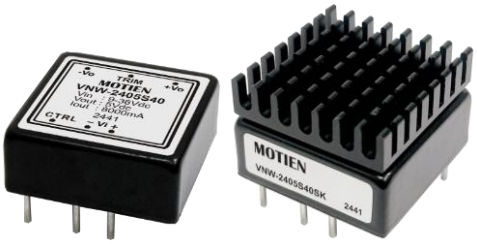
VNW-40W Series

40W 4:1 Regulated Single & Dual output

Features

- Ultra Wide 4:1 Input Range
- 1600 VDC Isolation
- Efficiency up to 91%
- Operating Temperature Range -40 ~ 105°C max.
- Adjustable Output Voltage
- Remote ON/OFF Control (CTRL)
- Continuous Short Circuit Protection
- Over Current Protection
- Over Voltage Protection
- Over Temperature Protection
- Soft Start



PART NUMBER STRUCTURE

VNW - 24 12 S 40 SK

(1) (2) (3) (4) (5) (6)

(1) Series

(2) Input Voltage Range
- **24 -** 9-36 V
- **48 -** 18-75 V

(3) Output Voltage
- **05 -** 5 V
- **12 -** 12 V
- **15 -** 15 V
- **24 -** 24 V

(4) Output Type
- **S -** Single Output
- **D -** Dual Output

(5) Watt

(6) Heat-sink (Optional)
- **Blank -** Without Heat-sink
- **SK -** With Heat-sink

ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED

Model Number	Input Voltage Range (VDC)	Input Current		Output Voltage (VDC)	Output Current		Efficiency @FL (%, typ.)	Capacitive Load @FL (μF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. load (mA)	Full load (mA)		
VNW-2405S40	9-36	15	1852	5	0	8000	90	7200
VNW-2412S40	9-36	15	1878	12	0	3400	90.5	1200
VNW-2415S40	9-36	15	1854	15	0	2700	91	1000
VNW-2424S40	9-36	15	1878	24	0	1700	90.5	680
VNW-2412D40	9-36	15	1868	±12	0	±1700	91	±750
VNW-2415D40	9-36	15	1854	±15	0	±1350	91	±500
VNW-4805S40	18-75	10	926	5	0	8000	90	7200
VNW-4812S40	18-75	10	939	12	0	3400	90.5	1200
VNW-4815S40	18-75	10	927	15	0	2700	91	1000
VNW-4824S40	18-75	10	934	24	0	1700	91	680
VNW-4812D40	18-75	10	934	±12	0	±1700	91	±750
VNW-4815D40	18-75	10	927	±15	0	±1350	91	±500

INPUT SPECIFICATIONS						
Parameter	**Conditions**		**Min.**	**Typ.**	**Max.**	**Unit**
Input Voltage Range	24V Input		9	24	36	VDC
	48V Input		18	48	75	
Under Voltage Protection	24V Input	Module ON		8.6		VDC
		Module OFF		7.6		
	48V Input	Module ON		17.5		
		Module OFF		16.5		
Input Filter			Pi Type			
Input Reflected Ripple Current [1]				30		mApk-pk
Start up Time	Nominal Vin and constant resistive load			30		ms
Remote ON/OFF [2]	Module ON (Open Circuit)		3.0		12	VDC
	Module OFF (Short circuit pin 2 and pin 3)		0		1.2	
	OFF idle current			2.0		mA
Recommended input fuse (slow blow)	24V Input		8			A
	48V Input		5			
Note 1: Measured with a simulated source inductance of 10μH and a source capacitor Cin (47μF, ESR<1.0Ω at 100kHz). Note 2: The remote ON/OFF control pin is referenced to –Vin (pin2).						

OUTPUT SPECIFICATIONS						
Parameter	**Conditions**		**Min.**	**Typ.**	**Max.**	**Unit**
Output Voltage Accuracy			-1.0		+1.0	%
Output Voltage Adjustability (Trim)	For Single output		-10		+10	%
Line Regulation			-0.5		+0.5	%
Load Regulation	From 0% to 100% Load	Single Output	-0.5		+0.5	%
		Dual Output	-1.0		+1.0	
Cross Regulation	Asymmetrical Load 25% / 100% for Dual Output		-5		+5	%
Ripple & Noise [3]	20MHz bandwidth			100	150	mVpk-pk
Over Voltage Protection (Zener diode clamp)	5V Output			6.2		VDC
	12V Output			15		
	15V Output			18		
	24V Output			27		
	±12V Output			±15		
	±15V Output			±18		
Over Current Protection			110	140	200	% of FL
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)			250		μs
Transient Response Deviation			-5		+5	%
Note 3: Measured with a 10μF MLCC.						

ABSOLUTE MAXIMUM RATINGS [4]					
Parameter	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Input Surge Voltage (100 ms)	24V Input			50	VDC
	48V Input			100	
Soldering Temperature	1.5mm from case 10sec max.			260	°C
Note 4: These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.					

GENERAL SPECIFICATIONS					
Parameter	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Isolation Voltage	Input-output, and rated for 60sec	1600			VDC
	Case-I/O, and rated for 60sec	1000			
Isolation Resistance	Input-output	1000			MΩ
Isolation Capacitance	Input-output		2500		pF
Switching Frequency	5V Output		310		kHz
	Other Output		360		
MTBF	MIL-HDBK-217 F @ 25°C	350			k hours
Safety Approval	IEC / EN / UL 62368-1	Designed to meet			
Environmental compliance		RoHS			

ENVIRONMENT SPECIFICATIONS					
Parameter	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Operating Ambient Temperature	See the Derating Curve	-40		105	°C
Maximum Case Temperature	5V Output			105	°C
	Other Output			110	°C
Thermal Impedance [5]	Without Heat-sink	13			°C/W
	With Heat-sink	12			°C/W
Over Temperature Protection	Case Temperature		115		°C
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30-65FM			
Note 5: Mounted on 5.9 x 2.75 inch FR-4 board with 2oz copper.					

EMC SPECIFICATIONS			
Parameter	**Standard**	**Condition**	Criterion
Conducted Emissions	EN55032	with external components	A
Radiated Emissions	EN55032	with external components	A
ESD	IEC 61000-4-2	Air: ± 8kV; Contact: ± 6kV	A
RS	IEC 61000-4-3	10V/m	A
EFT	IEC 61000-4-4	±2kV with external components	A
Surge	IEC 61000-4-5	±2kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	100A/m continuous; 1000A/m 1sec	A

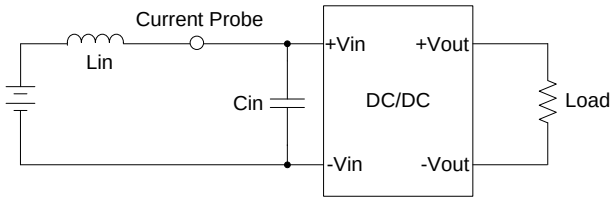
PHYSICAL SPECIFICATIONS

Parameter	Value
Case Material	Metal
Base Material	Nonconductive Black Plastic (UL94V-0 rated)
Pin Material	Ø1.0mm Brass Solder-coated
Potting Material	Silicone (UL94V-0 rated)
Weight	21.5 g, typ. (Without Heat-sink)
	25.2 g, typ. (With Heat-sink)
Dimensions	1.00" x 1.00" x 0.42" (Without Heat-sink)
	1.00" x 1.00" x 0.68" (With Heat-sink)

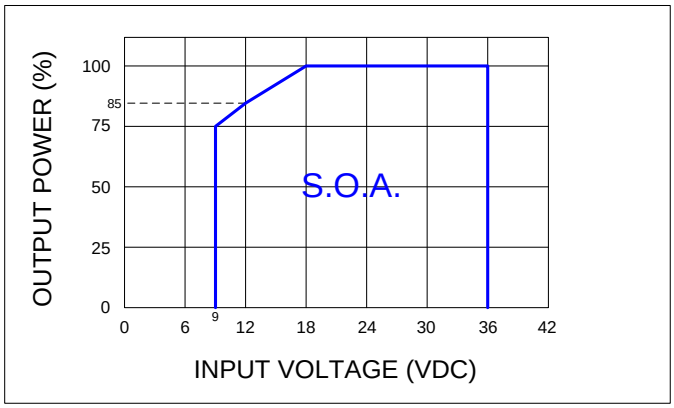
TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

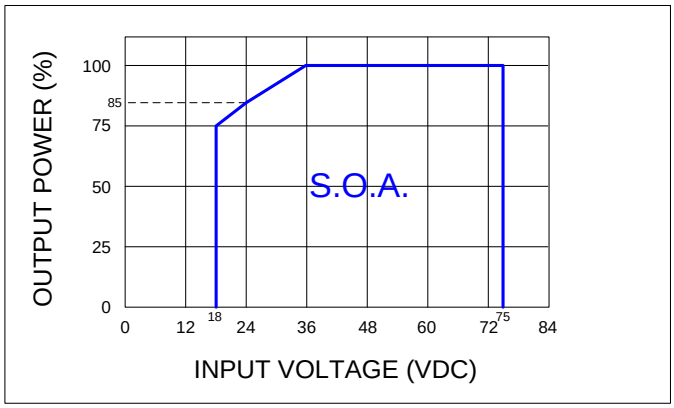
Input reflected ripple current is measured with a source inductor Lin (10μH) and a source capacitor Cin (47μF, ESR<1.0Ω at 100kHz) at nominal input and full load.



ELECTRICAL CHARACTERISTIC CURVES

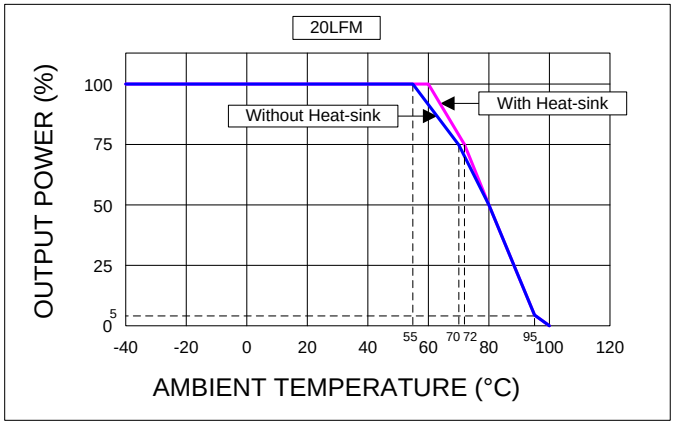


For 24Vin models

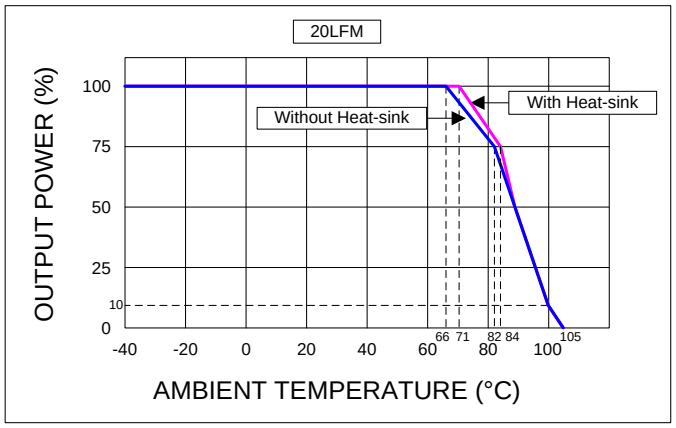


For 48Vin models

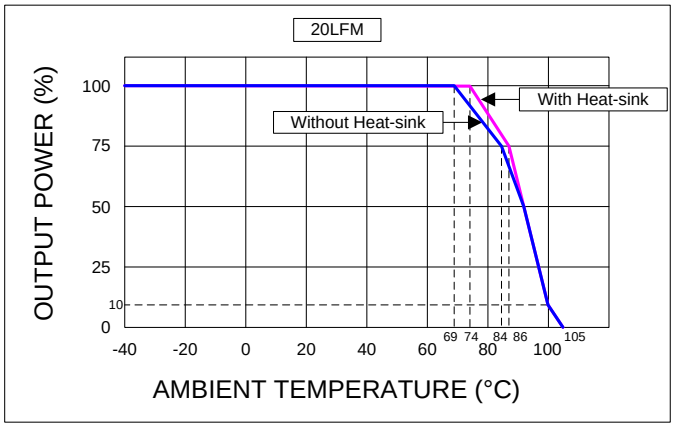
ELECTRICAL CHARACTERISTIC CURVES



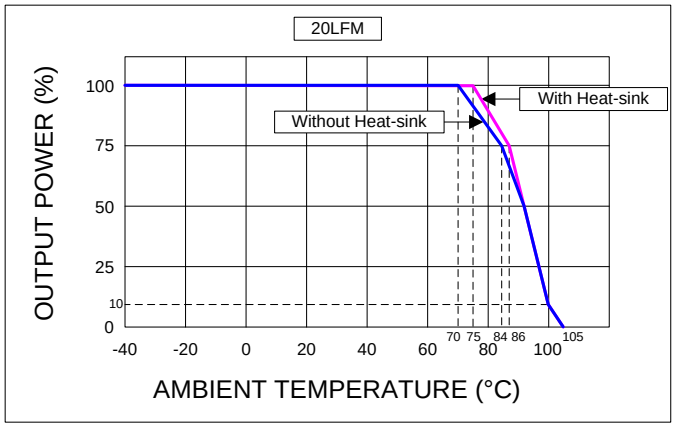
VNW-2405S40、VNW-4805S40



VNW-2412S40、VNW-2412D40



VNW-2415S40、VNW-2424S40、VNW-2415D40



VNW-4812S40、VNW-4815S40、VNW-4824S40、VNW-4812D40、VNW-4815D40

DESIGN & FEATURE CONFIGURATIONS

Over Current Protection

The module includes an internal over current protection circuit, which will endure current limiting for an unlimited duration during output over load condition. If the output current exceeds the OCP set point, the module will shut down automatically (hiccup).The module will try to restart after shut down. If the over load condition still exists, the module will shut down again.

Over Voltage Protection

The module includes an internal output over voltage protection circuit, which monitors the voltage on the output terminals. If this voltage exceeds the over voltage set point, the module will activate the control loop of internal circuit to clamp the output voltage.

DESIGN & FEATURE CONFIGURATIONS

Over Temperature Protection

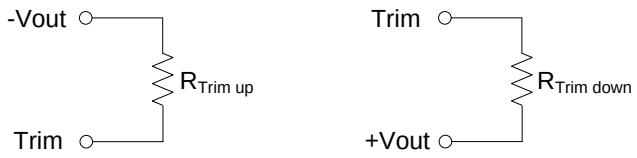
The over temperature protection consists of circuitry that provides protection from thermal damage. If the temperature exceeds the over temperature threshold the module will shut down. The module will try to restart after shut down, if the over temperature condition still exists during restart, the module will shut down again. This restart trial will continue until the temperature is within specification.

Remote Module ON / OFF

Positive logic turns on the module during high logic and off during low logic. Remote module ON/OFF can be controlled by an external switch between the CTRL terminal and -Vin terminal. For positive logic if the remote feature is not used, please leave the CTRL pin floating.

TRIMMING

Output voltage can be externally trimmed by using the method as below. (single output models only)

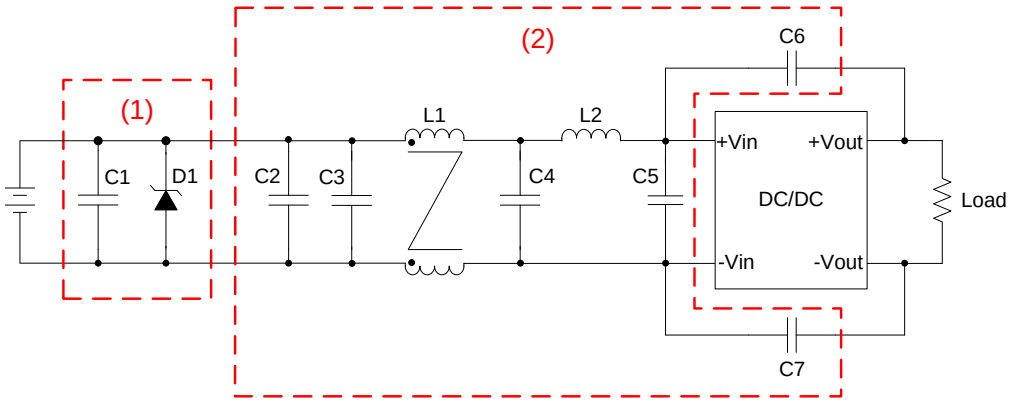


Trim Up Trim Down

DESIGN & FEATURE CONFIGURATIONS

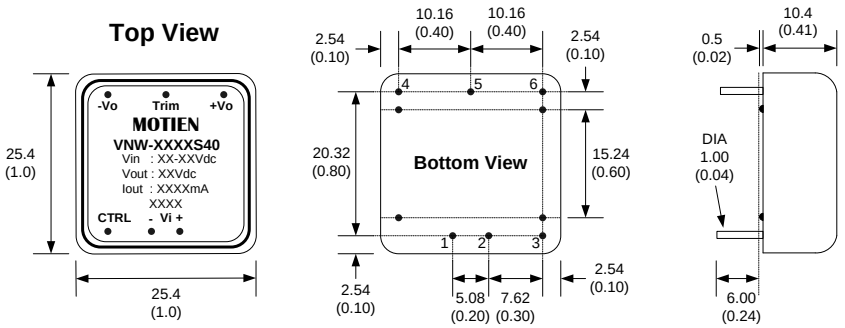
EMC Filter

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



	VNW-24XXX40	VNW-48XXX40
C1	NIPPON chemi-con KY series 680μF, 100V	NIPPON chemi-con KY series 470μF, 100V
D1	SMDJ58A	SMDJ120A
C2	NIPPON chemi-con KY series 220μF, 50V	NIPPON chemi-con KY series 100μF, 100V
C3	MLCC 4.7μF, 50V	MLCC 3.3μF, 100V
L1	LFTBH1276-27UH-5.2A 27μH	LFTBH1276-55UH-3A 55μH
C4	MLCC 4.7μF, 50V	MLCC 3.3μF, 100V
L2	1.5μH	3.3μH
C5	MLCC 4.7μF, 50V	MLCC 3.3μF, 100V
C6	MLCC 1000pF, 2000V	MLCC 1000pF, 2000V
C7	MLCC 1000pF, 2000V	MLCC 1000pF, 2000V

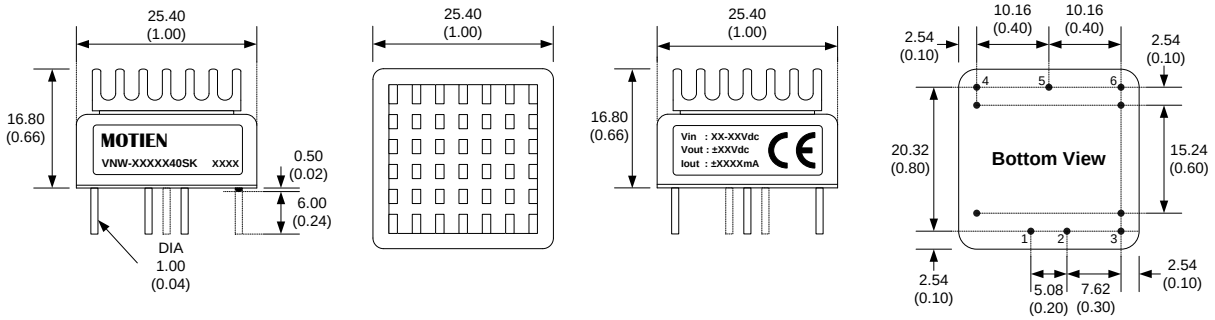
MECHANICAL SPECIFICATIONS



All dimensions are typical in millimeters (inches).
Pin diameter: 1.0±0.05 (0.04±0.002).
Pin pitch and length tolerance: ±0.35 (±0.014).
Case tolerance: ±0.5 (±0.02).
Stand-off tolerance: ±0.1 (±0.004).

PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL	CTRL
4	+Vout	+Vout
5	Trim	COM
6	-Vout	-Vout

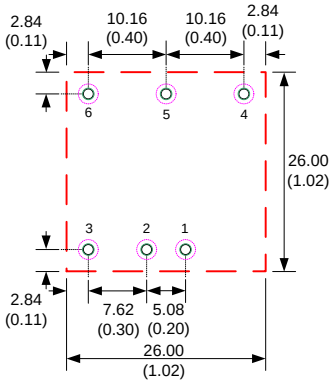
HEAT-SINK TYPE OPTIONS



All dimensions are typical in millimeters (inches).
Converters will be supplied with heat-sinks already mounted. Please contact factory for quotation.

Order code: VNW-XXXXX40SK (contain: heat-sink, thermal pad)
Material: Aluminum
Finish: Anodic treatment (black)
Weight: 3.7 g (0.13 oz) (without converter)

RECOMMENDED FOOTPRINT DETAILS



All dimensions are typical in millimeters (inches).
Through hole (black) 1~6: Ø1.3 (0.051).
Top view pad (green) 1~6: Ø1.5 (0.059).
Bottom view pad (pink) 1~6: Ø2.6 (0.098).