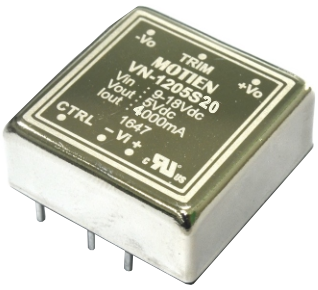
VN -20W Series

MOTIEN TECHNOLOGY

20W 2:1 Regulated Single & Dual output

Features

- Ultra Wide 2:1 Input Range
- 1600 VDC Isolation
- No Minimum Load Required
- Efficiency up to 90%
- Extended Operating Temperature Range -40 ~ 75°C max.
- Adjustable Output Voltage
- Remote On/Off Control (CTRL)
- Continuous Short Circuit Protection
- Over Current Protection
- Over Voltage Protection
- Soft Start



The VN series is a family of cost effective 20W single & dual output DC-DC converters. These converters combine nickle-coated copper package in a 1"x1" case with high performance features , continuous short circuit protection with automatic restart and tight line / load regulation. Devices are encapsulated using flame retardant resin. Input voltages of 12 and 24 and 48 with output voltage of 3.3, 5, 12, 15, ±12, ±15Vdc. High performance features include high efficiency operation up to 90% and output voltage accuracy of ±1% maximum.

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

OUTPUT SPECIFICATIONS

Output Voltage Accuracy		±1%, max.
Output Voltage Adjustability(Trim)		Single output: ±10%, max.
Maximum Output Current		See table, max.
Line Regulation		±0.5%, max.
Load Regulation(Io=0% to 100%)		Single: ±0.5%, max. Dual:±1%, max(balanced load)
Cross Regulation (Dual Output) (1)		±5%
Ripple&Noise(20MHz bandwidth) (2)		3.3 & 5.0V models:75mVp-p, max. Other models:100mVp-p, max.
Over Voltage Protection (Zener diode clamp)	3.3V output	3.9V
	5V output	6.2V
	12V output	15V
	15V output	18V
	±12V output	±15V
	±15V output	±18V
Over Current Protection		140% of FL, typ.
Short Circuit Protection		Indefinite(hiccup) (Automatic Recovery)
Temperature Coefficient		±0.02%/°C
Capacitive Load (3)		See table, max.
Transient Recovery Time (4)		250µs, typ.
Transient Response Deviation(4)		±3%, max.

INPUT SPECIFICATIONS

Input Voltage Range		See table
Under Voltage Lockout		
12V Modes	Module ON / OFF	8.6Vdc / 7.9Vdc, typ.
24V Modes	Module ON / OFF	17.8Vdc / 15.5Vdc, typ.
48V Modes	Module ON / OFF	33.5Vdc / 30.5Vdc, typ.
Start up Time (Nominal Vin and constant resistive load)		30mS, typ.
Input Filter		Pi Type
Input Current(No-Load)		See table, max.
Input Current(Full-Load)		See table, typ.
Input Reflected Ripple Current(5)		30mAp-p, typ.
Remote On/Off (Positive logic)(6)		
ON:		3.0 ... 12Vdc or open circuit
OFF:		0 ... 1.2Vdc or Short circuit pin2 and pin 3
OFF idle current:		5 mA, typ.

ENVIRONMENTAL SPECIFICATIONS

Operating Ambient Temperature	-40°C ~ +75°C(See Derating Curve) -40°C ~ +55°C(For 100% load)
Maximum Case Temperature	105°C
Storage Temperature	-55°C ~ +125°C
Cooling(7)	Nature Convection

GENERAL SPECIFICATIONS

Efficiency	See table, typ.
I/O Isolation Voltage(60sec)	
Input/Output	1600Vdc
Case/Input & Output	1600Vdc
Isolation Resistance	1000 MΩ, min.
Isolation Capacitance	1500 pF, typ.
Switching frequency	330kHz, typ.
Humidity	95% rel H
Reliability Calculated MTBF(MIL-HDBK-217 F)	>560 khrs
Safety Standard	UL/cUL 60950-1 , 62368-1 IEC/EN 60950-1 , 62368-1
Safety Approvals	UL/cUL 60950-1 , 62368-1 IEC/EN 60950-1 , 62368-1

PHYSICAL SPECIFICATIONS

Case Material	Nickel-coated Copper
Base Material	Non-conductive Black Plastic(UL94V-0 rated)
Pin Material	Φ1.0mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	19.0g
Dimensions	1.00"x1.00"x0.40"

ABSOLUTE SPECIFICATIONS (8)

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

Input Surge Voltage(100mS)	
12 Models	25 Vdc,max.
24 Models	50 Vdc,max.
48 Models	100 Vdc,max.
Soldering Temperature (1.5mm from case 10sec max.)	260°C max.

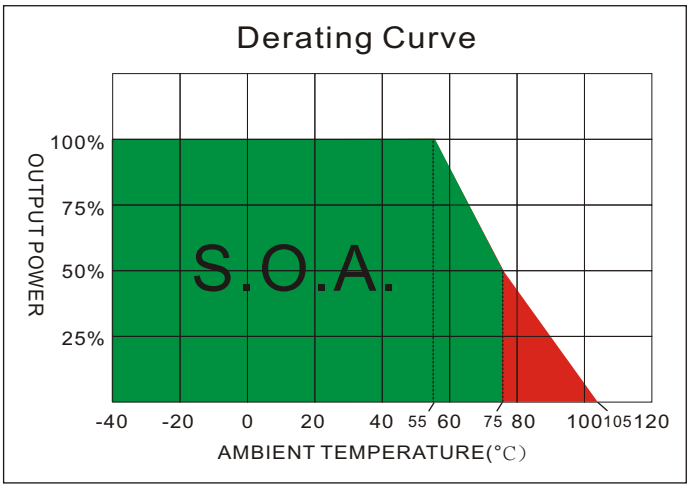
EMC SPECIFICATIONS

Radiated Emissions	EN55032	CLASS A
Conducted Emissions (9)	EN55032	CLASS A
ESD	IEC 61000-4-2	Perf. Criteria A
RS	IEC 61000-4-3	Perf. Criteria A
EFT (10)	IEC 61000-4-4	Perf. Criteria A
Surge (10)	IEC 61000-4-5	Perf. Criteria A
CS	IEC 61000-4-6	Perf. Criteria A
PFMF	IEC 61000-4-8	Perf. Criteria A

PART NUMBER STRUCTURE

VN - 24 12 S 20

- **VN** — Series Name
- **24** — **Input Voltage Range**
  - **12** - 9 ~ 18V
  - **24** - 18 ~ 36V
  - **48** - 36 ~ 75V
- **12** — **Nominal Output Voltage**
  - **3R3** - 3.3V
  - **05** - 5V
  - **12** - 12V
  - **15** - 15V
- **S** — **Output Type**
  - **S** - Single output
  - **D** - Dual Output
- **20** — Watt



MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current No-Load (mA, max.)	INPUT Current Full Load (mA, typ.)	OUTPUT Voltage (Vdc)	OUTPUT Current Min. load (mA)	OUTPUT Current Full load (mA)	EFFICIENCY @FL (%, typ.)	Capacitor Load @FL (μF, max.)
VN-123R3S20	9-18	60	1439	3.3	0	4500	86	7000
VN-1205S20	9-18	60	1852	5	0	4000	90	5000
VN-1212S20	9-18	30	1873	12	0	1670	89	850
VN-1215S20	9-18	30	1873	15	0	1330	89	700
VN-243R3S20	18-36	34	720	3.3	0	4500	86	7000
VN-2405S20	18-36	35	936	5	0	4000	89	5000
VN-2412S20	18-36	25	936	12	0	1670	89	850
VN-2415S20	18-36	25	936	15	0	1330	89	700
VN-483R3S20	36-75	25	360	3.3	0	4500	86	7000
VN-4805S20	36-75	25	468	5	0	4000	89	5000
VN-4812S20	36-75	15	468	12	0	1670	89	850
VN-4815S20	36-75	15	463	15	0	1330	85	700
VN-1212D20	9-18	30	1873	±12	0	±833	89	±470
VN-1215D20	9-18	30	1873	±15	0	±667	89	±330
VN-2412D20	18-36	30	936	±12	0	±833	89	±470
VN-2415D20	18-36	30	936	±15	0	±667	89	±330
VN-4812D20	36-75	20	468	±12	0	±833	89	±470
VN-4815D20	36-75	20	468	±15	0	±667	89	±330

NOTE

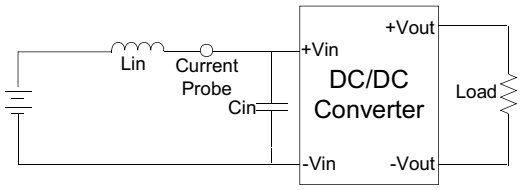
1. One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
2. Measured with a 1.0μF ceramic capacitor and 10μF tantalum capacitor.
3. Tested by minimal Vin and constant resistive load.
4. Tested by normal Vin and 25% load step change (75%-50%-25% of Io).
5. Measured Input reflected ripple current with a simulated source inductance of 12μHand a source capacitor Cin(47μF, ESR<1.0Ω at 100KHz).
6. The remote on/off control pin is referenced to -Vin(pin2).
7. "Nature Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).
8. Exceeding the absolute ratings of the unit could cause damage.
   It is not allowed for continuous operating.
9. Input filter meets EN 55022 Class A without external components.
10. An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.
    The filter capacitor Motien suggest: Nippon chemi-con KY series, 220μF/100V.

The models listed above is just for standard type. If you need the special specification product, please contact our service member by telephone presented in shortform cover or e-mail to : sales@motien.com.tw

TEST CONFIGURATIONS

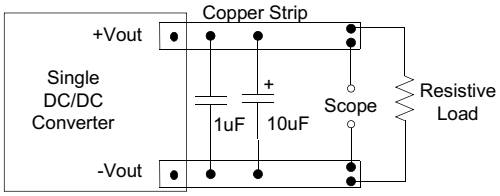
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor Lin(12μH) and a source capacitor Cin(47μF, ESR<1.0Ω at 100KHz) at nominal input and full load.



Output Ripple & Noise Measurement Test

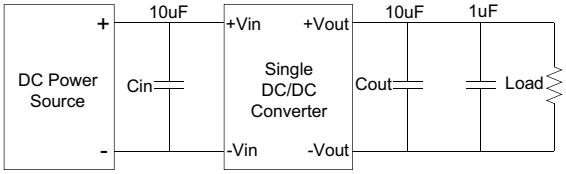
Measured with a 1.0μF MLCC capacitor and a 10μF tantalum capacitor .
The Scope measurement bandwidth is 0-20MHz.



DESIGN & FEATURE CONFIGURATIONS

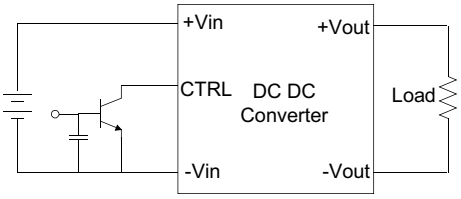
Output Ripple & Noise Reduction

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



CTRL Module ON / OFF

Positive logic turns on the module during high logic and off during low logic.
Ctrl module on/off can be controlled by an external switch between the ctrl terminal and -Vin terminal.
The switch can be an open collector or open drain
For positive logic if the ctrl feature is not used, please leave the ctrl pin floating.

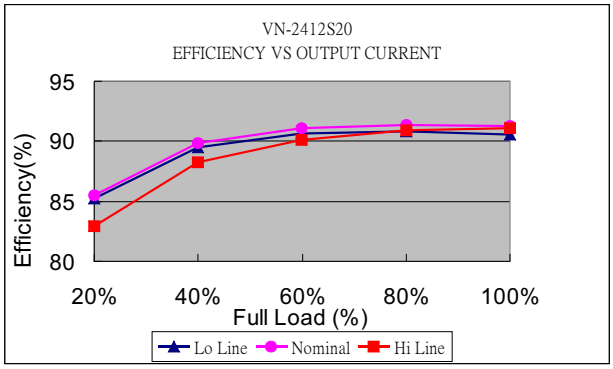


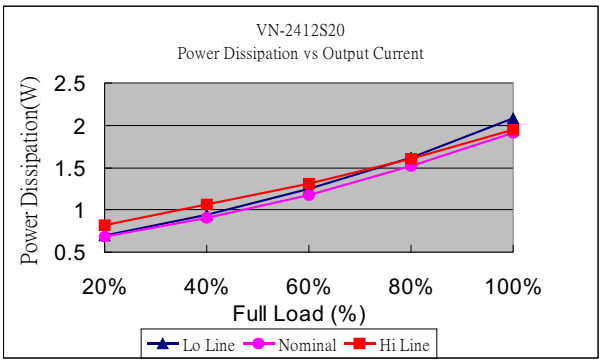
Over Voltage Protection

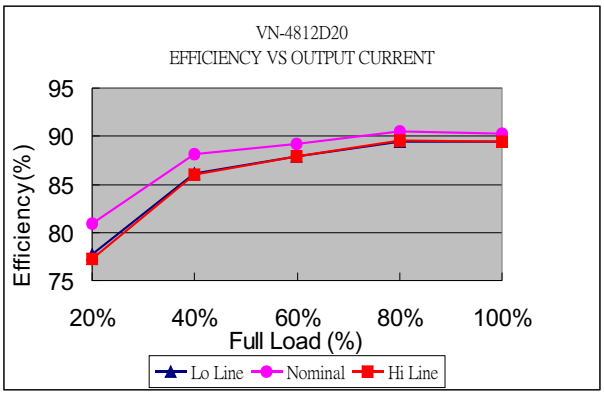
The module includes an internal output over voltage protection circuit, which monitors the voltage on the output terminals. If this voltage exceeds the over voltage set point, the module will activate the control loop of internal circuit to clamp the output voltage.

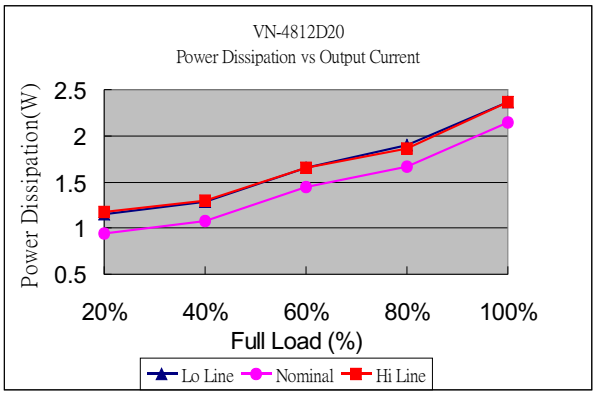
Over Current Protection

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.

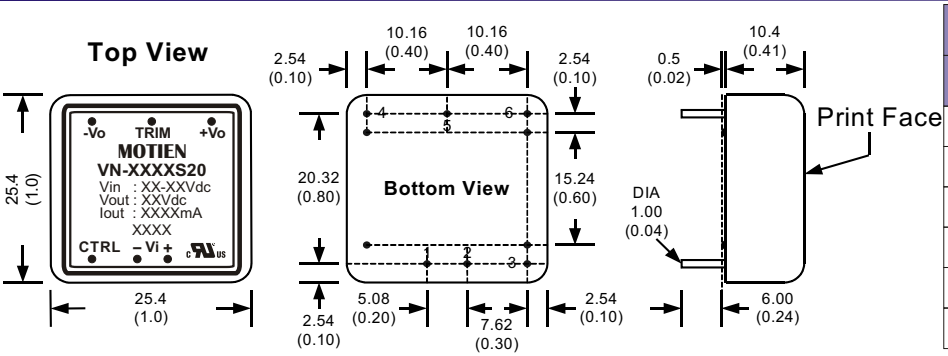








MECHANICAL SPECIFICATIONS



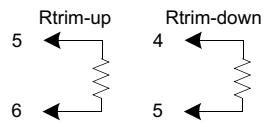
PIN CONNECTIONS		
PIN NUMBER	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL	CTRL
4	+Vout	+Vout
5	Trim	Com
6	-Vout	-Vout

All dimensions are typical in millimeters (inches).

1. Pin diameter: 1.0 ±0.05 (0.04 ±0.002)
2. Pin pitch and length tolerance: ±0.35 (±0.014)
3. Case Tolerance: ±0.5 (±0.02)
4. Stand-off tolerance: ±0.1 (±0.004)

EXTERNAL OUTPUT TRIMMING

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



MOTIEN ISO 9001 . ISO 14001 . IECQ QC080000
No. 9, Keji 2nd Rd., Technology Industrial Park, Tainan City 70955, Taiwan
Tel : 886-6-384 2366 (Rep.) Fax: 886-6-384 2399
Website : www.motien.com.tw Email : sales@motien.com.tw

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