

FEATURES

- Isolation up to 5000 Vac
- 4:1 Wide Input Range
- Efficiency up to 84%
- Remote ON/OFF Control
- Reinforced Insulation for 250 Vrms Working Voltage
- Continuous Short Circuit Protection
- Under Voltage Protection
- Operating Temperature Range -40~90°C
- No minimum Load required
- 8mm Clearance and creepage distance



GENERAL DESCRIPTION

The VMBHW-Series is a family of 3.5 Watt single & double output DC/DC converters designed for applications where isolated output is required from a distributed power system. The internal clearance and creepage distance is 8mm. Models operate from a wide 4:1 input bus voltage of 12, 24 and 48 Vdc offering output voltage levels of 5, 12, 15, ± 12 and ± 15 Vdc. The converter is used in applications with higher isolation requirements. Typical applications are in medical, telecom/datacom and industry control for on board power distribution.

PART NUMBER STRUCTUR

VMBHW -	12	05	S
Series Name	Input Voltage (VDC)	Output Voltage (VDC)	Output Quantity
	12: 4.5-18	05: 5.0	S: Single
	24: 9-36	12: 12	
	48: 18-75	15: 15	
		12: ± 12	D: Dual
		15: ± 15	

SELECTION GUIDE

Model No.	nominal Input Voltage Range [Vdc]	nominal Output Voltage [Vdc]	Output Current @ full load [mA]	Input Current @ No / Full Load [mA]	Max. Capacitive Load [μF]	Efficiency typ. [%]
VMBHW-1205S	12 (4.5~18)	5	700	25 / 374	1470	78
VMBHW-1212S		12	292	50 / 352	470	83
VMBHW-1215S		15	234	45 / 352	330	83
VMBHW-1212D		±12	±146	50 / 356	±220	82
VMBHW-1215D		±15	±117	60 / 356	±160	82
VMBHW-2405S	24 (9~36)	5	700	20 / 185	1470	79
VMBHW-2412S		12	292	25 / 174	470	84
VMBHW-2415S		15	234	30 / 176	330	83
VMBHW-2412D		±12	±146	30 / 174	±220	84
VMBHW-2415D		±15	±117	30 / 176	±160	83
VMBHW-4805S	48 (18~75)	5	700	15 / 94	1470	78
VMBHW-4812S		12	292	15 / 89	470	82
VMBHW-4815S		15	234	20 / 89	330	82
VMBHW-4812D		±12	±146	20 / 92	±220	80
VMBHW-4815D		±15	±117	20 / 91	±160	81

INPUT SPECIFICATIONS

Item	Conditions			Min.	Typ.	Max.	Unit
Operating input voltage range	12Vin (nom)			4.5	12	18	Vdc
	24Vin (nom)			9	24	36	
	48 Vin (nom)			18	48	75	
Start up time	nominal Vin and constant resistive load			-	30	-	ms
Under Voltage Lockout	12Vin (nom)			Module ON / OFF: 4.2 Vdc / 3.5 Vdc typ.			
	24Vin (nom)			Module ON / OFF: 8.5 Vdc / 7.0 Vdc typ.			
	48 Vin (nom)			Module ON / OFF: 17.5 Vdc / 15.5 Vdc typ.			
Input Filter	-			Capacitive type			
Input Reflected Ripple Current	measured input reflected ripple current with a simulated source inductance of 27μH and a source capacitor Cin(47μF, ESR<1.0Ω at 100kHz)			20 mAp-p, typ.			
Remote ON/OFF	Referred to -Vin pin (pin1)	Positive logic	DC-DC ON	open or high impedance			
			DC-DC OFF	2-4mA current applied via 1kOhm restistor			
		OFF idle current		-	2.5	-	mA
Recommended input fuse (slow blow)	12Vin module			1.6			A
	24Vin module			0.8			
	48Vin module			0.5			

OUTPUT SPECIFICATIONS

Item	Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	-		-1.0	-	+1.0	%
Line regulation	-		-0.5	-	+0.5	%
Load regulation	No load to full load	Single Output	-1.0	-	+1.0	%
		Dual Output	-1.0	-	+1.0	
Cross regulation	Asymmetrical Load 25% / 100% for Dual Output		-5	-	+5	%
Ripple and noise (20Hz bandwidth)	measured with a 0.1μF ceramic capacitor	Single Output	-	50	100	mVp-p
		Dual Output	-	75	100	
Short circuit protection	-		continuous			
Temperature coefficient	-		-0.02	-	+0.02	%/°C
Max. Capacitive Load	Minimum Vin and constant resistive load		see table			
Transient Recovery Time	tested by nom. Vin and 25% load step change	All models	-	500	-	μs
Transient Response Deviation		5V Output	-5	-	+5	%
		Other Output	-3	-	+3	

ENVIRONMENTAL SPECIFICATIONS

Item	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	see derating curve	-40	-	+90	°C
Maximum case temperature	-	-	-	+105	°C
Storage temperature range	-	-55	-	+125	°C
Thermal impedance	-	27	-	-	°C/W
Cooling	Natural convection	30-65 LFM			
Relative humidity	-	95% RH			

GENERAL SPECIFICATIONS

Item	Conditions	Min.	Typ.	Max.	Unit
Isolation voltage	Input to Output, for 60 sec	-	5000	-	Vac
Isolation resistance	Input to Output	1000	-	-	MΩ
Isolation capacitance	Input to Output	-	10	20	pF
Leakage Current	240Vac, 60 Hz	-	2.0	-	µA
Clearance/Creepage	-	8	-	-	mm
Switching frequency	-	-	100	-	kHz
Safety standards	designed to meet	IEC / UL / EN62368-1			
MTBF	MIL-HDBK-217F, Full load, 25°C	777 kHrs			
Insulation System	-	Reinforced Insulation			
Environmental compliance	-	RoHS			

PHYSICAL SPECIFICATIONS

Item	Conditions	Min.	Typ.	Max.	Unit
Case material	UL94V-0 rated	non-conductive black Plastic			
Base material	UL94V-0 rated	non-conductive black Plastic			
Pin material	-	0.5mm Brass Solder-coated			
Potting material	UL94V-0 rated	Silicone			
Weight	-	7.27g, typ.			
Dimensions	-	0.96" x 0.58" x 0.43"			

ABSOLUTE MAXIMUM RATINGS

Item	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100ms)	12V Models	-	-	25	Vdc
	24V Models	-	-	50	
	48V Models	-	-	100	
Soldering Temperature	1.5 mm from case, 10 sec max.	-	-	260	°C

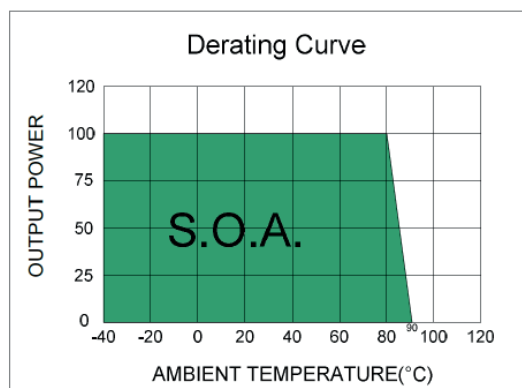
Note: These are stress ratings.

Exposure of devices to any of these conditions may adversely affect long-term reliability.

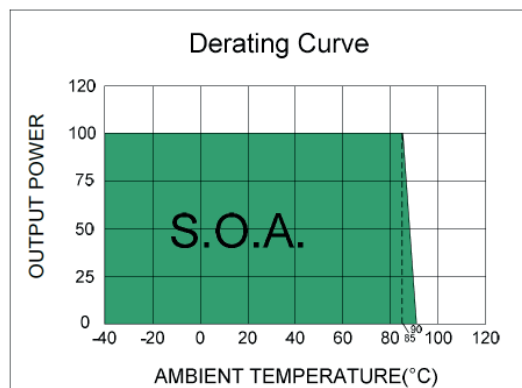
EMC SPECIFICATIONS

Item	Conditions		Level
Radiated Emissions	EN55032	with external components	Class B
Conducted Emissions	EN55032	without external components	Class B
ESD	EN61000-4-2	Air: $\pm 8\text{kV}$ / Contact: $\pm 6\text{kV}$	Perf. Criteria A
Radiated Immunity	EN61000-4-3	10V/m	Perf. Criteria A
Fast transient	EN61000-4-4	$\pm 2\text{kV}$ with external components	Perf. Criteria A
Surge	EN61000-4-5	$\pm 2\text{kV}$ with external components	Perf. Criteria A
Conduced immunity	EN61000-4-6	10Vrms	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8	100A/m	Perf. Criteria A

DERATING CURVES



5V Output-Models
VMBHW-4812D, VMBHW-4815D

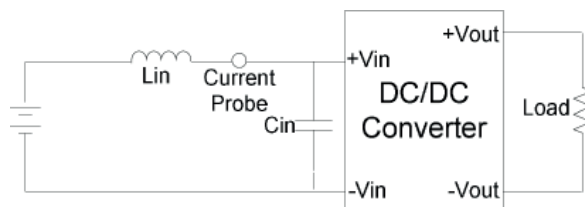


Other Models

TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

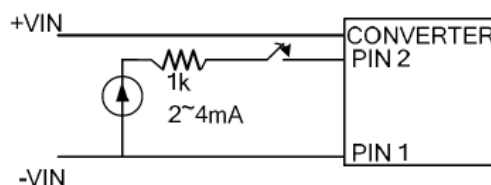
Input reflected ripple current is measured with a source inductor L_{in} (27 μ H) and a source capacitor C_{in} (47 μ F, $ESR < 1.0\Omega$ at 100kHz) at nominal input and full load.



Remote ON / OFF

Remote Module ON / OFF

Input current (2~4mA) via 1k Ω to Pin2, converter OFF.
Open or high impedance, converter ON.

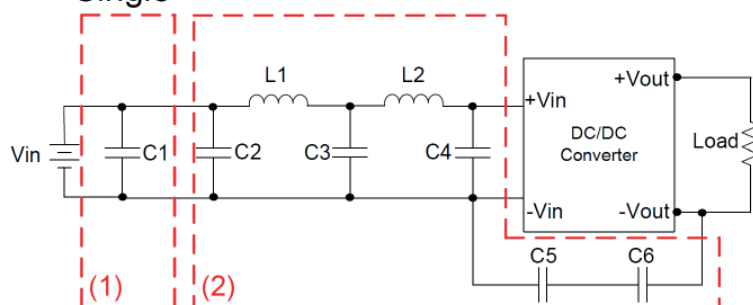


DESIGN & FEATURE CONFIGURATIONS

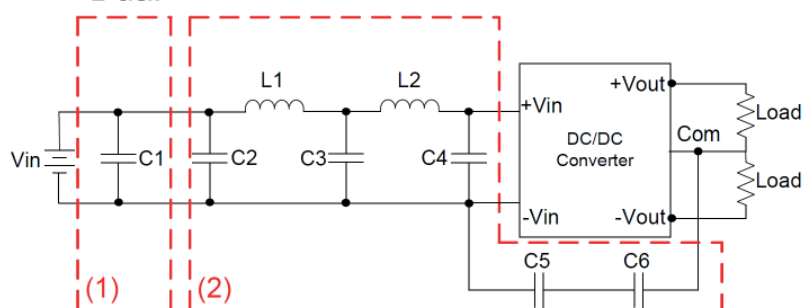
EMC Filter

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

Single

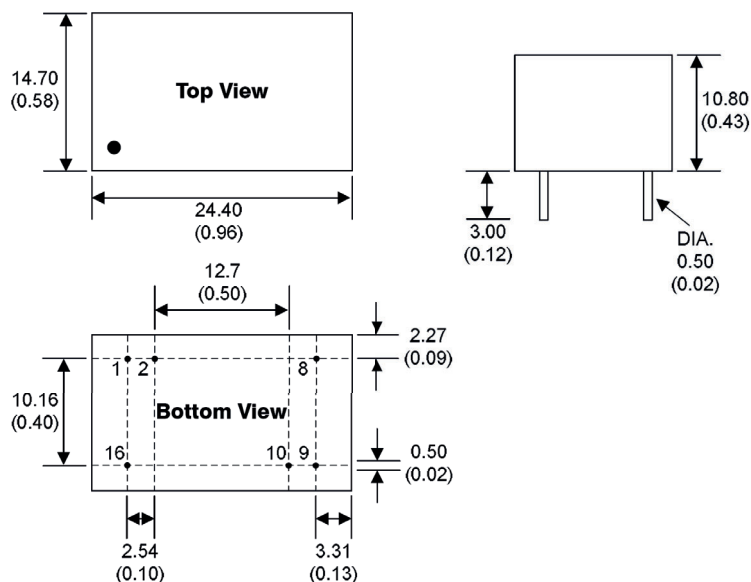


Dual



Model	C1	C2, C3, C4	C5	C6	L1	L2
VMBHW-12xxx	Nippon Chemi-con KY series 220μF, 100V	MLCC 22μF, 35V	47pF 400Vac Y1	100pF 400Vac Y1	2.2μH	2.2μH
VMBHW-24xxx		MLCC 10μF, 50V			33μH	33μH
VMBHW-48xxx		MLCC 4.7μF, 100V			4.7μH	4.7μH

MECHANICAL DRAWING

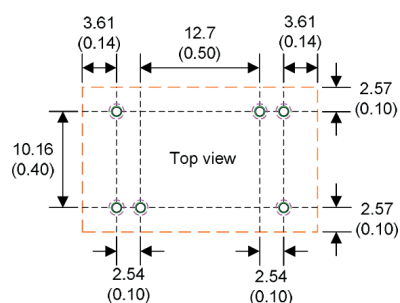


PIN CONNECTION

PIN	Single	Dual
1	-Vin	-Vin
2	CTRL	CTRL
3	N.C.	Common
4	+Vout	+Vout
5	-Vout	-Vout
6	+Vin	+Vin

Notes: All dimensions in mm [inch]
 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)

RECOMMENDED FOOTPRINT DETAILS



Notes:

- All dimensions in mm [inch]
 Through hole (black) 1.2.8.9.10.16: Ø0.8 (0.031)
 Top view pad (green) 1.2.8.9.10.16: Ø1.0 (0.039)
 Bottom view pad (pink) 1.2.8.9.10.16: Ø2.0 (0.079)
- There should be at least 8mm distance between primary and secondary circuit.

Specifications can be changed without prior notice. Products are not intended for and must not be used in life support systems, human implantation, nuclear facilities or systems or any other application where product failure or malfunction of the component could lead to loss of life or catastrophic property damage.