

VN -20W Series

20W 2:1 Regulated Single & Dual output



electronic powersolutions

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
- Built-in EMI filter meets EN55032 classA without external components



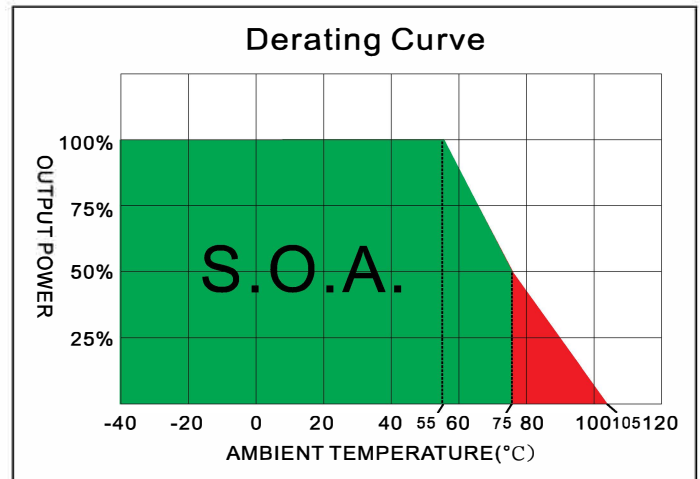
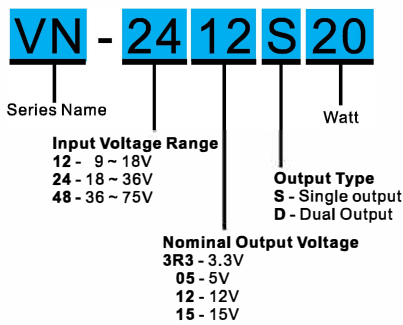
The VN series is a family of cost effective 20W single & dual output DC-DC converters. These converters combine nickel-coated copper package in a 1"x1" case with high performance features, continuous short circuit protection with automatic restart and tight line / load regulation. Devices are encapsulated 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		GENERAL SPECIFICATIONS	
Output Voltage Accuracy	±1%, max.	Efficiency	See table, typ.
Output Voltage Adjustability(Trim)	Single output: ±10%, max.	I/O Isolation Voltage(60sec)	
Maximum Output Current	See table, max.	Input/Output	1600Vdc
Line Regulation	±0.5%, max.	Case/Input & Output	1600Vdc
Load Regulation(Io=0% to 100%)	Single: ±0.5%, max. Dual:±1%, max(balanced load)	Isolation Resistance	1000 MΩ, min.
Cross Regulation (Dual Output) (1)	±5%	Isolation Capacitance	1500 pF, typ.
Ripple&Noise(20MHz bandwidth) (2)	3.3 & 5.0V models:75mVp-p, max. Other models:100mVp-p, max.	Switching frequency	330kHz, typ.
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	Humidity	95% rel H
Over Current Protection	140% of FL, typ.	Reliability Calculated MTBF(MIL-HDBK-217 F)	>560 khrs
Short Circuit Protection	Indefinite(hiccup) (Automatic Recovery)	Safety Standard	UL/cUL 60950-1, 62368-1 IEC/EN 60950-1, 62368-1
Temperature Coefficient	±0.02%/°C	Safety Approvals	UL/cUL 60950-1, 62368-1 IEC/EN 60950-1, 62368-1
Capacitive Load (3)	See table, max.	PHYSICAL SPECIFICATIONS	
Transient Recovery Time (4)	250µs, typ.	Case Material	Nickel-coated Copper
Transient Response Deviation(4)	±3%, max.	Base Material	Non-conductive Black Plastic(UL94V-0 rated)
INPUT SPECIFICATIONS		Pin Material	Φ1.0mm Brass Solder-coated
Input Voltage Range	See table	Potting Material	Epoxy (UL94V-0 rated)
Under Voltage Lockout		Weight	19.0g
12V Modes Module ON / OFF	8.6Vdc / 7.9Vdc, typ.	Dimensions	1.00"x1.00"x0.41"
24V Modes Module ON / OFF	17.8Vdc / 15.5Vdc, typ.	ABSOLUTE SPECIFICATIONS (8)	
48V Modes Module ON / OFF	33.5Vdc / 30.5Vdc, typ.	These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Start up Time (Nominal Vin and constant resistive load)	30mS, typ.	Input Surge Voltage(100mS)	
Input Filter	Pi Type	12 Models	25 Vdc,max.
Input Current(No-Load)	See table, max.	24 Models	50 Vdc,max.
Input Current(Full-Load)	See table, typ.	48 Models	100 Vdc,max.
Input Reflected Ripple Current(5)	30mA _{p-p} , typ.	Soldering Temperature	260°C max.
Remote On/Off (Positive logic)(6)		(1.5mm from case 10sec max.)	
ON:	3.0 ... 12Vdc or open circuit	EMC SPECIFICATIONS	
OFF:	0 ... 1.2Vdc or Short circuit pin2 and pin 3	Radiated Emissions	EN55032 CLASS A
OFF idle current:	5 mA, typ.	Conducted Emissions (9)	EN55032 CLASS A
ENVIRONMENTAL SPECIFICATIONS		ESD	IEC 61000-4-2 Perf. Criteria A
Operating Ambient Temperature	-40°C ~ +75°C(See Derating Curve) -40°C ~ +55°C(For 100% load)	RS	IEC 61000-4-3 Perf. Criteria A
Maximum Case Temperature	105°C	EFT (10)	IEC 61000-4-4 Perf. Criteria A
Storage Temperature	-55°C ~ +125°C	Surge (10)	IEC 61000-4-5 Perf. Criteria A
Cooling(7)	Nature Convection	CS	IEC 61000-4-6 Perf. Criteria A
		PFMF	IEC 61000-4-8 Perf. Criteria A

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PART NUMBER STRUCTURE



MODEL SELECTION GUIDE

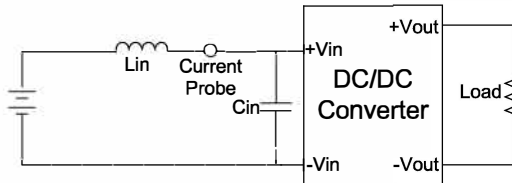
MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current		EFFICIENCY @FL (% , typ.)	Capacitor Load @FL (µF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. load (mA)	Full load (mA)		
VN-123R3S20	9-18	60	1439	3.3	0	4500	86	7000
VN-1205S20	9-18	60	1852	5	0	4000	90	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

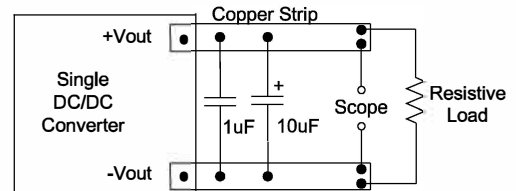
- One load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within ±5%.
- Measured with a 1.0µF MLCC capacitor and 10µF electrolytic capacitor.
- Tested by minimal Vin and constant resistive load.
- Tested by normal Vin and 25% load step change (75%-50%-25% of Io).
- Measured Input reflected ripple current with a simulated source inductance of 12µH and a source capacitor Cin(47µF, ESR<1.0Ω at 100KHz).
- The remote on/off control pin is referenced to -Vin(pin2).
- "Nature Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).
- Exceeding the absolute ratings of the unit could cause damage.
It is not allowed for continuous operating.
- Input filter meets EN 55032 Class A without external components.
- An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5. The filter capacitor suggest: Nippon chemi-con KY series, 220µF/100V.

TEST CONFIGURATIONS
Input Reflected Ripple Current Test Step

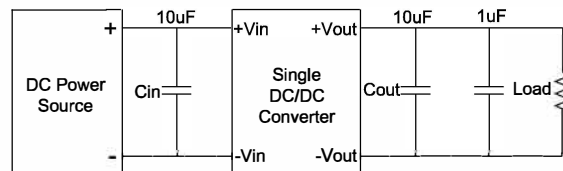
Input reflected ripple current is measured through a source inductor L_{in} ($12\mu H$) and a source capacitor C_{in} ($47\mu F$, $ESR < 1.0\Omega$ at $100KHz$) at nominal input and full load.


Output Ripple & Noise Measurement Test

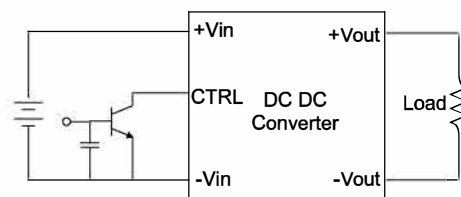
Measured with a $1.0\mu F$ MLCC capacitor and a $10\mu F$ electrolytic capacitor. The Scope measurement bandwidth is $0-20MHz$.


DESIGN & FEATURE CONFIGURATIONS
Output Ripple & Noise Reduction

To reduce ripple and noise, it is recommended to use a $1.0\mu F$ MLCC capacitor and a $10\mu F$ 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 $-V_{in}$ 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.

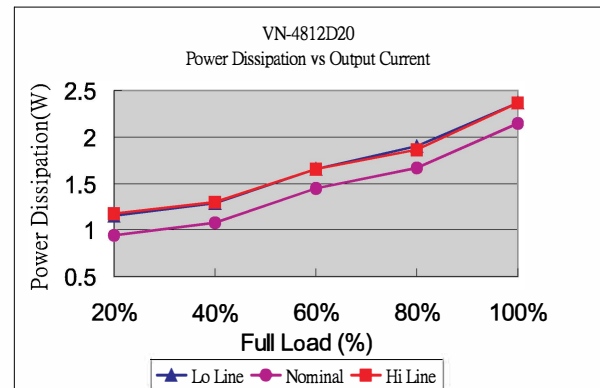
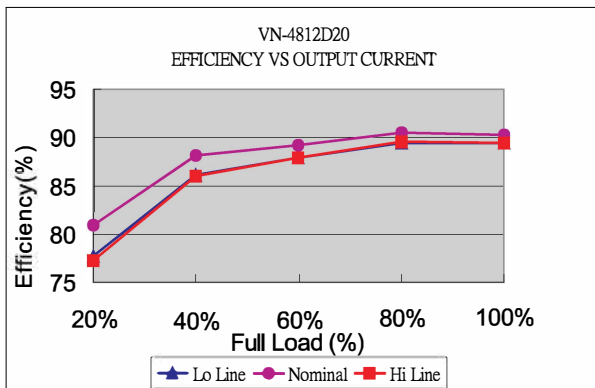
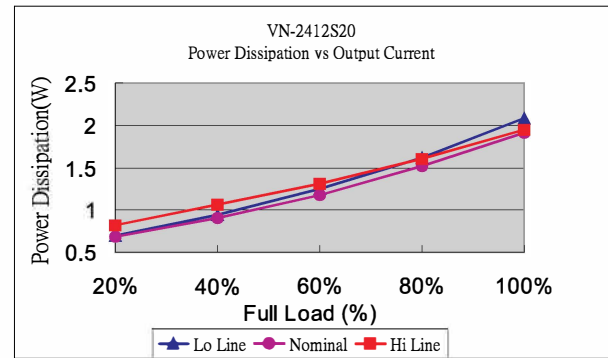
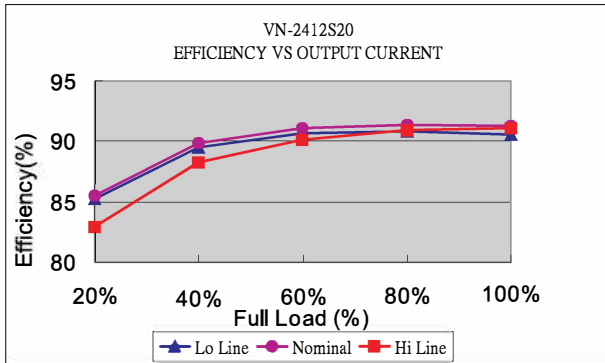
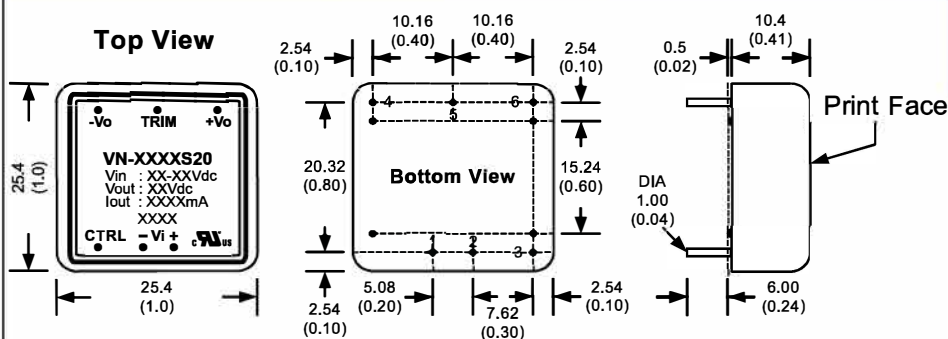

Over Voltage Protection

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.

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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)