

FEATURES

- 4 :1 wide input range: 9-36VDC
- Triple output: 5 & ±15Volts DC
- Operation temperature range:
-40°C to +100°C
- 20W isolated output
- Efficiency up to 87%
- Fixed switching frequency
- 5 sides sheilding, good EMI performance
- 1.5kVDC I/O isolation
- Standard 2"×1"×0.4" footprint
- Extensive self-protection, UVLO, OTP, OVP, OCP and short protection
- Outstanding thermal dissipation
- Fully encapsulated, high reliability
- MTBF ≥ 1 MHrs
- RoHS compliant



PRODUCT OVERVIEW

The DNC20W24 series are highly reliable, and efficient isolated DC/DC converter. Wide input range of 9-36V(24V nominal) is ideal for automation, power grid, railway, semiconductor equipment, instrumentation, test and measurement, and distribution power system.

A wealth of self-protection features included input under-voltage lockout, overcurrent protection with "hiccup" autorestart technique, provides short-circuit protection, along with output OVP. The module delivers full power at 100°C case temperature.

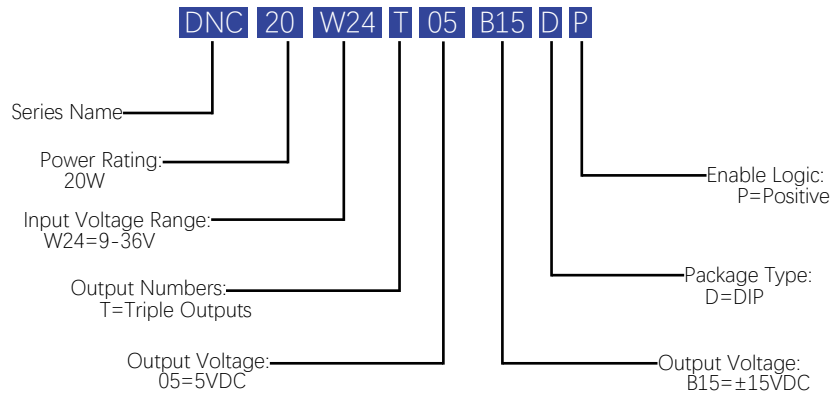
Advanced fully encapsulated package technology provides outstanding thermal performance, which is ideal for ruggedized applications involving harsh environments.

The DNC20W24 series are designed to safety standards UL/IEC/CSA 60950, 2nd edition.

Models Selections

Basic Models	Input Voltage [VDC]	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [A]	Efficiency Typ. [%]	Capacitive Load Max. [µF]	Package [inch]
DNC20W24T05B15DP	24	9-36	5	3	87	680	2"×1"×0.4"
			±15V	0.25		±470	

Model Numbering



Absolute Maximum Ratings						
Parameters	Conditions	Min.	Typ.	Max.	Units	
Input Voltage Continuous		-0.5		36	VDC	
Input Voltage Transient	< 100ms			50	VDC	
Operating Case Temperature		-40		100	°C	
Operating Environment Temperature		-40		85	°C	
Storage Temperature Range		-45		125	°C	
Soldering Temperature	Wave soldering < 10s			260	°C	
Cooling	Free air convection					
Safety and EMC Compliance						
Conducted Emission	EN55032	Class B (With external filter)				
Radiated Emission	EN55032	Class B (With external filter)				
Conducted Susceptibility	IEC6100-4-6	10Vrms Criteria A				
Radiated Susceptibility	IEC6100-4-3	10V/m Criteria A				
EFT	IEC6100-4-4	±2KV Criteria A (With external filter)				
Surge	IEC6100-4-5	±2KV Criteria A (With external filter)				
ESD	IEC6100-4-2	Contact: ±4KV Air: ±4KV Criteria A				
Isolation Safety Rating	Basic insulation					
Input Specifications						
Parameters	Conditions	Min.	Typ.	Max.	Units	
Operating Voltage Range		9	24	36	VDC	
Start-up Threshold		8.0	8.5	9.0	VDC	
Under Voltage Shutdown		7.5	8.0	8.5	VDC	
Recommended Input Fuse			8.0		A	

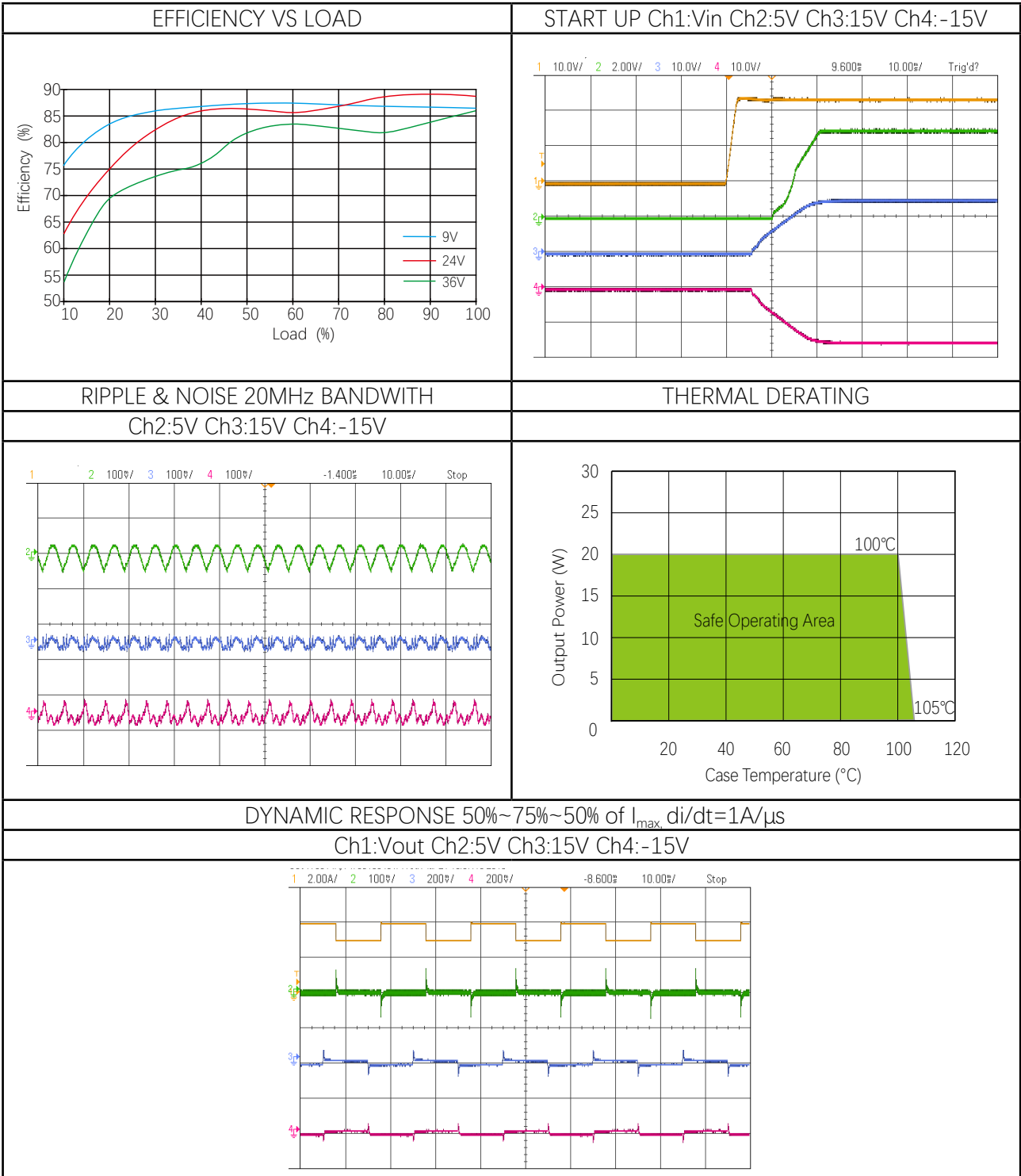
General Specifications					
Parameters	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage (Test for 1 minute)	Input to output	1500			VDC
	Input to case	1500			VDC
	Output to case	500			VDC
Isolation Resistance (Viso=500VDC)	Input to output		100		MΩ
Isolation Capacitance	Input to output		1000		pF
Switching Frequency			220		KHz
Start-up Delay	From undervoltage shutdown recovery to 10% Vout		30	50	mS
Rise Time	From 10% Vout to 90% Vout capacitive load		10	50	mS
Vibration	IEC 60068-2-64, Environmental testing - Part 2				
Shock (Operational)	IEC 60068-2-27, Environmental Testing- Part 2.27				

All specifications are tested at 25 °C ambient temperature, nominal input voltage, rated output current conditions unless otherwise specified.

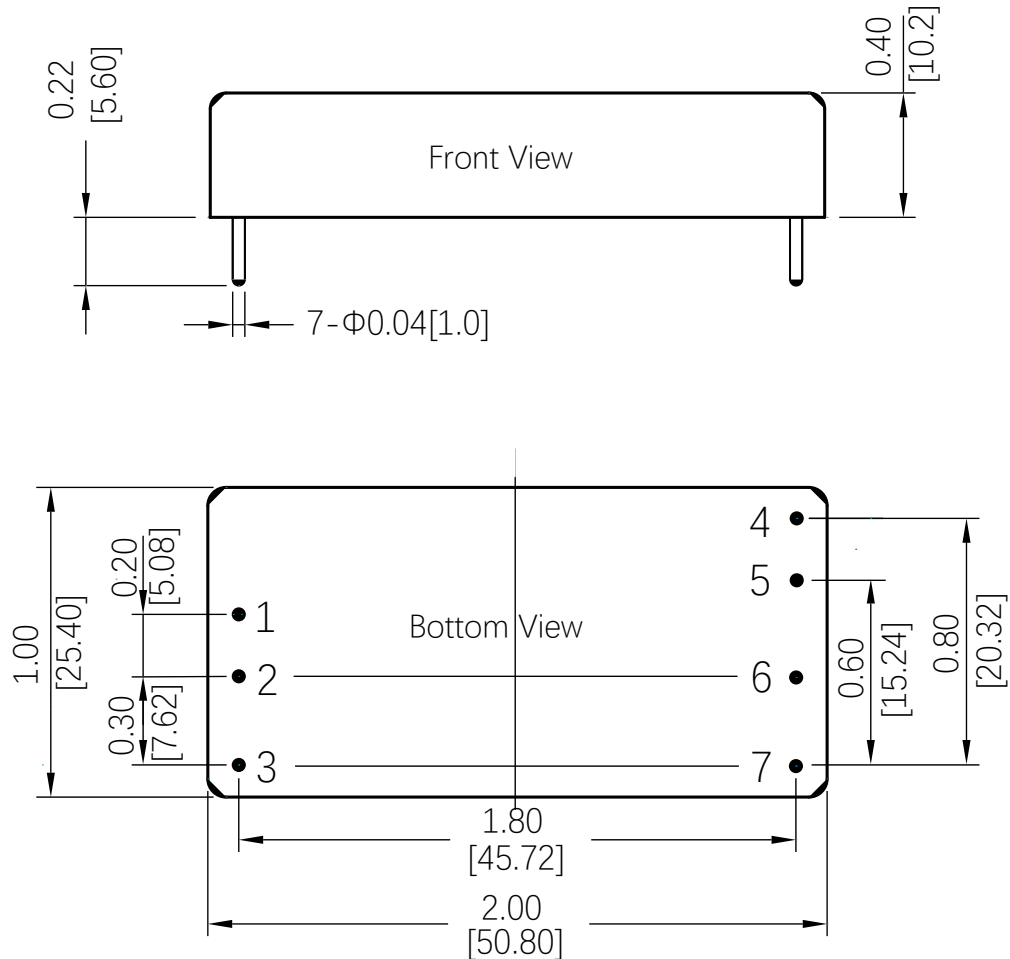
Performance Data (5 & ±15V Vout Model)

Input Specifications					
Parameters	Conditions	Min.	Typ.	Max.	Units
Reflected Input Ripple Current	With 4.7μH inductor and 100μF capacitor		200	600	mA pk-pk
Input Current @ No Load			80	140	mA
Input Current @ Min. Line				5	A
Power Loss @ No Load			1.5	2	W
Recommended External Input Capacitance	1μF CBB and 100μF E-cap used in combination	220			μF
Output Specifications					
Parameters	Conditions	Min.	Typ.	Max.	Units
Output Voltage Setpoint	5V Vout, nom.line, 50% load	4.90	5.00	5.10	VDC
	±15V Vout, both 50% load	±14.78	±15.00	±15.22	
Vout Accuracy	5V Vout	-2		+2	%
	±15V Vout	-1.5		+1.5	
Line Regulation	Vin from min. line to max. line, 50% load	-1.0		+1.0	%
Load Regulation	From min. load to full load, Vin=nom.line	-2.0		+2.0	%
Cross Regulation	One output load from 10% to 100%, the others load @50%	-5.0		+5.0	%
Temperature Coefficient	From -40°C to 85°C	-0.02		+0.02	% of Vout /°C
Over Current Protection	5V Vout, hiccup, auto-recover	140		270	%
	±15V Vout, hiccup, auto-recover	200		500	
Over Voltage Protection	Hiccup, auto-recover	115		140	%
Output Short Protection	Hiccup, auto-recover				
Ripple & Noise Max. ^①	5V Vout		75	150	mV Pk-Pk
	±15V Vout		150	300	
Dynamic Load Peak Deviation ^②		-5		+5	%Vout
Dynamic Load Response	Within 10% band of Vout deviation			500	μS
Minimum Load	No minimum load required				
Notes					
① Ripple & noise is tested with certain filter parameters, please see output ripple & noise in technical notes on page 7 for more details.					
② Load is set from 50%-75%-50% of full load, di/dt=1A/μS.					

Performance Data(5 & ±15V Vout Model)



Mechanical Specifications



PIN:

PIN1~PIN7: $\Phi 0.04 \pm 0.004$ (1.02 \pm 0.10)

Material: Copper alloy

Finish: Gold 3 ~ 5 μ m(min.) over nickel 50 μ m(Min.)

Tolerance:

X.XX = ± 0.02 (0.5)

X.XXX = ± 0.010 (0.25)

Dimensions are in inches [mm]

Weight: ~35g.

PIN CONNECTIONS	
Pin	Function
1	+Vi
2	-Vi
3	RC
4	+15V
5	-15V
6	GND
7	+5V

Technical Notes

INPUT FUSING

Certain applications may require fuse at the inputs of power conversion components. Fuses should also be used when there is possibility of sustained input voltage reversal which is not current limited. The DNC20W24 modules are not internally fused. We strongly recommend a slow-blown fuse to be used in the ungrounded input supply line. For safety agency approvals, the installer must install the converter in compliance with the end user safety standard.

TYPICAL APPLICATION CONNECTION

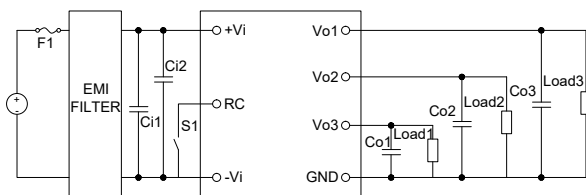


Figure 1: Typical Application Connection

In order to prevent the input line from causing the input oscillation, it is recommended to add the input capacitor close to the input of the module. Similarly, the output capacitor is added to the output of the module. Specific recommended parameters: input capacitance $C_{i1}=47\sim 100\mu\text{F}$ electrolytic capacitor. For output Capacitance, recommended value is $100\mu\text{F}/\text{A}$ (The current here refers to the output current).

REFLECTED RIPPLE CURRENT

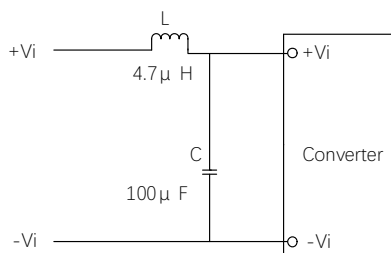


Figure 2: Reflected Ripple Current

Add LC filter at the front of the power module to reduce the interference of reflected ripple current

on the DC bus, recommended value of L and C with appropriate current and voltage rating as below: $L=4.7\mu\text{H}$; $C=100\mu\text{F}$.

REMOTE CONTROL FUNCTION

Module Power Remote Control or called ON/OFF pin is for the user to enable or disable the output. Control use high and low level control, there are two general control logic, positive logic or negative logic control. Recommend to use optocoupler to control ON/OFF Pin as below.

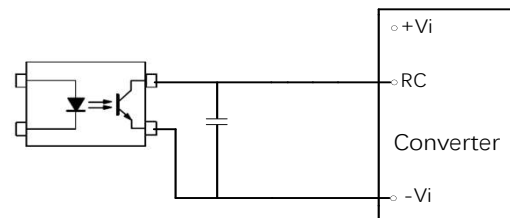


Figure 3: Remote Control

Remote Control Pin can be connected in parallel for multiple converters which with the same Remote Control characters. However, when several converters share the same remote control circuits, the total sink and source current must be taken into consideration, and make sure that the optocoupler has enough drive capability.

To reduce external PCB trace interference, it is recommended to add high frequency bypass capacitor between RC pin and -Vi, recommended capacitor value is 100-1000pF.

OUTPUT RIPPLE & NOISE

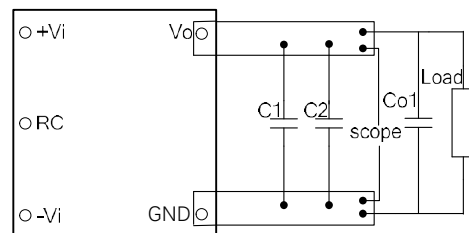


Figure 4: Output Ripple & Noise

These DNC20W24 modules' output ripple and

Technical Notes

noise is measured at the rated input voltage and output current, along with 10uF tantalum capacitor and 0.1uF MLCC used in parallel with appropriate voltage ratings and placed as C1,C2 shown in the figure above. The scope's bandwidth is set to 20MHz.

External output capacitors are required to reduce the ripple & noise. The output capacitors should be low ESR and appropriate frequency response with appropriate voltage ratings, and must be located as close to the converters as possible, also PCB layout must be taken into consideration.

INPUT UNDERVOLTAGE SHUTDOWN AND START-UP THRESHOLD

Once operating, module will not turn off until the input voltage drops below the Undervoltage Shutdown threshold. Subsequent re-start will not occur until the input is brought back up to the Start-Up Threshold. This built in hysteresis prevents any unstable on/off situations from occurring at a single input voltage.

CURRENT LIMITING

The maximum current limit remains constant as the output voltage drops. However, once the impedance of the short across the output is small enough to make the output voltage drop below the specified Output Current Limit Shutdown Voltage, the converter turns off.

The converter then enters into "hiccup mode" where it repeatedly turns on and off until the short circuit condition is removed. This prevents excessive heating of the converter or the load board.

SHORT CIRCUIT CONDITION

When the converter is in current-limit mode, the output voltage will drop as the output current demand increases and then the converter will be shut down. If the short-circuit condition persists, another shutdown cycle will be initiated. This on/off cycling is referred to as "hiccup" mode. The hiccup cycling reduces the average output current, thereby preventing internal temperatures from rising to excessive levels. The module is capable of enduring an indefinite short circuit output condition.

OUTPUT OVERVOLTAGE PROTECTION

DNC20W24 output voltages are monitored for an overvoltage condition via magnetic feedback. The signal is coupled to the primary side and if the output voltage rises to a level which could be damaging to the load, the sensing circuitry will power down the PWM controller causing the output voltages to decrease. Following a time-out period the PWM will restart, causing the output voltages to ramp to their appropriate values. If the fault condition persists, and the output voltages again climb to excessive levels, the overvoltage circuitry will initiate another shutdown cycle.

THERMAL SHUTDOWN

These DNC20W24 converters are equipped with thermal-shutdown circuitry. If environmental conditions cause the internal temperature of the DC-DC converter to rise above the designed operating temperature, a precision temperature sensor will power down the unit. When the internal temperature decreases below the threshold of the temperature sensor, the unit will auto restart.



This product is subject to the following operating requirements and the Life and Safety Critical Application Sales Policy:

Refer to: <http://www.densitypower.com>

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