

Typical Features

- ◆ Constant voltage input, isolated non-regulated output, 3W output power
- ◆ Efficiency up to 85%
- ◆ Compact SIP package
- ◆ Isolation Voltage: 1500VDC
- ◆ Long-term short-circuit protection with Self-recovery
- ◆ Operating Temperature Range: -40° C to +105° C
- ◆ Plastic housing, meets UL94-V0 requirements



Application Areas

This series of products can be widely used in the fields of instrument, communication, pure digital circuit, general low frequency analog circuit, relay drive circuit, data exchange circuit, etc.

Product Selection Guide

Certifications	Model	Input Voltage Range		Output Voltage/Current (Vo/Io)		Input Current @ Nominal Input Typ		Maximum Capacitive Load	Rated Voltage at Full Load Output Efficiency	
		Nomin al Value (VDC)	Range Value (VDC)	Voltage (VDC)	Current (mA)	Full Load (mA)	No Load (mA)	uF	Min (%)	Typ (%)
CE	NN3-05S05CN	5	4.5 - 5.5	5	600/60	665	12	1200	80	83
-	NN3-05S09CN			9	333/33	665	18	560	80	83
CE	NN3-05S12CN			12	250/30	650	18	560	80	83
CE	NN3-05S15CN			15	200/20	650	20	560	80	83
-	NN3-05S24CN			24	125/13	680	20	470	80	83
CE	NN3-12S05CN	12	10.8 - 13.2	5	600/60	295	12	1200	80	83
CE	NN3-12S09CN			9	333/33	295	12	560	80	83
CE	NN3-12S12CN			12	250/30	290	12	560	81	84
CE	NN3-12S15CN			15	200/20	285	12	560	80	83
CE	NN3-12S20CN			20	150/15	285	12	560	80	83
CE	NN3-12S24CN			24	125/13	285	12	470	80	83
-	NN3-15S15CN	15	13.5 - 16.5	15	200/20	248	12	560	80	83
-	NN3-24S05CN	24	21.6	5	600/60	148	8	1200	80	83

-	NN3-24S09CN		-	9	333/33	148	8	560	80	83
-	NN3-24S12CN		26.4	12	250/30	138	8	560	81	84
-	NN3-24S15CN			15	200/20	135	8	560	82	85
-	NN3-24S24CN			24	125/13	135	8	470	81	84

Note 1: Max. Capacitive Load refers to the capacitance capacity permitted at the output when the power supply starts under full load. Exceeding this capacity may prevent the power supply from starting.

Note 2: The above efficiencies are measured at the Nominal Input Voltage and rated output load;

Note 3: Due to space limitations, the above represents only a partial product list. For products not included in the list, please contact our sales department.

Input Characteristics

Test Item	Test Conditions	Minimum	Typical	Maximum	Unit
Input Transient Voltage (1 sec. max.)	3.3Vdc input	-0.7	-	7	VDC
	5Vdc input	-0.7	-	9	VDC
	9Vdc input	-0.7	-	12	VDC
	12Vdc input	-0.7	-	18	VDC
	15Vdc input	-0.7	-	21	VDC
	24Vdc input	-0.7	-	30	VDC
Input Filter	Capacitor Filter				
Hot Plug	N/A				

Output Characteristics

Test Item	Test Conditions		Minimum	Typical	Maximum	Unit
Output Power			0.3	-	3	W
Output Voltage Accuracy	See error envelope curve diagram (Figure 1)					
Load Regulation	10% to 100% load	3.3Vdc Output	-	15	20	%
		Other Outputs	-	10	15	%
Linear Voltage Regulation	Input voltage variation ±1%	3.3Vdc Output	-	-	1.5	%
		Other Outputs	-	-	1.2	%
Temperature Coefficient			-	-	±0.03	%/°C
Ripple & Noise	0%-100% load, 20MHz bandwidth	Other Outputs	-	80	150	mVp-p
		24Vdc Output	-	100	150	mVp-p
Output Short-circuit Protection (SCP)	Sustained short-circuit protection, Self-recovery					

Note: Ripple & noise testing employs twisted-pair testing methodology. Refer to Ripple & Noise Test Specifications for details.

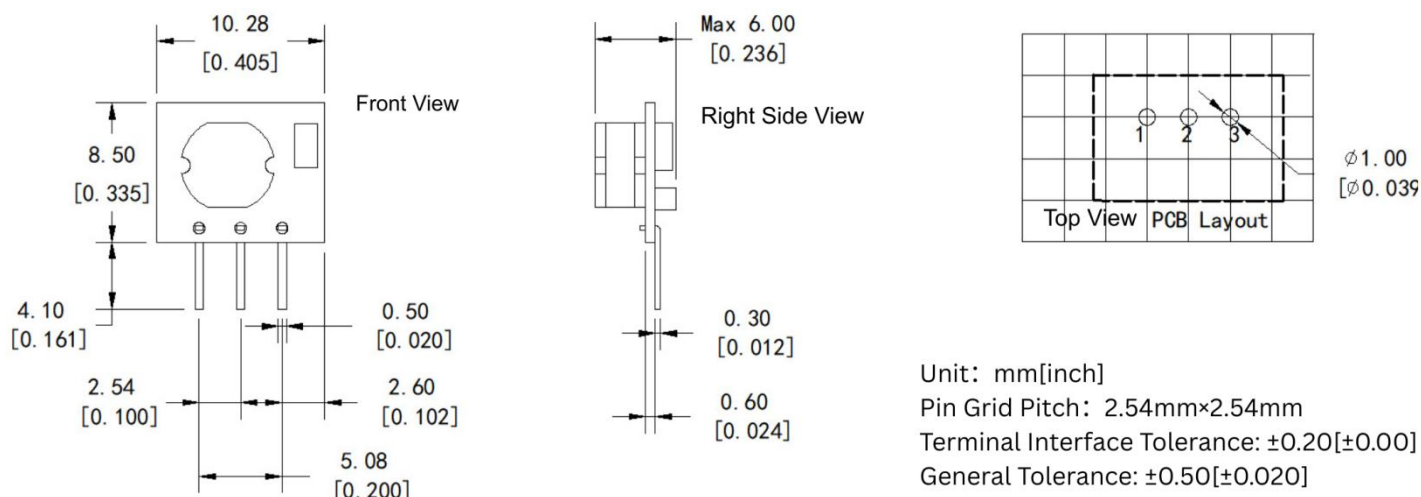
General Characteristics

Test Item	Test Conditions	Minimum	Typical	Maximum	Unit
Switching Frequency	Nominal Input Voltage at Full Load	-	260	-	kHz
Operating temperature	Refer to the Temperature Derating Curves (Figure 2)	-40	-	+105	°C
Storage Temperature	/	-55	-	+125	
Case Temperature Rise	Within operating curve range	-	25	-	
Pin Soldering Resistance Temperature	Solder joint distance from housing: 1.5mm, 10 seconds	-	-	300	
Relative Humidity	Non-condensing	5	-	95	%RH
Isolation Voltage	Input to Output, Tested for 1 min, Leakage Current < 1 mA	1500	-	-	VDC
Insulation Resistance	Input-Output, Voltage 500VDC	1000	-	-	MΩ
Isolation Capacitance	Input-Output, 100kHz/0.1V	-	20	-	pF
Vibration	10-150Hz, 5G, 30 Min. along X, Y and Z				
MTBF	MIL-HDBK-217F@25°C	3500	-	-	K hours
Case Material	Black Flame-retardant Heat-resistant Plastic (UL94-V0)				
Weight	2.5g (Typ.)				
Cooling Method	Natural Convection				
Packaging Method	Single tube (525*18*10mm)		25PCS		
	Single Carton (542*110*155mm)		2000PCS (80 tubes total)		
Dimensions	L x W x H	19.50 × 7.00 × 10.10mm		0.768 × 0.276 × 0.398 inch	

Electromagnetic Compatibility Characteristics

Component	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 ±8kV, Contact ±6kV perf. Criteria B

Mechanical Dimensions



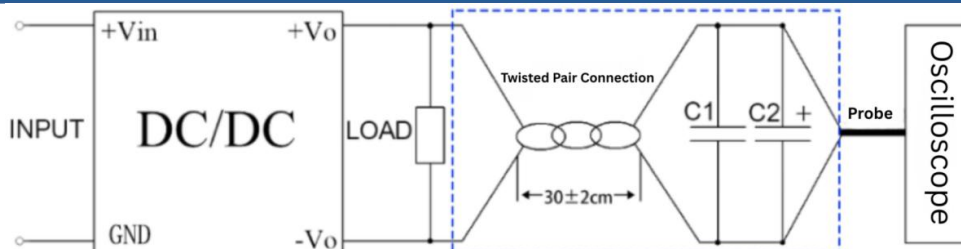
Pin Definitions

Pin No.	1	2	3	4	5	6	7
Single-channel (S)	+Vin	GND	NP	-Vo	NP	+Vo	NP
	Input Positive	Input Ground	No Pin	Output Negative	No Pin	Output Positive	No Pin

Note: If the pin definitions of the power module differ from those in the selection manual, refer to the labels on the actual product.

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

Test Method:



1. Ripple noise is measured using a #12 twisted pair cable. Set the oscilloscope bandwidth to 20MHz with 100M bandwidth. Remove the probe cap and ground clip. Connect C1 (0.1uF polypropylene capacitor) and C2 (10uF high-frequency low-ESR electrolytic capacitor) in parallel at the probe end. Use the Sample mode for oscilloscope sampling.

2. Output Ripple Noise Test Diagram: Connect the power supply input to the input power source. The power supply output connects to the electronic load via the fixture board. For testing, use a 30cm±2cm sampling lead to directly sample from the power supply output port. Select insulated wires with appropriate wire gauges based on the output current.

Application Reference:

- Max. Capacitive Load values are obtained under pure resistive full-load Test Conditions;
- Minimum 10% load or connection of a high-frequency, low-ESR electrolytic capacitor ($\geq 100\mu\text{F}$) is recommended to prevent increased output voltage ripple and noise;
- Our company offers complete power supply solutions or product customization. Due to space limitations, please contact our relevant personnel for any other inquiries.

Product Characteristic Curves

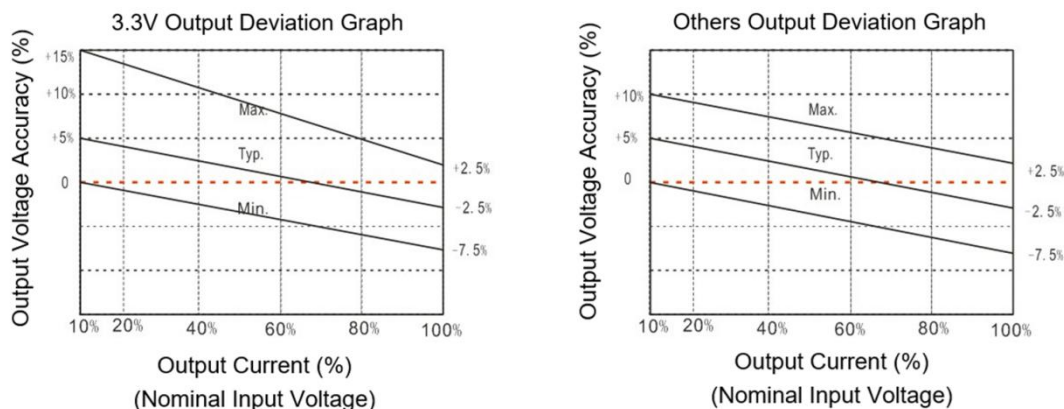


Figure 1

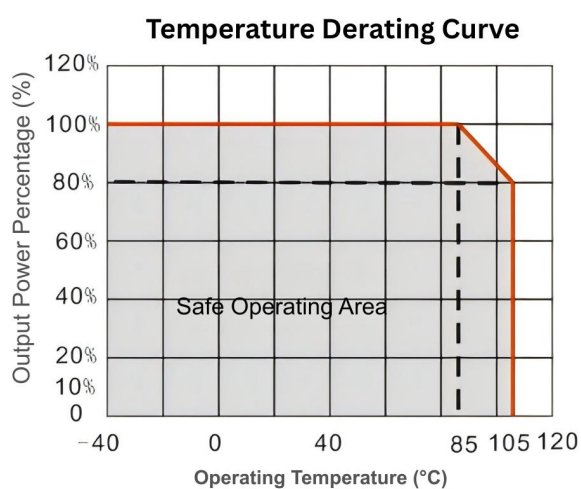
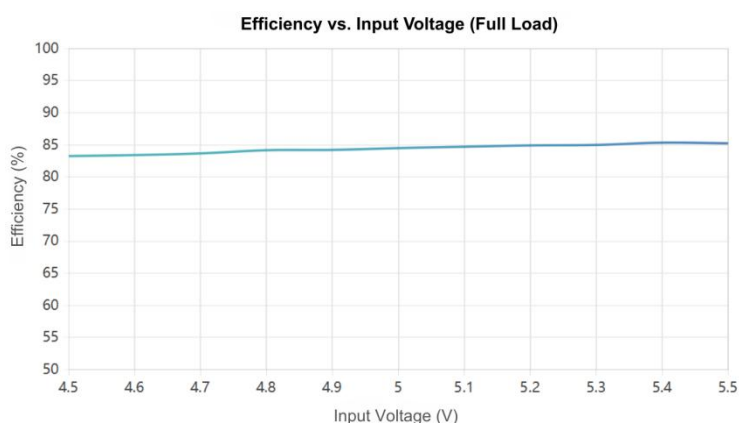
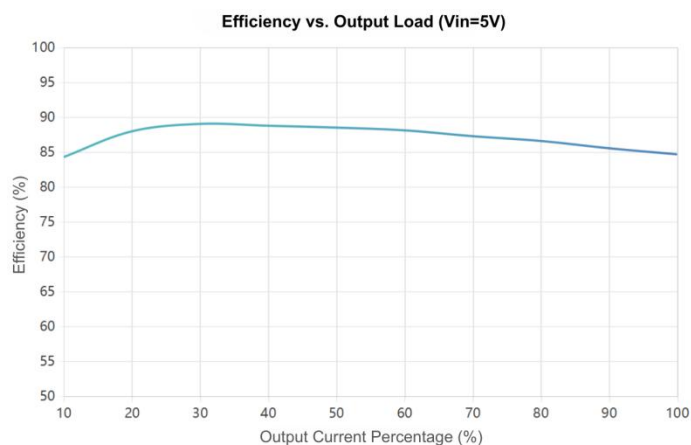


Figure 2



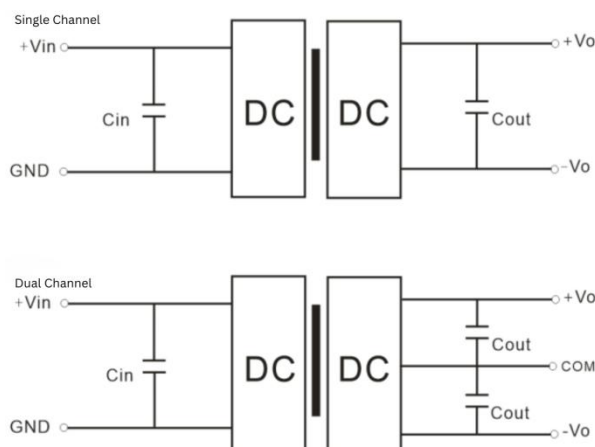
Design Reference Applications

➤ Output Load Requirements

a. To ensure efficient and reliable operation of this power module, the minimum load should not fall below 10% of the rated resistive load. If your actual power requirement is significantly lower, connect a resistor equivalent to 10% of the rated load in parallel at the output terminal.

b. The Max. Capacitive Load is determined by nominal full-load testing. Do not exceed the Max. Capacitive Load at the output terminals during use, as this may cause startup difficulties and potentially damage the product.

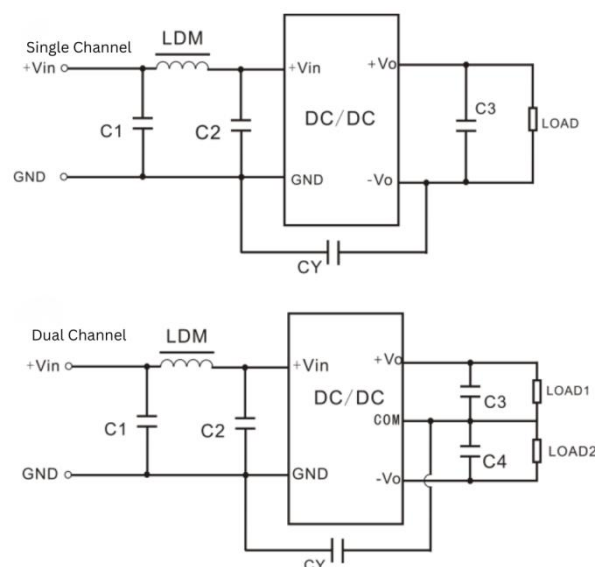
➤ **Recommended Circuit** To effectively reduce input/output ripple and noise, connect a Capacitor Filter to the input and output terminals. Refer to the chart in below



Recommended Capacitive Load Values Table (Table 1)

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

➤ EMC Typical Recommended Circuit



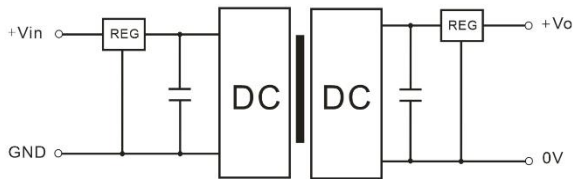
Input Voltage (Single Channel)		3.3/5Vdc	9/12/15/24Vdc
EMI	C1/C2	4.7μF/16V	4.7μF/50V
	CY	270pF/3KVdc	270pF/3KVdc
	C3	Refer to the Cout parameter in Table 1	Refer to the Cout parameters in Table 1
	LDM	6.8μH	6.8μH

Input Voltage (Dual Channel)		3.3/5Vdc	9/12/15/24Vdc
EMI	C1/C2	4.7μF/16V	4.7μF/50V
	CY	270pF/3KVdc	270pF 3KVdc
	C3	Refer to the Cout parameter in Table 1	Refer to the Cout parameters in Table 1
	LDM	6.8μH	6.8 μH

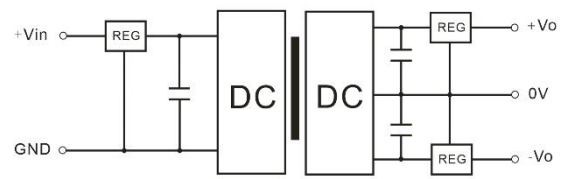
➤ Output Voltage Regulation and Overvoltage Protection Circuit

The simplest device for output voltage regulation, overvoltage, and overcurrent protection involves connecting a linear voltage regulator with thermal protection in series at the input or output, along with a Capacitor Filter (see figure below). Recommended values for filter capacitors are detailed in (Table 1). Select the linear voltage regulator based on actual operating voltage and current requirements; alternatively, use our FW series products.

Single-channel



Dual-channel


Note:

1. This product cannot be used in parallel and does not support Hot Plug;
2. The product must be used within its specified parameters; otherwise, permanent damage may occur.
3. When operating below the minimum required load, product performance cannot be guaranteed to meet all Performance Specifications outlined in this manual;
4. If the product operates beyond its load range, compliance with all Performance Specifications in this manual cannot be guaranteed;
5. Unless otherwise specified, all data above is measured at $T_a=25^{\circ}\text{C}$, humidity $<75\%$, Nominal Input Voltage, and rated output load (resistive load);
6. All testing methods for the above specifications comply with our company's standards;
7. The Performance Specifications listed above apply to the product models specified in this manual. Non-standard models may exceed certain requirements; please contact our technical personnel directly for specific details.
8. Customized products are available upon request.

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