

FEATURES

- 1600 VDC Isolation
- 2:1 Wide Input Range
- Efficiency up to 86%
- Plastic Case Standard
- Remote ON/OFF Control (optional)
- SIL8 Housing
- Continuous Short Circuit Protection
- Extended Operating Temperature Range -40~85°C



GENERAL DESCRIPTION

The VMG-3W series is a family of cost effective 3 W single & dual output DC-DC converters with 1.6 kVDC isolation. These converters achieve low cost and miniature SIL8 size without compromising performance or field reliability. Models operate from an input bus voltage of 5, 12, 24 and 48 VDC offering output voltage levels of 3.3, 5, 12, 15, ± 5 , ± 12 or ± 15 VDC.

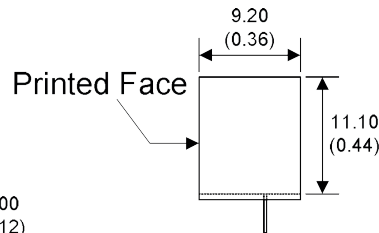
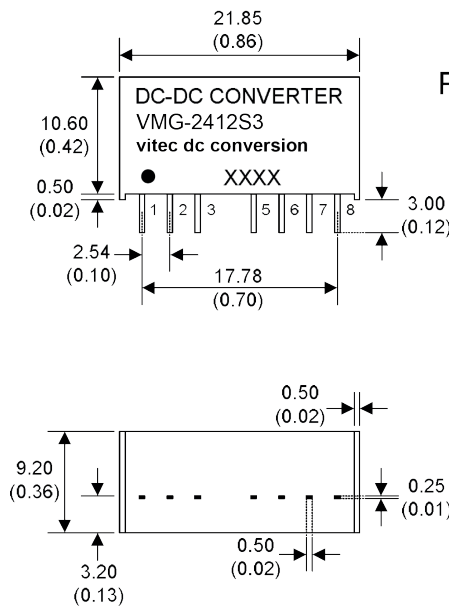
PART NUMBERING

VMG - 24	05	S	3	-	C
Series Name	Input Voltage (VDC)	Output Voltage (VDC)	Output and Housing	Power Level	Options
	05: 4.5-9 12: 9-18 24: 18-36 48: 36-72	3R3: 3.3 05: 5.0 12: 12 15: 15 05: ± 5.0 12: ± 12 15: ± 15	S: SIL8, Single Output D: SIL8, Dual Output		<input type="checkbox"/> None C: remote on/off -T: Alternative Pinning (dual output-models only)

SIL 8 Package - Standard Types

Model No.	Input Voltage (Range) [Vdc]	nominal Output Voltage [Vdc]	Output Current [mA]		Input Current [mA] 05/12/24/48		Max. Capacitive Load [µF]	Efficiency typ. [%] 05/12/24/48
			@ min. load	@ full load	@ No Load	@ Full Load		
VMG-xx3R3S3	"xx" 05: 4.5-9V 12: 9-18V 24: 18-36V 48: 36-72V	3.3	175	700	70/25/15/10	608/244/127/63	2200	76/79/76/76
VMG-xx05S3		5.0	150	600	85/25/15/6	750/305/154/78	1000	80/82/81/80
VMG-xx12S3		12	63	250	80/25/25/15	732/297/151/76	470	82/84/83/82
VMG-xx15S3		15	50	200	85/35/25/20	732/301/145/75	220	82/83/86/83
VMG-xx05D3		±5.0	±75	±300	100/55/20/20	769/309/152/79	±1000	78/81/82/79
VMG-xx12D3		±12	±31	±125	100/45/25/25	723/291/151/76	±220	83/86/83/82
VMG-xx15D3		±15	±25	±100	100/60/25/20	698/301/149/76	±100	86/83/84/82

MECHANICAL DRAWING - SIL8 Package



- 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. Pin to case tolerance: ±0.5 [±0.02]
 4. Case Tolerance: ±0.5 [±0.02]
 5. Stand-off Tolerance: ±0.1 [±0.004]

PIN	S (single)	S+C	D (dual)	D+C	D+T	D+C+T
1	-Vin	-Vin	-Vin	-Vin	-Vin	-Vin
2	+Vin	+Vin	+Vin	+Vin	+Vin	+Vin
3	no Pin	CTRL	N.C.	CTRL	N.C.	CTRL
5	no Pin	N.C.	N.C.	N.C.	N.C.	N.C.
6	+Vout	+Vout	+Vout	+Vout	+Vout	+Vout
7	-Vout	-Vout	-Vout	-Vout	COM	COM
8	N.C.	N.C.	COM	COM	-Vout	-Vout

N.C.: No connection

INPUT SPECIFICATIONS					
Item	Conditions	Min.	Typ.	Max.	Unit
Input voltage range	5 Vin Models	4.5	5	9	Vdc
	12 Vin Models	9	12	18	
	24 Vin Models	18	24	36	
	48 Vin Models	36	48	72	
Start up time	nominal Vin and constant resistive load	-	20	-	ms
Input Filter	-	Capacitor			
Input Reflected Ripple Current	measured input reflected ripple current with a simulated source inductance of 12µH and a source capacitor Cin(47µF, ESR<1.0Ω at 100kHz)	-	35	-	mApk-pk
Remote ON/OFF	DC-DC ON	Open or High Impedance			
	DC-DC OFF	Input Current (3 ~ 6 mA)			
	OFF idle current	-	-	3	mA
Recommended input fuse (slow blow)	5Vin module	1.6			A
	12Vin module	0.8			
	24Vin module	0.5			
	48Vin module	0.315			

OUTPUT SPECIFICATIONS					
Item	Conditions	Min.	Typ.	Max.	Unit
Voltage accuracy	-	-1.0	-	+1.0	%
Line regulation	-	-0.5	-	+0.5	%
Load regulation	From 25% to 100% Load	-1.0	-	+1.0	%
Cross regulation	Asymmetrical Load 25% / 100% for Double Output	-5	-	+5	%
Ripple and noise	20MHz bandwidth, measured with a 0.1µF MLCC and 10 µF electrolytic capacitor.	-	-	75	mVp-p
Short circuit protection	-	Indefinite hiccup (Automatic Recovery)			
Temperature coefficient	-	-0.02	-	+0.02	%/°C
Maximum Capacitive Load	Minimum Vin and constant resistive load	see Table			
Transient Recovery Time	Nominal Vin and 25% load step change (75%~50%~25% of Io)	-	300	-	µs
Transient Response Deviation			-	-	+3

GENERAL SPECIFICATIONS					
Item	Conditions	Min.	Typ.	Max.	Unit
Isolation voltage	(input-output, 60 sec)	1600	-	-	Vdc
Isolation resistance	Input - Output	1000	-	-	MΩ
Isolation capacitance	Input - Output	-	680	-	pF
Switching frequency	-	100	-	650	kHz
Safety standards	(designed to meet)	IEC / UL / EN62368-1			
MTBF	MIL-HDBK-217F @ 25°C	1.34 Mhrs			
Environmental compliance	-	RoHS conform			
Case material	(UL94V-0 rated)	non-conductive Black Plastik			
Pin material	-	Tinned copper			
Potting material	(UL94V-0 rated)	Epoxy			
Weight	-	4.5 g			
Dimensions	-	0.86" x 0.36" x 0.44"			
Soldering Temperature	1.5 mm from case, 10 sec max.	260°C			
Absolute Specifications Input Surge Voltage (100ms)	5 Vin Models	-	-	15	Vdc
	12 Vin Models	-	-	36	
	24 Vin Models	-	-	50	
	48 Vin Models	-	-	100	

ENVIRONMENTAL SPECIFICATIONS					
Item	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature (see derating curve)	-	-40	-	+85	°C
Maximum case temperature	-	-	-	+100	°C
Thermal impedance	-	40	-	-	°C/W
Storage temperature range	-	-55	-	+125	°C
Cooling	„Natural convection“ is usually about 30-65 LFM, but is not equal to still air (0 LFM).	Natural convection			
Relative humidity	-	95% RH			

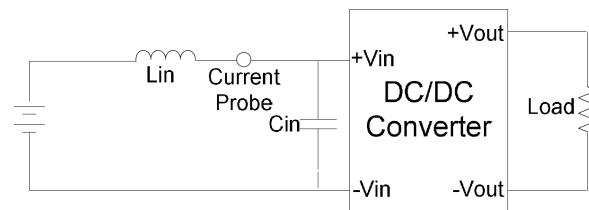
EMC SPECIFICATIONS

Item	Conditions		Level
Radiated Emissions	EN55032	-	Class A
Conducted Emissions	EN55032	with external components	Class A
ESD	EN61000-4-2	Air: 8kV / Contact: 6kV	Perf. Criteria A
RS - Radiated Immunity	EN61000-4-3	20V/m	Perf. Criteria A
EFT - Fast transient	EN61000-4-4	±2kV with external components	Perf. Criteria A
Surge	EN61000-4-5	±1kV with external components	Perf. Criteria A
CS - Conducted immunity	EN61000-4-6	10Vrms	Perf. Criteria A
PFMF - Power frequency magnetic field	EN61000-4-8	1A/m	Perf. Criteria A

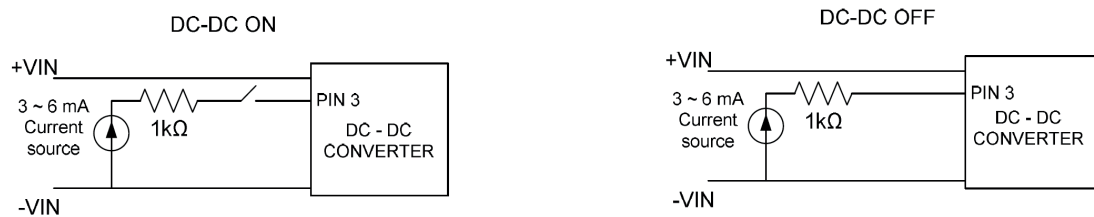
TEST CONFIGURATIONS

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, $ESF < 1.0\Omega$ at 100kHz) at nominal input and full load.

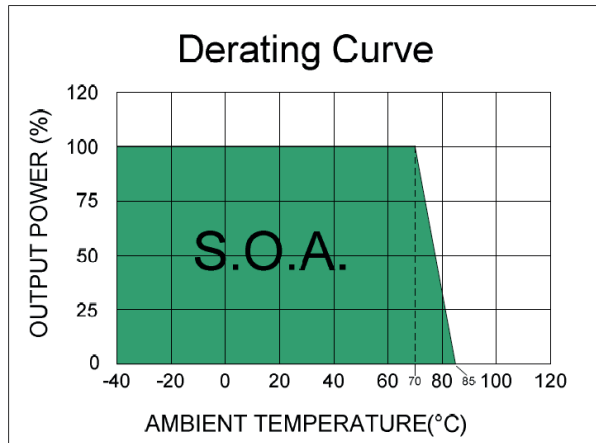


REMOTE ON / OFF

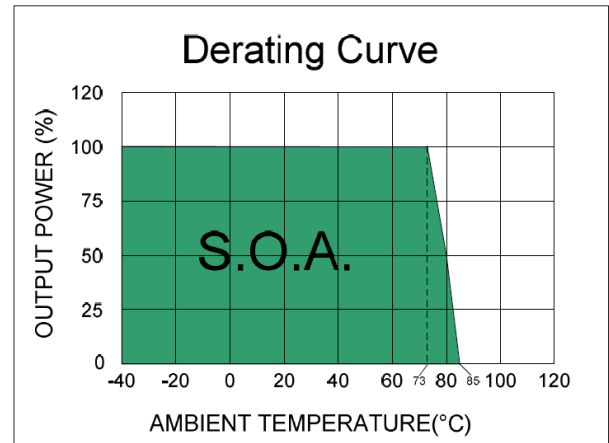


	remote	Ctrl pin applied voltage via 1k Ω	Output Voltage	Converter Input Current
Converter on	Off	Open or High Impedance	see module	see module
Converter off	On	Input current (3~6 mA)	no output voltage	2.5mA, typ.

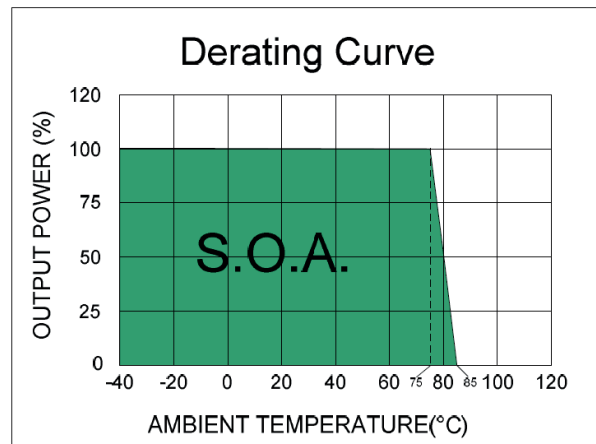
DERATING CURVES



Vout = 5.0V



Vout = 3.3V & Efficiency 81%~83% Models

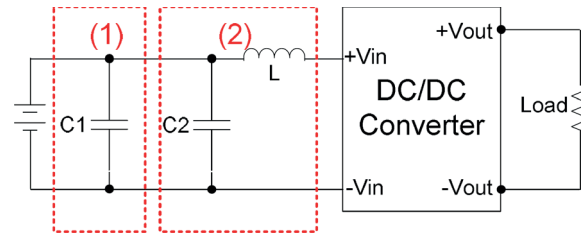


Efficiency 84%~86% Models

TEST CONFIGURATIONS

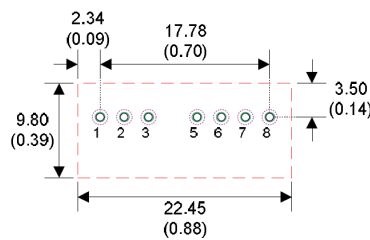
EMC Filter

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



Model	C1	C2	L
VMG-05xxxx3	Nippon Chemi-con KY series 470µF, 100V	Nippon Chemi-con KY series 220µF, 25V	5.6µF
VMG-12xxxS3		Nippon Chemi-con KY series 100µF, 100V	18µF
VMG-12xxxSD3		MLCC 2.2µF, 100V	
VMG-24xxxx3		MLCC 10µF, 50V	
VMG-48xxxx3			Nippon Chemi-con KY series 100µF, 100V

RECOMMENDED FOOTPRINT DETAILS



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

Through hole (black) 1~8 : Ø0.80 (0.031)

Top view pad (green) 1~8 : Ø1.00 (0.039)

Bottom view pad (pink) 1~8 : Ø1.60 (0.063)

Note: 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.