FEATURES

1.Package Type：DIP24
2.Universal Input：2:1
3.Operating temperature range ： -40℃ - +85℃
4.Isolation voltage ： 3000VDC
5.High efficiency up to：86%
6.Input under-voltage protection; Output short-circuit protection, over-voltage protection, Over-current protection mechanism.
7.Fields of application ： Industry, Power, Instrumentation, Communication, Rail transit.

RoHS CE 3 years Warranty

Selection Guide

Part No.	Input Voltage (VDC)		Output		Full Load Efficiency % （Typ.）	Capacitive Load(μF) Max.
	Nominal (Range)	Max.	Voltage (VDC)	Current (mA) Max./Min.		
NKF0505P-3WR2	5（4.5-9）	11	5	600/30	74	4700
NKF0512P-3WR2	5（4.5-9）	11	12	250/12	77	2700
NKF0515P-3WR2	5（4.5-9）	11	15	200/10	77	2200
NKE0505P-3WR2	5（4.5-9）	11	±5	±300/±15	76	2200#
NKE0512P-3WR2	5（4.5-9）	11	±12	±125/±6	78	1800#
NKE0515P-3WR2	5（4.5-9）	11	±15	±100/±5	78	1000#
NKF1203P-3WR2	12（9-18）	20	3.3	909/46	74	4700
NKF1205P-3WR2	12（9-18）	20	5	600/30	81	4700
NKF1212P-3WR2	12（9-18）	20	12	250/12	83	2700
NKF1215P-3WR2	12（9-18）	20	15	200/10	82	2200
NKF1224P-3WR2	12（9-18）	20	24	125/6	83	1800
NKE1205P-3WR2	12（9-18）	20	±5	±300/±15	81	2200#
NKE1209P-3WR2	12（9-18）	20	±9	±166/±8	84	2000#
NKE1212P-3WR2	12（9-18）	20	±12	±125/±6	84	1800#
NKE1215P-3WR2	12（9-18）	20	±15	±100/±5	85	1000#
NKF2403P-3WR2	24（18-36）	40	3.3	909/46	78	4700
NKF2405P-3WR2	24（18-36）	40	5	600/30	81	4700
NKF2409P-3WR2	24（18-36）	40	9	333/16	81	2700
NKF2412P-3WR2	24（18-36）	40	12	250/12	86	2700
NKF2415P-3WR2	24（18-36）	40	15	200/10	86	2200
NKF2424P-3WR2	24（18-36）	40	24	125/6	85	1800
NKE2405P-3WR2	24（18-36）	40	±5	±300/±15	82	2200#
NKE2412P-3WR2	24（18-36）	40	±12	±125/±6	84	1800#
NKE2415P-3WR2	24（18-36）	40	±15	±100/±5	84	1000#
NKF4803P-3WR2	48（36-75）	80	3.3	909/46	76	4700
NKF4805P-3WR2	48（36-75）	80	5	600/30	82	4700
NKF4812P-3WR2	48（36-75）	80	12	250/12	86	2700
NKF4815P-3WR2	48（36-75）	80	15	200/10	86	2200
NKE4805P-3WR2	48（36-75）	80	±5	±300/±15	82	2200#
NKE4812P-3WR2	48（36-75）	80	±12	±125/±6	84	1800#
NKE4815P-3WR2	48（36-75）	80	±15	±100/±5	85	1000#

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load/no load)	5VDC Input	--	789/40	834/45	mA
	12VDC Input	--	316/30	348/35	
	24VDC Input	--	152/15	165/20	
	48VDC Input	--	77/5	85/10	
Reflected Ripple Current	5VDC Input	--	20	--	mA
	12VDC Input	--	30	--	
	24VDC Input	--	30	--	
	48VDC Input	--	30	--	
Input impulse voltage	5VDC Input	-0.7	--	12	VDC
	12VDC Input	-0.7	--	25	
	24VDC Input	-0.7	--	50	
	48VDC Input	-0.7	--	100	
Starting voltage	5VDC Input	--	--	4.5	VDC
	12VDC Input	--	--	9	
	24VDC Input	--	--	18	
	48VDC Input	--	--	36	
Input Filter		Capacitance Filter			
Hot Plug		Unavailable			

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy			--	±1.0	±3.0	%
Accuracy of no-load output voltage	Input voltage range		--	±1.5	±5.0	%
Linear Regulation	Input voltage from low limit to high limit, full load		--	±0.2	±0.5	%
Load Regulation	5%- 100% load		--	±0.2	±0.5	%
Ripple & Noise	25% load step change, nominal input voltage	24V output	--	100	120	mVp-p
		Others	--	50	80	
Transient Recovery Time	25% load step change		--	0.5	2	%
Transient response deviation	25% load step change		--	±2	±5	%
Temperature Drift Coefficient	Full Load		--	±0.02	±0.03	%/°C
Short-Circuit Protection	Input voltage range		Continuous, Self-Recovery			

Note: 1.Auxiliary circuit output voltage(Vo2) maximum accuracy is ±5%;

2. Load regulation for 0%-100% load is ±5%;

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Insulation Voltage	Input-output, test time 1 minute, leakage current less than 1mA	3000	--	--	VDC
Insulation Resistance	Input-output, insulated voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	1000	--	pF
Operating Temperature	Derating when operating temperature≥85℃, (See Figure 1)	-40	--	85	℃
Storage Temperature		-55	--	125	℃
Case Temperature Rise	Ta=25℃, nominal input, output load	--	25	--	℃
Pin welding can withstand the highest temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	℃
Storage Humidity	Non-condensing	--	--	95	%RH
Switching Frequency	Full load, nominal input voltage	--	200	--	kHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K Hours

Mechanical Specification

Case Material	Black flame retardant and heat-resistant plastic（UL 94V-0）
Package Dimensions	31.80 × 20.00 × 12.60mm
Weight	12.70g(Typ.)
Cooling Method	Free air convection

EMC Specifications

EMI	CE	CISPR32/EN55032 CLASS A (without extra components)/ CLASS B (Recommended circuit diagram 3-②)
	RE	CISPR32/EN55032 CLASS A (without extra components)/ CLASS B (Recommended circuit diagram 3-②)
EMS	ESD	IEC/EN61000-4-2 Contact±4KV Perf.Criteria B
	RS	IEC/EN61000-4-3 10V/m Perf.Criteria A
	EFT	IEC/EN61000-4-4 ±2KV (Recommended circuit diagram 3-①) Perf.Criteria B
	Surge	IEC/EN61000-4-5 line to line±2KV (Recommended circuit diagram 3-①) Perf.Criteria B
	CS	IEC/EN61000-4-6 3Vr.m.s Perf.Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29 0% ~70% Perf.Criteria B

Typical Characteristic Curves

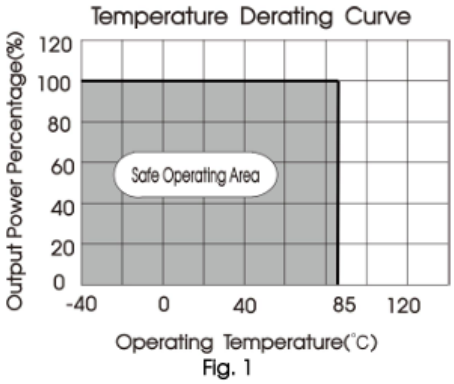
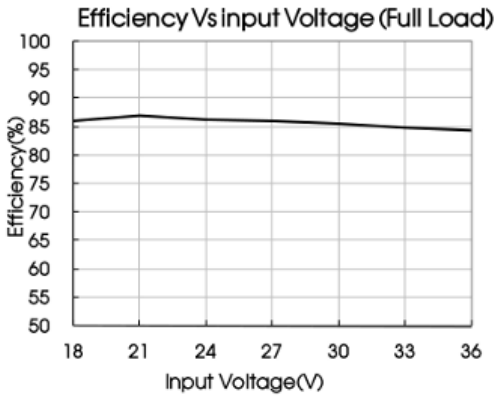
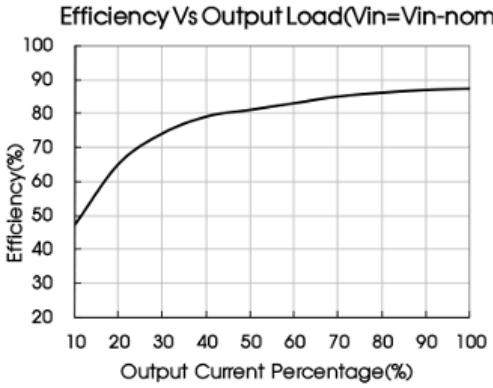


Fig. 1



NKE2415P-3WR2



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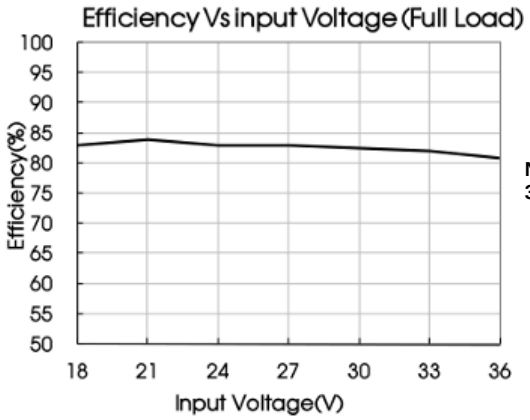
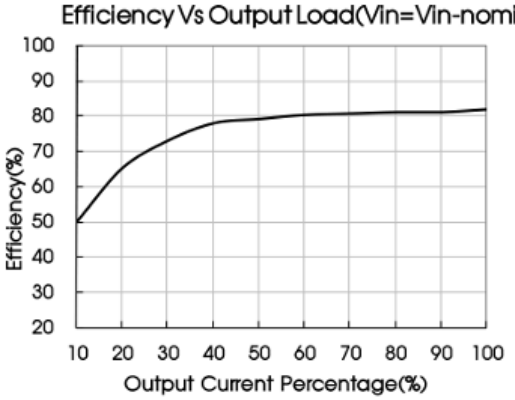


NKF2405P-3WR2



NKF2405P-3WR2

Typical Circuit Design and Application

1. Typical application

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product

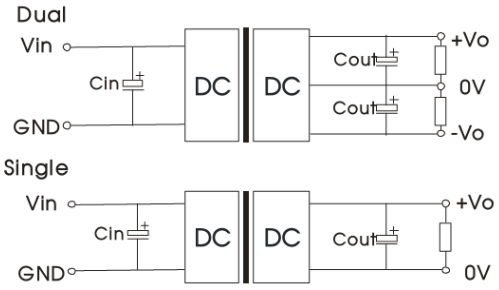


Fig. 2

Vin(VDC)	Cin	Cout
5V&12	100μF/25V	Vo(3/±3/5/±5/9/±9):10μF/16V Vo(12/±12/15/±15V):10μF/25V
24V&48	10μF~47μF/100V	Vo(24/±24V):10μF/50V

2. EMC Compliance circuit

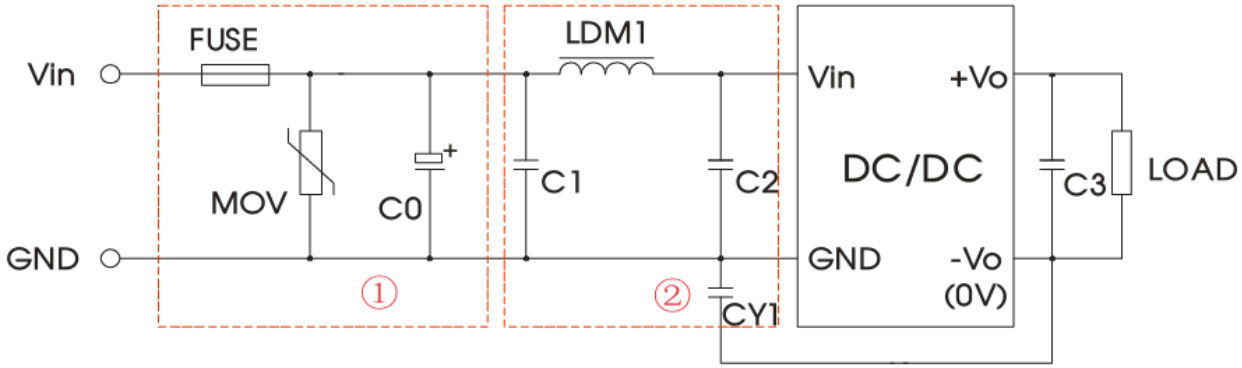


Fig. 3

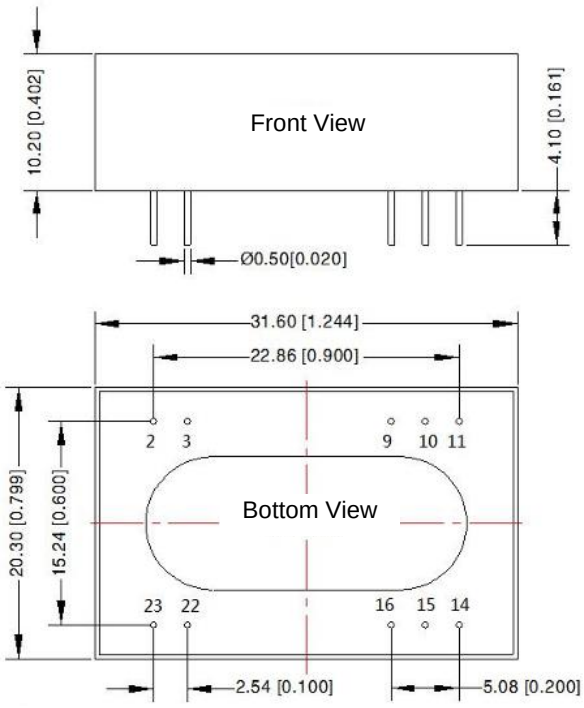
Parameter description

Model	Vin:5VDC	Vin:12VDC	Vin:24VDC	Vin:48VDC
FUSE	Choose according to actual input current			
MOV	--	S14K20	S20K30	S14K60
C0	1000μF/16V	1000μF/25V	330μF/50V	330μF/100V
C1	4.7μF/50V			4.7μF/100V
LDM1	12μH			
C2	4.7μF/50V			4.7μF /100V
C3	Refer to the Cout in Fig.2			
CY1	1nF/3kV			

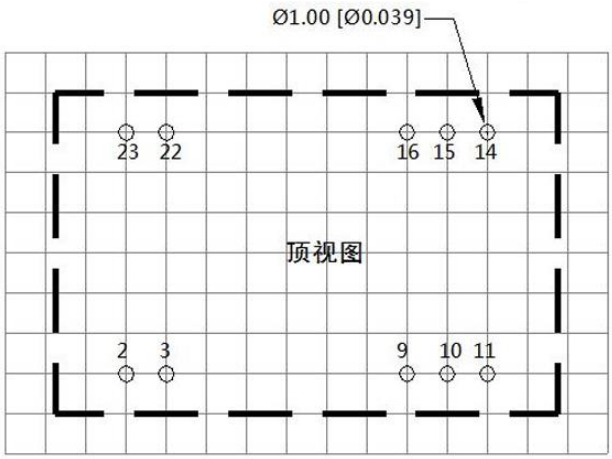
Note: ①For EMC test we use Part ① in the Fig. 3 for immunity and part ② for emissions, Selecting based on needs. ②If there is no recommended parameters, the model no require the external component.

Dimensions and Recommended Layout

Dimensions	PCB Printing Layout & Pin Definition Table



Note:
Unit: mm[inch]
Pin section tolerances:±0.10[±0.004]
General tolerances:±0.50[±0.020]



Note：The grid distance is 2.54*2.54mm

Pin	Function(S)	Function(D)
2,3	GND	GND
9	NC	0V
10,15	NC	NC
11	NC	-Vo
14	+V0	+Vo
16	0V	0V
22,23	Vin	Vin

NC: Cannot connected to any external electric device

Note:
1. If the product works under the minimum required load, it cannot guarantee that the performance of the product complies with all the performance indicators in this manual;
2. The maximum capacitive load is tested under the input voltage range and full load condition;
3. Unless otherwise stated, all indexes in this manual are measured at Ta=25℃, humidity <75%RH, nominal input voltage and rated output load;
4. All index testing methods in this manual are based on the enterprise standards of the company;
5. Our company can provide product customization, specific needs can directly contact our technical staff;