Typical Features

- Fixed input voltage, isolated & unregulated, output power 1W
- Efficiency up to 86% (Typ.)
- Small SMD package, international standard Pin-out
- Isolation Voltage: 1500 VDC
- Continuous short-circuit protection, Self-recovery
- Operating Temperature Range: -40°C to +105°C
- Plastic case, UL 94V-0 rated

UL62368-1

EN62368-1

IEC62368-1

ROHS

Applications

NN1-XXDXXANT series is widely used in instrumentation, communications, pure digital circuits, general low-frequency analog circuits, relay drives, and data switching circuits.

Selection Guide

Certifications	Model	Input Voltage Range		Output Voltage/Current (Vo/Io)		Input Current @Nominal Input Typ		Max.Capacitive Load	Efficiency @ Full Load (Typ)	
		Nominal Value (VDC)	Range Value (VDC)	Voltage (VDC)	Current (mA)	Full Load (mA)	No-load (mA)	μF	Min (%)	Typ (%)
CE	NN1-3V3D3V3ANT	3.3	2.97 - 3.63	±3.3	±152/±15	375	8	1200	74	77
CE	NN1-3V3D05ANT			±5	±100/±10	365	8	1200	78	82
CE	NN1-05D3V3ANT	5	4.5 - 5.5	±3.3	±15 2/±15	250	8	1,200	74	78
CE	NN1-05D05ANT			±5	±100/±10	230	8	1200	81	84
CE	NN1-05D09ANT			±9	±55/±6	228	10	1200	81	84
CE, RoHS	NN1-05D12ANT			±12	±42/±4	226	14	470	81	84
CE	NN1-05D15ANT			±15	±33/±3	230	16	330	80	83
CE	NN1-05D24ANT			±24	±21/±2	245	20	330	80	83
CE	NN1-12D05ANT	12	10.8 - 13.2	±5	±100/±10	98	8	1200	81	84
CE	NN1-12D09ANT			±9	±56/±6	96	8	1000	81	84
CE, RoHS	NN1-12D12ANT			±12	±42/±4	96	8	470	82	85
CE	NN1-12D15ANT			±15	±33/±3	92	9	470	83	86
CE	NN1-24D05ANT	24	21.6 - 26.4	±5	±100/±10	48	8	1200	81	84
CE	NN1-24D09ANT			±9	±56/±6	46	8	1000	81	84
CE	NN1-24D12ANT			±12	±42/±4	46	8	470	82	85
CE	NN1-24D15ANT			±15	±33/±3	46	8	470	83	86

Note 1: Max. Capacitive Load: The maximum output capacitance allowed for a successful start-up at full load. Exceeding this value may result in start-up failure.

Note 2: Efficiency: Measured at nominal input voltage and rated output load.

Note 3: Models marked with "*" are currently under development. Due to space limitations, only representative models are listed. Please contact our sales department for additional options.

Input Specifications

Item	Operating Condition	Min.	Typ.	Max.	Unit
Input Surge Voltage (1sec. max.)	3.3Vdc Input	-0.7	--	7	VDC
	5Vdc Input	-0.7	--	9	
	12Vdc Input	-0.7	--	18	
	15Vdc Input	-0.7	--	21	
	24Vdc Input	-0.7	--	30	
Input filter type	Capacitor Filter				
Hot plug	N/A				

Output Specifications

Test Item	Operating Conditions		Minimum	Typical	Max	Unit
Output Power			0.1	-	1	W
Output Voltage Accuracy	See error envelope curve (Figure 1)					
Load regulation	10% to 100% load	3.3 Vdc output	-	15	20	%
		Other outputs		10	15	%
Linear voltage regulation	Input voltage variation ±1%	3.3 Vdc output	-	--	1.5	-
		Other outputs		--	1.2	-
Temperature Coefficient			-	-	±0.03	%/°C
Ripple and Noise	0%–100% load, 20 MHz bandwidth		-	100	150	mVp-p
Output Short-circuit Protection (SCP)	Continuous short-circuit protection, Self-recovery					
Note: Ripple & noise testing uses the twisted-pair method; see the Ripple & Noise Test Instructions for details.						

General Specification

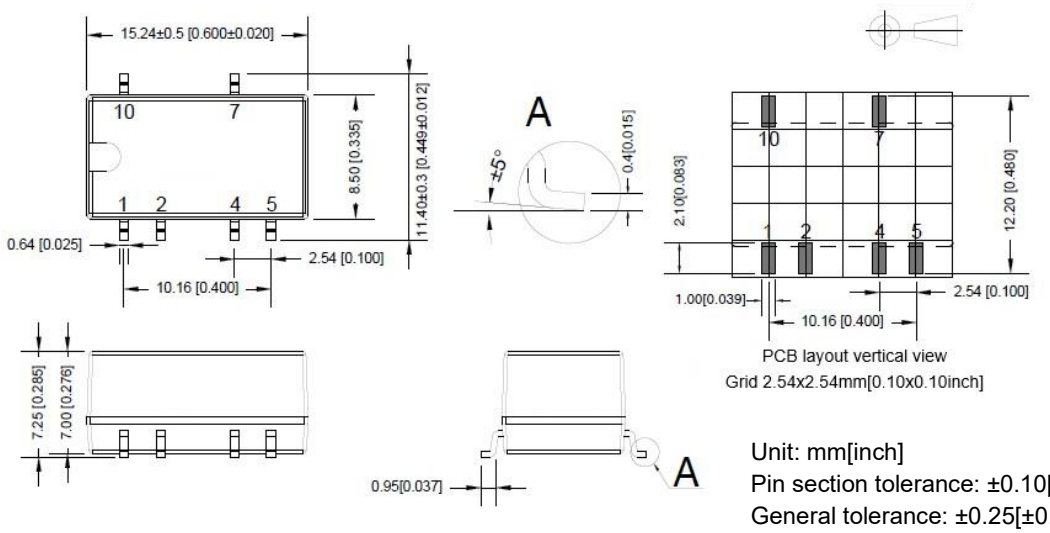
Test Item	Operating Conditions	Minimum	Typical	Max	Unit
Switching Frequency	Nominal Input Voltage at Full Load	-	260	-	kHz
Operating temperature	Refer to the temperature derating curve (Figure 2)	-40	-	+105	°C
Storage temperature	/	-55	-	+125	
Case Temperature Rise	Within the operating curve range	-	30	-	
Pin Soldering Temperature	Solder joint 1.5 mm from the housing, 10 seconds	-	-	300	
Reflow Temperature	Peak temperature Tc≤250℃, the maximum time 60S above 217℃				
Relative Humidity	Non-condensing	5	-	95	%RH
Isolation Voltage	Input/Output, test 1min, leakage current <1mA	1500	-	-	VDC
Insulation Resistance	Input/Output, @ 500VDC	1000	-	-	MΩ
Isolation Capacitance	Input/Output,100KHz/0.1V	-	20	-	pF
Vibration	10–150 Hz, 5G, 30 min. along X, Y, and Z				
MTBF	MIL-HDBK-217F @ 25°C	3,500	-	-	K hours
Case Material	Plastic in Black, flame class UL94 V-0				
Weight	1.4 g (Typ.)				

Cooling Method	Natural Convection		
Packaging Method (Tubing)	Single tube (525 × 18 × 10 mm)		33PCS
	Single box (542 × 110 × 155 mm)		2640 pcs (80 tubes total)
Packaging Method (Tape)	Single reel (Φ330 × 24.5 mm)		500 pcs
Dimensions	L x W x H	15.24 × 11.40 × 7.25 mm	0.600 × 0.449 × 0.285 in

EMC Performance

Total Item	Sub-item	Technical Standard	Performance Criteria
EMI	CE	CISPR 32/EN 55032	CLASS B (See EMC Recommended Circuit Diagram)
	RE	CISPR32/EN55032	CLASS B (see EMC recommended circuit diagram)
EMS	ESD	IEC/EN 61000-4-2	Air ±8 kV, Contact ±6 kV perf. Criteria B

Mechanical Dimensions



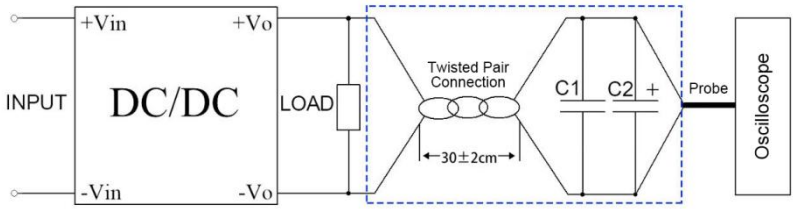
Unit: mm[inch]
Pin section tolerance: ±0.10[±0.004]
General tolerance: ±0.25[±0.010]

Pin Definitions

Pin No.	1	2	4	5	7	10
Marking	GND	+Vin	COM	-Vo	+Vo	NC
Function	Negative Input	Positive Input	Common Ground	Negative Output	Positive Output	No Connection

Note: If any pin definition differs from this datasheet, the actual product label shall prevail.

Ripple & Noise Test Instruction (Twisted Pair Method, 20MHz Bandwidth)



Test Method:

1.Ripple and Noise: Use the twisted-pair method (#12 twisted-pair). Set the oscilloscope bandwidth to 20 MHz. For probes with 100 MHz bandwidth, remove the probe cap and ground clip. Connect C1 (0.1μF polypropylene capacitor) and C2 (10μF high-frequency low-ESR electrolytic capacitor) in parallel at the probe tip. Use "Sample" acquisition mode.

2.Setup: Connect the input to the power source and the output to an electronic load via a test fixture. Use a 30 cm (±2cm) sampling lead directly from the output port. Ensure power cable gauges are selected based on the output current.

Application Notes:

1.Max. Capacitive Load: Measured under pure resistive full-load conditions.

2.Minimum Load: A minimum load of 10% or an external high-frequency low-ESR electrolytic capacitor (≥100μF) is recommended; otherwise, output ripple and noise may increase.

Custom Services: AIPUPOWER provides integrated power solutions and customized design services. Due to space limitations, please contact our technical sales team for further inquiries.

Product Characteristics Curves

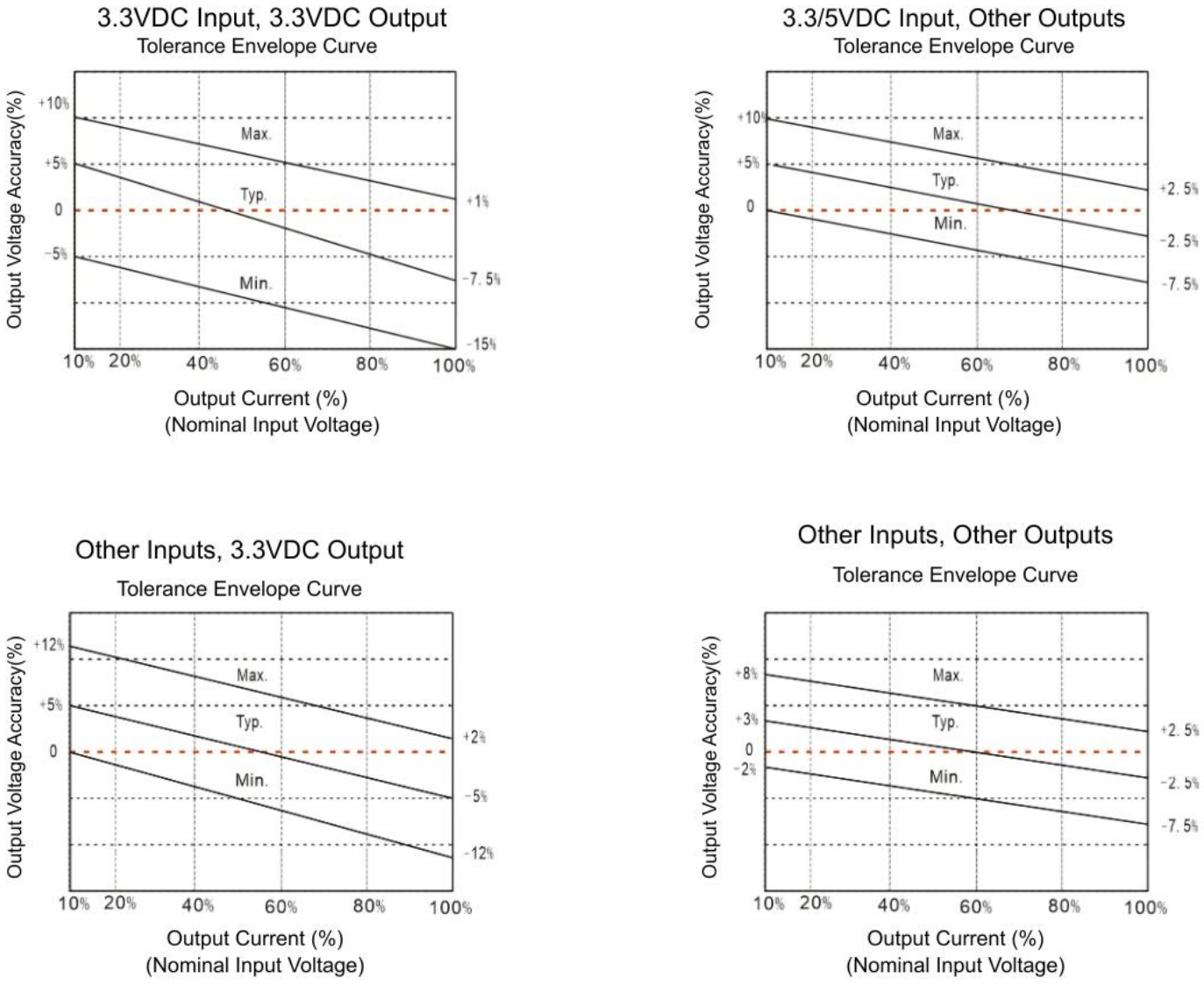


Figure 1

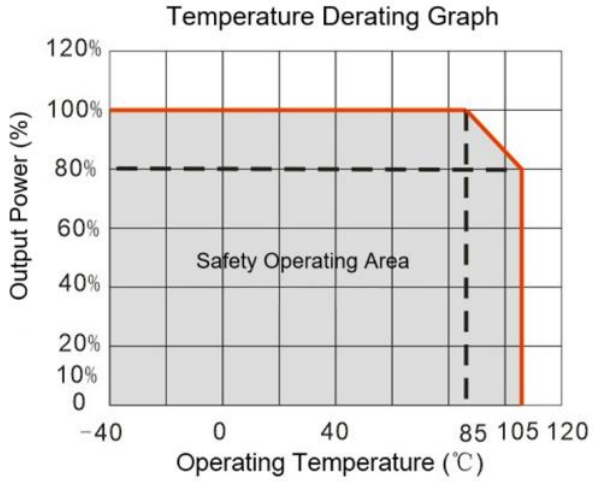


Figure 2

Recommended Circuits for Application

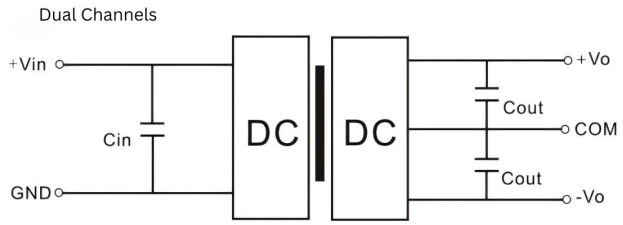
1. Output load requirements

a. To ensure high efficiency and reliability, a minimum load of 10% (nominal resistive load) is recommended. If the actual power requirement is lower, please connect a dummy load (resistor) in parallel at the output to maintain the 10% minimum load.

b. The maximum capacitive load is measured at nominal full load. Do not exceed this limit, as excessive capacitance may cause start-up failure or permanent damage to the module.

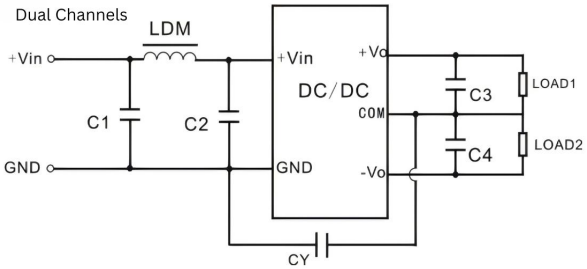
2. Typical application circuit

To effectively reduce input/output ripple and noise, a capacitive filter network can be connected as shown in the application circuit below. Please ensure appropriate filter capacitors are selected; excessive capacitance may hinder start-up. To ensure each output operates reliably, the recommended maximum capacitive loads are specified in Table 1.



Recommended Capacitive Load Values (Table 1)			
Vin (Vdc)	Cin	Dual Vout (Vdc)	Cout
3.3	10μF/ 16V	±3.3	4.7μF/16V
5	10μF /16V	±5	4.7μF/16V
9	4.7μF/16V	±9	2.2 μF/25V
12	2.2μF/25V	±12	1 μF/50V
15	2.2μF/25V	±15	1 μF/50V
24	1μF/50V	±24	470nF/5V

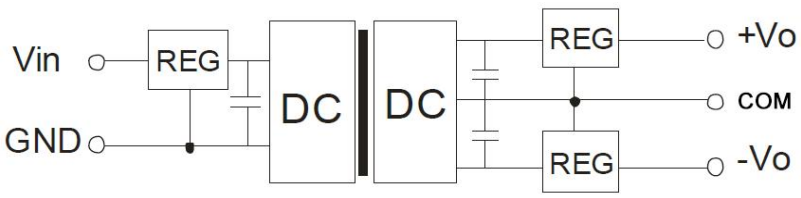
3. EMC Typical Recommended Circuit



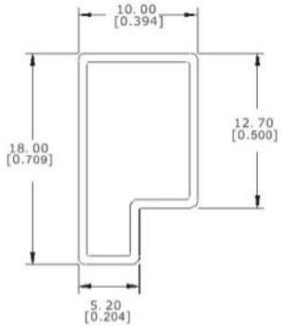
Input Voltage (Dual Channel)		3.3/5 Vdc	12/15/24 Vdc
EMI	C1/C2	4.7μF / 16V	4.7μF / 50V
	CY	270pF/3KVdc	270pF/3KVdc
	C3	Refer to Table 1 for Cout parameters	Refer to the Cout parameter in Table 1
	LDM	6.8μH	6.8μH

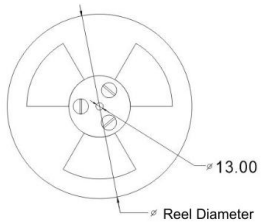
4. Output voltage regulation and over voltage protection

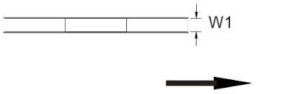
For the simplest output regulation and protection (over-voltage/over-current), a linear regulator with thermal protection and a filter capacitor network can be connected in series at the input or output (see diagram below). Recommended capacitor values are listed in Table 1. Ensure the linear regulator is appropriately selected based on voltage and current requirements, or choose our NW series products.

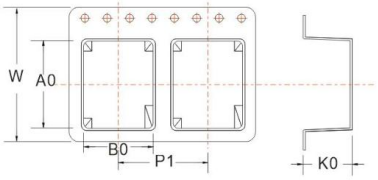


Packing Information

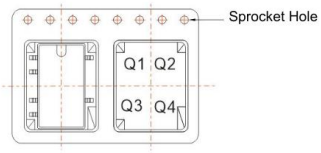








Pin 1 Orientation in Tape



Note:
Unit: mm[inch]
General tolerance ±1.00[±0.039]
Qty per Tube: 33 PCS
Total Qty per Carton: 2640 PCS
Tube Dimensions: 525×18×10mm
Carton Dimensions: 542 ×110×155mm

Part Number	Package	Pin	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W1 (mm)	Pin1 (Quadrant)
NNX-XXDXXANT	SMD	6	500	330.0	24.5	15.65	12.05	8.0	16.0	24.0	Q1

Note:

1. Parallel connection and hot-plugging are not supported.
2. The product should be used within specified ranges; operation beyond these limits may cause permanent damage.
3. If operating below the minimum required load, the product's performance is not guaranteed to meet all specifications in this manual.
4. Operating beyond the load range will result in performance that may not meet the specifications listed in this manual.
5. Unless otherwise specified, all data above was measured at Ta = 25°C, humidity < 75%, with nominal input voltage and rated resistive load.
6. All measurement and testing methods are based on our corporate standards.
7. Specifications apply to the standard models listed in this manual. For non-standard models, some parameters may differ; please contact our technical department for details.
8. Customized products and power solutions are available upon request.

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