

VHD-3.5W Series



3.5W Regulated Single Output

Features

- 5KVAC Highest Reinforced Isolation
- Minimum internal creepage and clearance distance > 8mm
- Industry standard DIP24 package
- Excellent efficiency up to 80%
- ±20% input voltage range
- 3.5W regulated output
- Short circuit protection
- Operating temperature range -40°C to 85°C



The VHD series is a family of cost effective 3.5W single output DC-DC converters. These converters combine miniature package in a 24-pin DIL compatible case with high performance features such as 5000 VAC input/output isolation voltage, continuous short circuit protection with automatic restart and tightline / load regulation. Devices are encapsulated using flame retardant resin. Input voltages of 5, 12, with output voltage of 3.3, 5, 12, and 15 Vdc. High performance features include high efficiency operation up to 85% and output voltage accuracy of ±2% maximum. Standard features include an input range of ±20% tolerance and low output noise and ripple.

All specifications typical at Ta=25°C, nominal input voltage and full load unless otherwise specified

OUTPUT SPECIFICATIONS	
Output Voltage Accuracy	±2%
Output Current (Full Load)	See table, max.
Line Regulation	±0.2%, max.
Load Regulation (Io=10% to 100%)	±0.5%, max.
Output Ripple & Noise (20 MHz bandwidth) (1) (Io=3% to 100%)	See table, max.
Short Circuit Protection	Continuous (Automatic Recovery)
Temperature Coefficient	±0.02%/°C
Capacitive Load (2)	See table, max.
Transient Recovery Time (3)	250us, typ.
Transient Response Deviation (3)	±3%, max.

INPUT SPECIFICATIONS	
Input Voltage Range	±20%
Start up Time (Nominal Vin and constant resistive Load)	70mS, typ.
Input Current (No-Load)	See table, max.
Input Current (Full-Load)	See table, typ.
Input Filter	Capacitors
Input Reflected Ripple Current (4)	35mA _{p-p} , typ.

EMC CHARACTERISTICS		
Radiated Emissions (5)	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

NOTE

1. Ripple/Noise measured with a 1uF ceramic capacitor.
2. Tested by minimal Vin and constant resistive load.
3. Tested by normal Vin and 25% load step change (75%-50%-25% of Io).
4. Measured Input reflected ripple current with a simulated source inductance of 12uH.
5. Input filter components (C1, C2, C3, L1) are used to help meet conducted and radiated emissions requirement for the module, which application refer to the EMI Filter of design & feature configuration. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.
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, 470uF/25V.
7. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.

GENERAL SPECIFICATIONS	
Efficiency (Full-Load)	See table, min.
I/O Isolation Voltage (3 sec.)	5000Vac
I/O Isolation Capacitance	50 pF, max.
I/O Isolation Resistance	1000 MΩ, min.
Switching Frequency	570KHz, typ.
Humidity	95% rel H
Reliability Calculated MTBF (MIL-HDBK-217 F)	>1.0 Mhrs
Safety Standard : (designed to meet)	IEC/EN 60950-1
Reinforced Isolation PCB Creepage & Clearance Distance	8 mm, min.

PHYSICAL SPECIFICATIONS	
Case Material	Non-conductive Black Plastic (UL94V-0 rated)
Base Material	Non-conductive Black Plastic (UL94V-0 rated)
Pin Material	Ø0.5mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	12.5g
Dimensions	DIP24 : 1.25"x0.8"x0.4"

ABSOLUTE MAXIMUM RATINGS (7)	
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.
Soldering Temperature (1.5mm from case 10 sec. max.)	260°C, max.

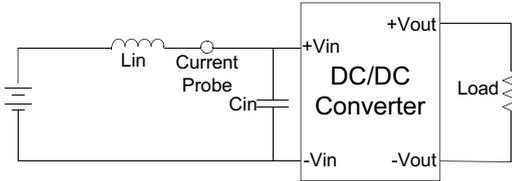
ENVIRONMENT SPECIFICATIONS	
Operating Ambient Temperature	-40°C ~ +85°C (See Derating Curve)
Maximum Case Temperature	100°C
Storage Temperature	-55°C ~ +125°C
Cooling	Nature Convection

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TEST CONFIGURATIONS

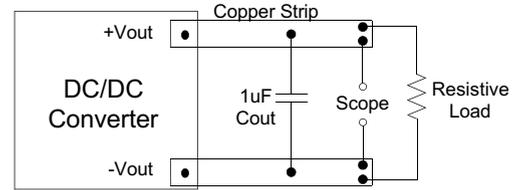
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through 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.



Output Ripple & Noise Measurement Test

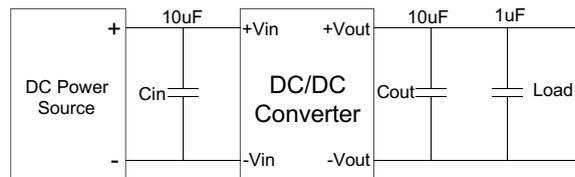
Use a capacitor C_{out} (1.0 μ F) measurement. The Scope measurement bandwidth is 0-20MHz.



DESIGN & FEATURE CONFIGURATIONS

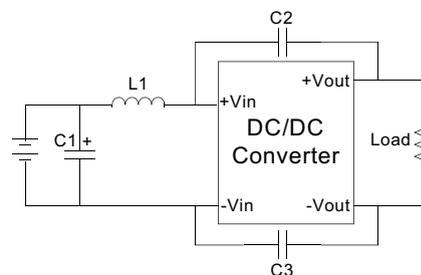
Output Ripple & Noise Reduction

To reduce ripple and noise, it is recommended to use a 1 μ F ceramic disk capacitor and a 10 μ F electrolytic capacitor to at the output.



EMI Filter

Input filter components ($C1, C2, C3, L1$) 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.

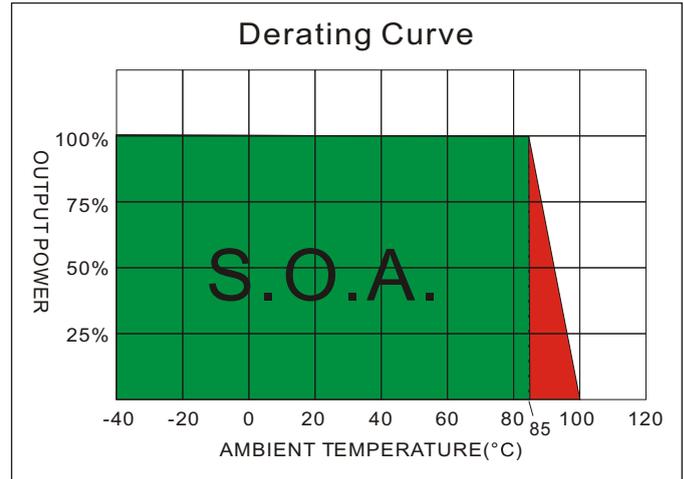
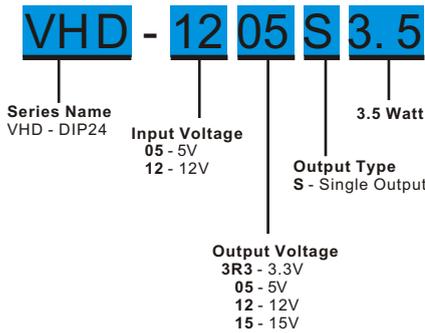


C1	L1	C2 & C3
47 μ F, 25V	12 μ H	150PF/250VAC

C2 & C3: Y5P Safety Standard Recognized Ceramic Capacitors
foot distance 10mm

VHD - 3.5W Regulated Single output

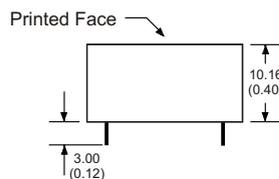
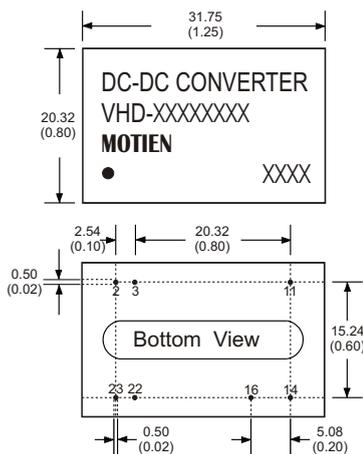
PARTNUMBER STRUCTURE



MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current Full load (mA)	OUTPUT Ripple & noise (mV)	EFFICIENCY @FL(%)	Capacitor Load(uF)
		No-Load (mA)	Full Load (mA)					
VHD-053 R3S3.5	5	70	633	3.3	700	75	73	470
VHD-05 05S3.5	5	85	909	5	700	75	77	470
VHD-05 12S3.5	5	95	884	12	291	85	79	220
VHD-05 15S3.5	5	115	896	15	233	75	78	220
VHD-123 R3S3.5	12	30	257	3.3	700	75	75	470
VHD-12 05S3.5	12	35	369	5	700	75	79	470
VHD-12 12S3.5	12	50	364	12	291	85	80	220
VHD-12 15S3.5	12	60	364	15	233	75	80	220

MECHANICAL SPECIFICATIONS



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	DESCRIPTION
2	-V Input
3	-V Input
11	N.C.
14	+V Output
16	-V Output
22	+V Input
23	+V Input