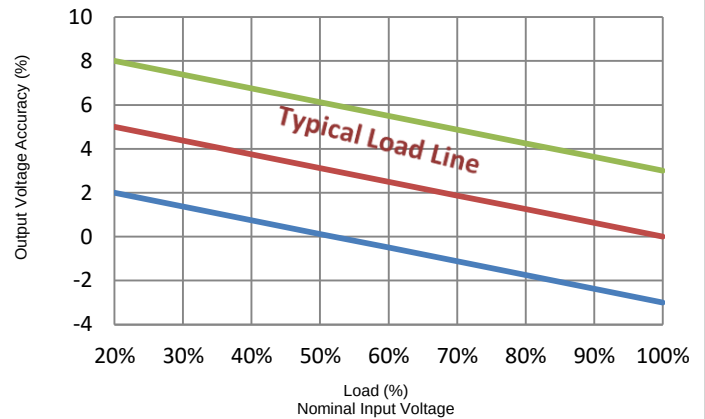
Load Regulation 15% Models

Output Voltage Tolerance Envelope Curve



Load Regulation 13% Models

Output Voltage Tolerance Envelope Curve

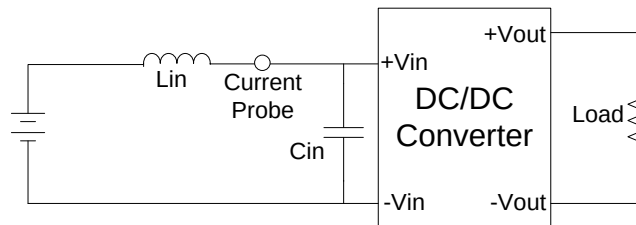


Load Regulation 8% Models

TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

Input reflected ripple current is measured with a source inductor L_{in} (12 μ H) and a source capacitor C_{in} (47 μ F, ESR<1.0 Ω 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.

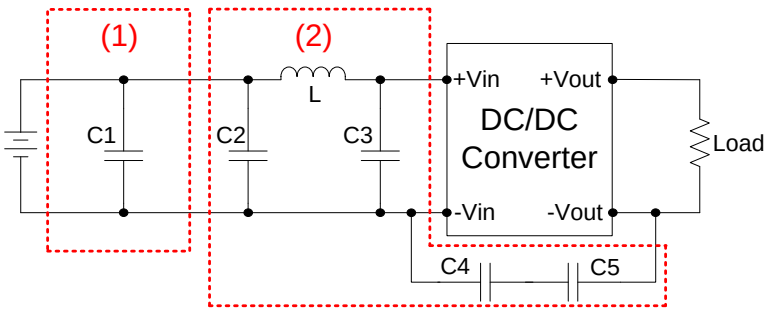
Any material including the enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltage, thus implying that the number of tests should be strictly limited.

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

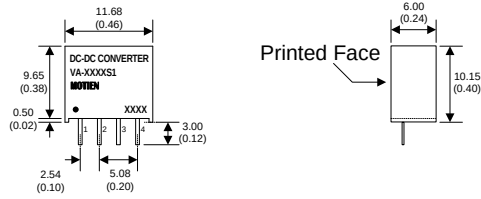
The part (1) Circuit is used to meet Surge & EFT test, and the part (2) Circuit is used to meet EMI test.



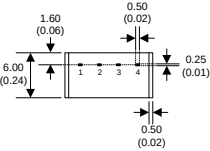
	C1	C2	L	C3	C4	C5
VA-3R3XXX1	NIPPON Chemi-con KY Series 470µF, 100V	MLCC 2.2µF, 100V	18µH			
VA-05XXX1						
VA-12XXX1						
VA-15XXX1				MLCC 2.2µF, 100V	MLCC 470pF, 2kV MLCC 820pF, 2kV	MLCC 820pF, 2kV
VA-24XXX1						
VA-24XXX1H						

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MECHANICAL SPECIFICATIONS



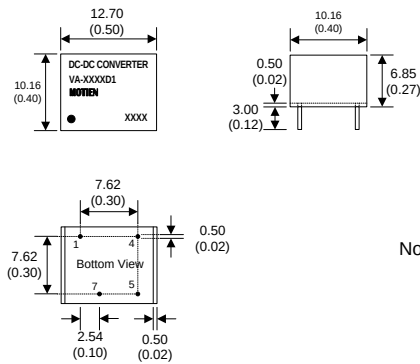
Printed Face



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)

PIN CONNECTIONS	
PIN NUMBER	SINGLE
1	-Vin
2	+Vin
3	-Vout
4	+Vout



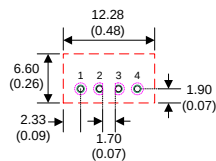
Notes : All dimensions are typical in millimeters (inches).

1. Pin diameter: 0.5 ± 0.05 (0.02 ± 0.002)
2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
3. Pin to case tolerance: ± 0.5 (± 0.02)
4. Case Tolerance: ± 0.5 (± 0.02)

PIN CONNECTIONS	
PIN NUMBER	SINGLE
1	-Vin
4	+Vin
5	+Vout
7	-Vout

RECOMMENDED FOOTPRINT DETAILS

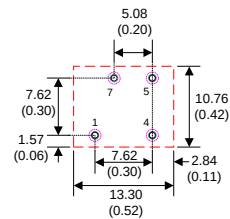
SIP4 Package



Notes : 1. All dimensions are typical in millimeters (inches).

- Through hole (black) 1~4: $\varnothing 0.80$ (0.031)
- Top view pad (green) 1~4: $\varnothing 1.00$ (0.039)
- Bottom view pad (pink) 1~4: $\varnothing 1.60$ (0.063)

DIP8 Package



Notes : 1. All dimensions are typical in millimeters (inches).

- Through hole (black) 1~7: $\varnothing 0.80$ (0.031)
- Top view pad (green) 1~7: $\varnothing 1.00$ (0.039)
- Bottom view pad (pink) 1~7: $\varnothing 1.60$ (0.063)