

### FEATURES AND APPLICATIONS

- Wide 2:1 Input range
- 2" x 2" Package
- Regulated Output Voltage
- High Efficiency up to 91%
- 1500 Vdc Isolation
- Adjustable Output Voltage
- Remote On/Off Control
- Overvoltage and Overcurrent Protection
- Meets EN55022 Class A without external components
- Heat Sink Option
- RoHS ✓



### GENERAL DESCRIPTION

The VM60 series is a family of 60 W single output DC-DC converters with 1.5 kVdc isolation. These converters achieve miniature package in a 2" x 2" compatible case with high performance features and a short circuit protection with automatic restart and tight line/load regulation. Wide range devices operate over 2:1 Input voltage range providing stable output voltage. Models operate from an input bus voltage of 24 and 48 Vdc offering output voltage levels of 3.3, 5, 12 or 15 Vdc.

2:1 Input, Single Output								
Model Number	Input Voltage Range [Vdc]	Output Voltage [Vdc]	Input Current		Full Load Output Current [mA]	Ripple & Noise max. [mV <sub>pk-pk</sub> ]	Capacitor Load max. [µF]	Efficiency [%] 24/48
			No-Load [mA] 24/48	Full Load [mA] 24/48				
VM60-xx3R3S	18-36 36-75	3.3	80/50	2151/1075	36000	75	36000	91/91
VM60-xx05S		5.0	100/60	2762/1389	20400	75	20400	91/91
VM60-xx12S		12.0	40/40	2793/1397	3550	100	3550	90/91
VM60-xx15S		15.0	40/40	2793/1397	2300	100	2300	90/91

\* non-standard output voltages on request

xx ... nominal input voltage:

24 (18 – 36Vdc)  
48 (36 – 75Vdc)

Suffix -HS Heat Sink Option

### ELECTRICAL SPECIFICATIONS

Specifications typical at +25°C, nominal Input voltage, rated output current unless otherwise specified.

#### Input Specifications

Voltage Range	24 Vdc, 18-36 Vdc 48 Vdc, 36-72 Vdc
Under Voltage Lockout (On/Off)	24 Vdc: 17.8 Vdc / 16 Vdc typ. 48 Vdc: 33.5 Vdc / 30.5 Vdc typ.
Filter	Pi-Network
Start up Time	20mSec, typ.
Input Reflected Ripple Currents	20mA pk-pk
<small>(Measured with a simulated source inductance of 12 µH)</small>	
Input Surge Voltage (100 ms)	24V input: 50 Vdc, max. 48V input: 100 Vdc, max.

#### Output Specifications

Voltage Accuracy	±1%, max.
Output Voltage Adjustability (Trim)	±10%, max. (Details see Page 3)
Ripple and Noise (20 MHz BW)	see Table
<small>(Measured with a 1.0 µF ceramic capacitor)</small>	
Short Circuit Protection	Continuous (Hiccup)
Short Circuit Restart	Automatic
Current Limiting	135% of max. Iout, typ.
Over Voltage Protection	3.3V output: 3.9 V 5V output: 6.2 V 12V output: 15 V 15V output: 18 V
<small>(Zener Diode Clamp)</small>	
Line Voltage Regulation	±0.5%, max.
Load Voltage Regulation	±0.5%, max.
Temperature Coefficient	±0.2%/°C
Transient Recovery Time	250 µs, typ.
Transient Response Deviation	±3.0%, max.

#### EMC Characteristics

EMI/RFI	EN55022 Class A
EN61000-4-2 (ESD)	Perf. Criteria A
EN61000-4-3 (RS)	Perf. Criteria A
EN61000-4-4 (EFT)*	Perf. Criteria A
EN61000-4-5 (Surge)*	Perf. Criteria A
<small>*An external Capacitor is required; Suggestion Nippon chemi-con KY series, 220µF/100V</small>	
EN61000-4-6 (CS)	Perf. Criteria A
EN61000-4-8 (PFMF)	Perf. Criteria A

#### Remote ON/OFF Control

Control voltage referenced to negative (-) input (Pin 2)	
ON-Control	3V-12Vdc or open
OFF-Control	0V-1.2V or short Pin 2 and Pin 3
Off Idle Current:	5 mA typ.

#### Environmental Specification

Operating Temperature	-40°C to +85°C derating above +40°C
Max. Case Temperature	+110°C
Storage Temperature	-40°C to +125°C
Over Temp. Protection	120°C, typ. (Case)
Thermal Impedance	10.5°C without Heat Sink (Nature Convection) 8.4°C with Heat Sink
Cooling	Free-air convection

#### General Specification

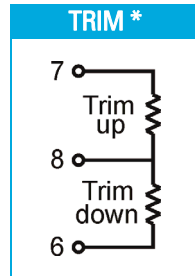
Efficiency	see table
Switching Frequency	270 kHz, typ.
I/O Isolation Voltage	1500 Vdc (3 sec.)
Isolation Capacitance	2000 pF, max.
Isolation Resistance	10 <sup>9</sup> Ω, min.
Safety Standard	IEC/EN 60950-1 (designed to meet)
MTBF (MIL-HDBK-217 F)	> 110 khrs
Humidity	95% rel H

#### Physical Characteristics

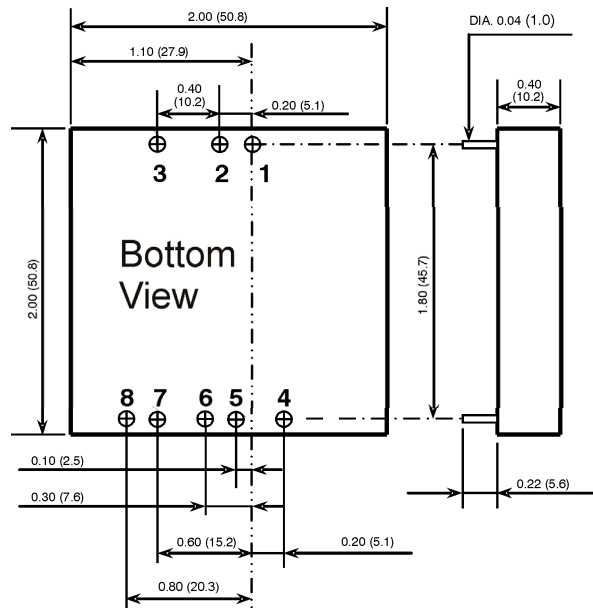
Dimension	50.8 x 50.8 x 10.2 mm 2.0 x 2.0 x 0.40 inches
Weight	70.0 g
Case Material	Nickel-Coated Copper Metal
Base Material (UL94V-0 rated)	Non-conductive Black Plastic
Pin Material	Dia 1.0 mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Soldering Temperature	260°C max. (1.5mm from case 10 sec. max.)

### MECHANICAL SPECIFICATIONS

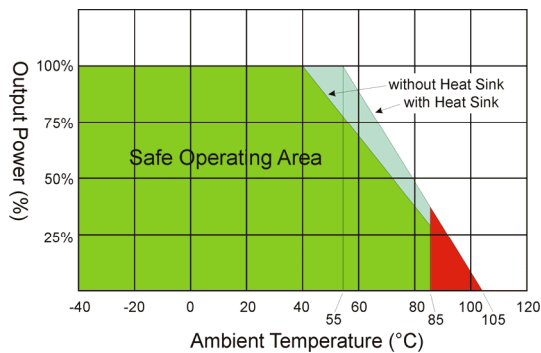
Standard Isolation	
Pin	Single Output
1	+ V Input
2	-V Input
3	CTRL
4	- Sense
5	+Sense
6	+ V Output
7	-V Output
8	TRIM



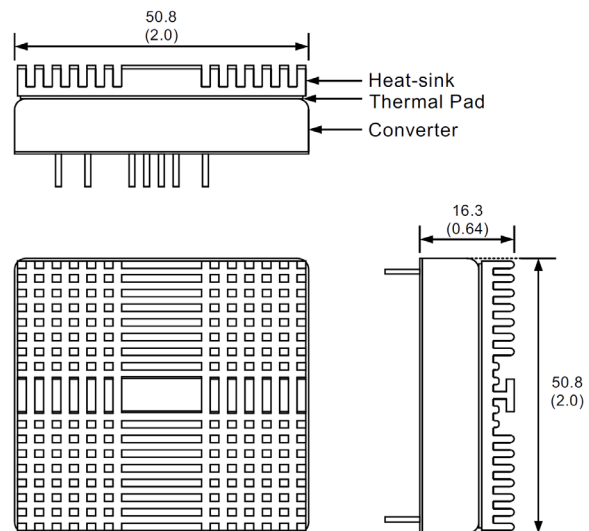
\* Output can be externally trimmed. Maximum output deviation is 10% inclusive of remote sense and trim. If remote sense is not being used, the +sense should be connected to its corresponding +OUTPUT and likewise the -sense should be connected to its corresponding -OUTPUT.



### Derating VM60-Series



### Heat Sink Option (Suffix -HS)



Heat Sink Material: Aluminium  
Finish: Anodic treatment (black)  
Weight: 22g (without converter)

**Notes:**

All dimensions in millimeters (inches).

Tolerance  $\pm 0.25\text{mm}$  (0.01).

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.

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