

VD-5W Series



5W 2:1 Regulated Single & Dual output

Features

- Wide 2:1 Input Range
- Full SMD Technology
- 1500 VDC Isolation, Up to 3500 VDC
- Continuous Short Circuit Protection
- Efficiency up to 83%
- -40 ~ 85°C Operation Temperature Range
- Metal Case Standard, Optional Plastic Case



The VD series is a family of cost effective 5.0W single & dual output DC-DC converters. These converters are consisted with Nickel-coated copper in a 24-pin DIL package with high performance features such as 1500 VDC ~ 3500VDC input/output isolation voltage, continuous short circuit protection with automatic restart and tight line / load regulation. Devices are encapsulated using flame retardant resin. Input voltages of 12,24 and 48 with output voltage of 3.3,5,9,12,15, 24, ± 3.3 , ± 5 , ± 9 , ± 12 , ± 15 and ± 24 Vdc. High performance features include high efficiency operation up to 75% and output voltage accuracy of $\pm 1\%$ maximum.

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

OUTPUT SPECIFICATIONS	
Voltage accuracy	$\pm 1\%$
Line regulation	$\pm 0.5\%$
Load regulation	$\pm 0.5\%$
	(Output 3.3V / ± 3.3 V Model) $\pm 1.5\%$
Ripple & noise(20 MHz bandwidth)(1)	60mV 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	See table
Max. Input Current	See table
No-Load Input Current	See table
Input Filter	PI Type
Input Reflected Ripple Current(3)	35mA pk-pk

GENERAL SPECIFICATIONS	
Efficiency	See table, typ.
I/O Isolation Voltage(3 sec)	
Input/Output	1500~3500Vdc
Metal Case/Input & Output	1000Vdc
I/O Isolation Capacitance	500 pF, typ.
I/O Isolation Resistance	1000M Ohm
Switching Frequency	266kHz, typ.
Humidity	95% rel H
Reliability Calculated MTBF(MIL-HDBK-217 F)	>1.121 Mhrs
Safety Standard : (designed to meet)	IEC 60950-1

PHYSICAL SPECIFICATIONS	
Case Material	Nickel-coated Copper
	Non-conductive Black Plastic(UL94V-0 rated)
Base Material	Non-conductive Black Plastic(UL94V-0 rated)
Pin Material	$\varnothing 0.5\text{mm}$ Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	17.0g(Metal Case)/13.5g(Plastic Case)
Dimensions	1.25"x0.8"x0.4"

ENVIRONMENT SPECIFICATIONS	
Operating Temperature	$-40^\circ\text{C} \sim 85^\circ\text{C}$ (See Derating Curve)
Maximum Case Temperature	100°C
Storage Temperature	$-40^\circ\text{C} \sim 125^\circ\text{C}$
Cooling	Nature Convection

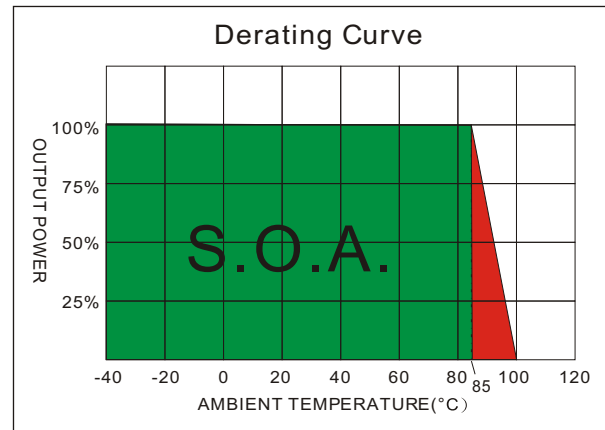
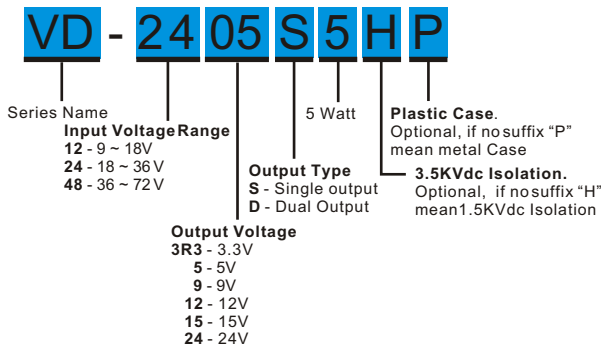
ABSOLUTE MAXIMUM RATINGS(4)	
These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Input Surge Voltage(100mS)	
12 Models	24 Vdc, max.
24 Models	40 Vdc, max.
48 Models	80 Vdc, max.
Soldering Temperature	260°C, max.
(1.5mm from case 10sec. max.)	

EMC SPECIFICATIONS		
Radiated Emissions	EN55022	CLASS A
Conducted Emissions (5)	EN55022	CLASS A
ESD	IEC 61000-4-2	Perf. Criteria A
RS	IEC 61000-4-3	Perf. Criteria A
EFT (6)	IEC 61000-4-4	Perf. Criteria A
Surge (6)	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 Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL(%)	Capacitor Load(uF)
		No-Load (mA)	Full Load (mA)		Min. load (mA)	Full load (mA)		
VD-123R3S5	9-18	30	490	3.3	0	1300	73	1000
VD-1205S5	9-18	30	542	5	0	1000	77	1000
VD-1209S5	9-18	30	534	9	0	555	78	680
VD-1212S5	9-18	30	514	12	0	417	81	330
VD-1215S5	9-18	30	520	15	0	333	80	220
VD-1224S5	9-18	30	520	24	0	208	80	68
VD-123R3D5	9-18	30	565	±3.3	0	±750	73	±680
VD-1205D5	9-18	30	542	±5	0	±500	77	±330
VD-1209D5	9-18	30	520	±9	0	±278	80	±220
VD-1212D5	9-18	30	520	±12	0	±208	80	±100
VD-1215D5	9-18	30	528	±15	0	±167	79	±47
VD-1224D5	9-18	30	520	±24	0	±104	80	±33
VD-243R3S5	18-36	20	239	3.3	0	1300	75	1000
VD-2405S5	18-36	20	261	5	0	1000	80	1000
VD-2409S5	18-36	20	254	9	0	555	82	680
VD-2412S5	18-36	20	261	12	0	417	80	330
VD-2415S5	18-36	20	255	15	0	333	82	220
VD-2424S5	18-36	20	255	24	0	208	82	68
VD-243R3D5	18-36	20	275	±3.3	0	±750	75	±680
VD-2405D5	18-36	20	267	±5	0	±500	78	±330
VD-2409D5	18-36	20	251	±9	0	±278	83	±220
VD-2412D5	18-36	20	261	±12	0	±208	80	±100
VD-2415D5	18-36	20	261	±15	0	±167	80	±47
VD-2424D5	18-36	20	261	±24	0	±104	80	±33
VD-483R3S5	36-72	12	120	3.3	0	1300	75	1000
VD-4805S5	36-72	12	131	5	0	1000	80	1000
VD-4809S5	36-72	12	127	9	0	555	82	680
VD-4812S5	36-72	12	131	12	0	417	80	330
VD-4815S5	36-72	12	126	15	0	333	83	220
VD-4824S5	36-72	12	126	24	0	208	83	68

Suffix "H" means 3.5KVdc isolation

Suffix "P" means Plastic case instead of standard Metal Case

VD - 5W 2:1 Regulated Single & Dual output

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL(%)	Capacitor Load(μF)
		No-Load (mA)	Full Load (mA)		Min. load (mA)	Full load (mA)		
VD-483R3D5	36-72	12	142	±3.3	0	±750	73	±680
VD-4805D5	36-72	12	132	±5	0	±500	79	±330
VD-4809D5	36-72	12	132	±9	0	±278	79	±220
VD-4812D5	36-72	12	131	±12	0	±208	80	±100
VD-4815D5	36-72	12	131	±15	0	±167	80	±47
VD-4824D5	36-72	12	131	±24	0	±104	80	±33

Suffix "H" means 3.5KVdc isolation

Suffix "P" means Plastic case instead of standard Metal Case

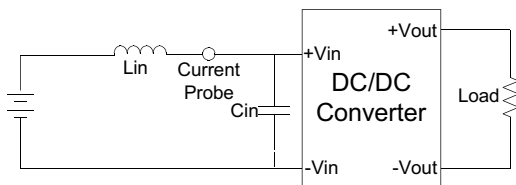
NOTE

1. Ripple/Noise measured with a 1μF ceramic capacitor.
2. Test by nominal input voltage and constant resistor load.
3. Measured Input reflected ripple current with a simulated source inductance of 12μH.
4. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.
5. Input filter components are required to help meet conducted emission class A, which application refer to the EMI Filter of design & feature configuration.
6. An external filter capacitor is required if the module has to meet IEC 61000-4-4 and IEC 61000-4-5.
The filter capacitor Motien suggest: Nippon - chemi - con KY series, 220μF/100V.

TEST CONFIGURATIONS

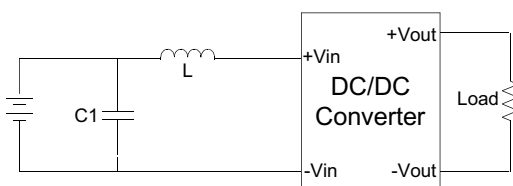
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor L_{in} (12μH) and a source capacitor C_{in} (47μF, ESR<1.0Ω at 100KHz) at nominal input and full load.



EMI Filter

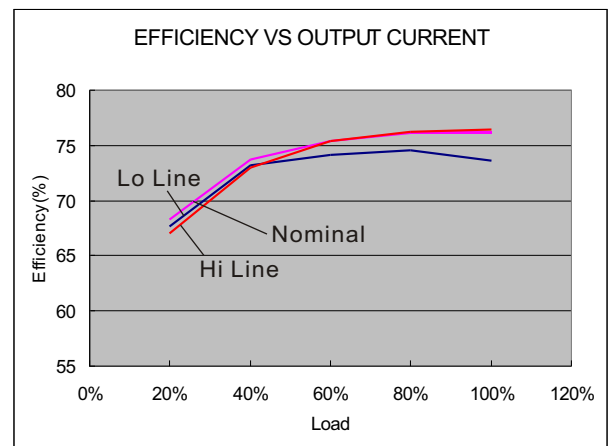
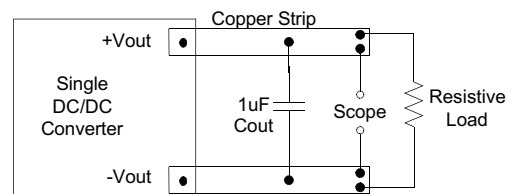
Input filter components (C_1 , L) are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



C1	L
100μF, 100V	12μH

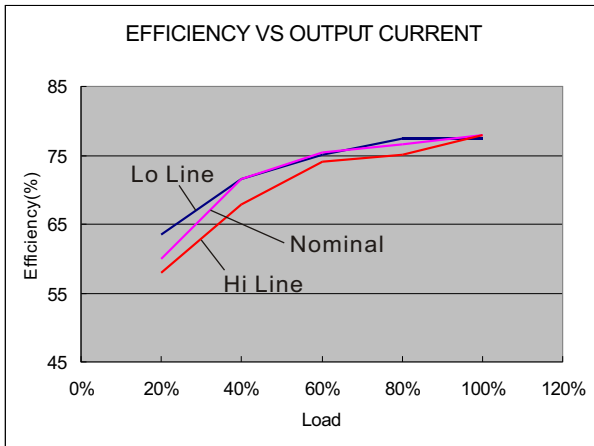
Output Ripple & Noise Measurement Test

Use a capacitor C_{out} (1.0μF) measurement. The Scope measurement bandwidth is 0-20MHz.

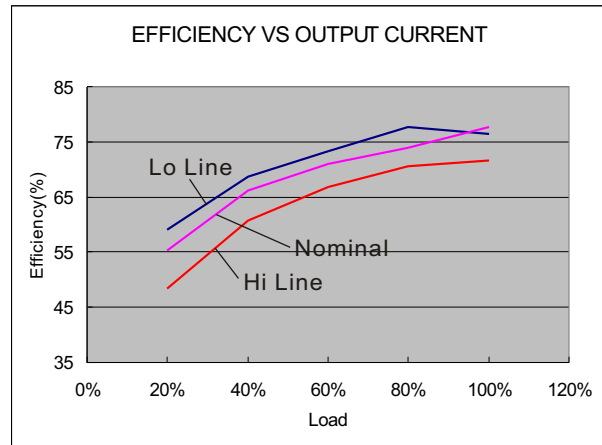


12 Models

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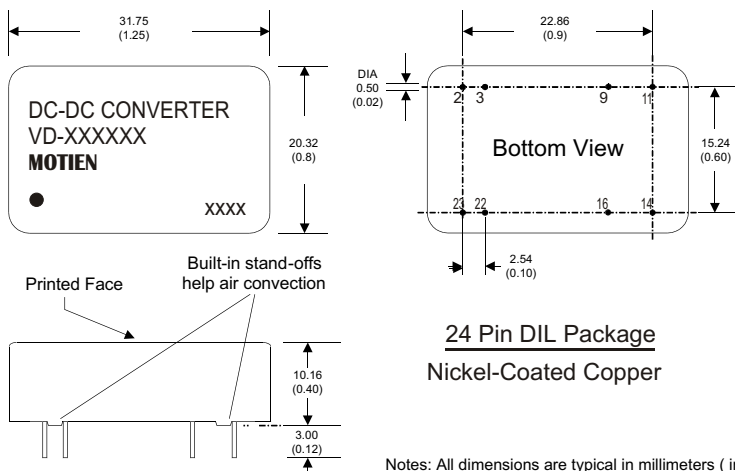


24 Models



48 Models

MECHANICAL SPECIFICATIONS



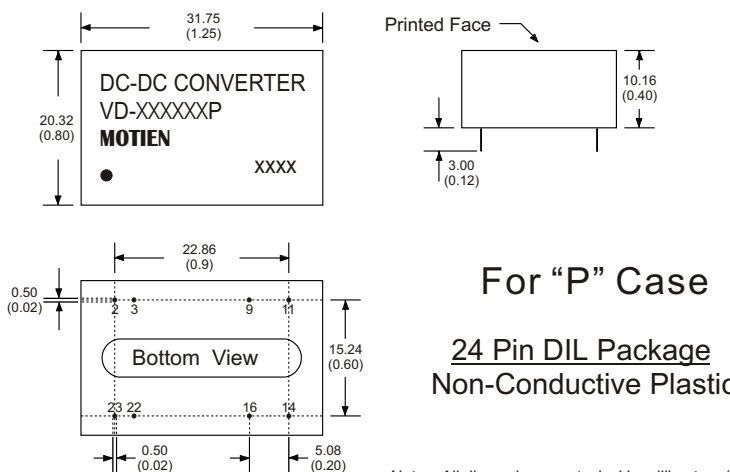
24 Pin DIL Package
Nickel-Coated Copper

- 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	DUAL
2	-V Input	-V Input
3	-V Input	-V Input
9	N.P.	Common
11	N.C.	-V Output
14	+V Output	+V Output
16	-V Output	Common
22	+V Input	+V Input
23	+V Input	+V Input

(The Pin Connection of high isolation one is the same with normal one.)

MECHANICAL SPECIFICATIONS



For "P" Case
24 Pin DIL Package
Non-Conductive Plastic

- 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	DUAL
2	-V Input	-V Input
3	-V Input	-V Input
9	N.P.	Common
11	N.C.	-V Output
14	+V Output	+V Output
16	-V Output	Common
22	+V Input	+V Input
23	+V Input	+V Input

(The Pin Connection of high isolation one is the same with normal one.)