

NR-1.0 Series



1A Output Current, Non-Isolated DC-DC converter

Features

- Non-isolated Regulator
- Wide Input Range, Step-down switching DC-DC converter
- High Voltage Input Range, up to 36V
- Continuous Short Circuit Protection
- Pin-out compatible with LM78XX three terminals positive Regulator
- Efficiency up to 96%



PART NUMBER STRUCTURE

NR - **24** **3R3** - **1.0**
(1) (2) (3) (4)

(1) Series

(2) Input Voltage Range

24 - 4.6-36 V

(4) Output Current

1.0 - 1.0 A

(3) Output Voltage

1R2 - 1.2 V

1R5 - 1.5 V

1R8 - 1.8 V

2R5 - 2.5 V

3R3 - 3.3 V

05 - 5.0 V

6R5 - 6.5 V

09 - 9.0 V

12 - 12 V

15 - 15 V

ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED

Model Number	Input Voltage Range (VDC)	Input Current			Output Voltage (VDC)	Output Current Full Load (mA)	Efficiency Full Load (% , typ.)		Capacitive Load @FL (μF, max.)
		No-Load (mA, typ.)	Full Load (mA, typ.)				@Min. Vin	@Max. Vin	
			@Min. Vin	@Max. Vin					
NR-241R2-1.0	24 (4.6-36)	1.5	300	47	1.2	1000	87	72	680
NR-241R5-1.0	24 (4.6-36)	1.5	367	55	1.5	1000	89	76	680
NR-241R8-1.0	24 (4.6-36)	1.5	433	64	1.8	1000	90.5	79	680
NR-242R5-1.0	24 (4.6-36)	1.5	588	84	2.5	1000	92.5	83	680
NR-243R3-1.0	24 (4.75-36)	1.5	740	106	3.3	1000	94	86.5	680
NR-2405-1.0	24 (6.5-36)	1.5	806	156	5	1000	95.5	89.5	680
NR-246R5-1.0	24 (9-36)	1.5	765	201	6.5	1000	94.5	90	680
NR-2409-1.0	24 (12-36)	1.5	786	272	9	1000	95.5	92	470
NR-2412-1.0	24 (15-36)	1.5	843	359	12	1000	95	93	470
NR-2415-1.0	24 (18-36)	1.5	869	444	15	1000	96	94	330

INPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Filter		Capacitor			
Input Reflected Ripple Current (1)			35		mApk-pk
Start up Time	Nominal Vin and constant resistive load		5		ms
Recommended input fuse (slow blow)	NR-241R2-1.0 & NR-241R5-1.0 NR-241R8-1.0	0.8			A
	NR-242R5-1.0 & NR-243R3-1.0 NR-2405-1.0 & NR-246R5-1.0	1.5			
	NR-2409-1.0 & NR-2412-1.0 NR-2415-1.0	2			
Note : 1. Measured with a simulated source inductance of 12uH and a source capacitor C _{in} (10uF, ESR<1.0Ω at 100kHz).					

OUTPUT SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy			-2.0		+2.0	%
Maximum Output Current					1000	mA
Line Regulation	Vo ≤ 2.5 V		-0.5		+0.5	%
	Vo ≥ 3.3 V		-0.3		+0.3	
Load Regulation	From 0% to 100% Load	Vo ≤ 2.5 V	-1.5		+1.5	%
		Vo ≥ 3.3 V	-0.8		+0.8	
		Vo ≥ 9.0 V	-0.5		+0.5	
	From 10% to 100% Load	Vo ≤ 2.5 V	-0.8		+0.8	
		Vo ≥ 3.3 V	-0.6		+0.6	
		Vo ≥ 9.0 V	-0.5		+0.5	
Ripple & Noise (1)	20MHz bandwidth	Vo ≤ 6.5 V			50	mVpk-pk
		Vo ≥ 9 V			75	
Short Circuit Protection			Continuous (Automatic Recovery)			
Temperature Coefficient			-0.02		+0.02	%/°C
Maximum Capacitive Load	Minimum Vin and constant resistive load		See Table			
Transient Recovery Time	Nominal Vin and 25% load step change (75%-50%-25% of Io)			250		μs
Transient Response Deviation			-3		+3	%
Note :						
1. Ripple & Noise measured with a 0.1μF MLCC.						

ABSOLUTE MAXIMUM RATINGS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (100 ms)				40	VDC
Soldering Temperature	1.5mm from case 10sec max.			260	°C
Note : These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.					

GENERAL SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Switching Frequency			410		kHz
MTBF	MIL-HDBK-217 F @ 25°C	3.5			M hours
Safety Approval	IEC / EN / UL 62368-1	Design to meet			
Environmental compliance		RoHS			

The information and specifications contained in this data sheet are believed to be correct at time of publication. However, **MOTIEN Technology** accepts no responsibility for consequences arising from printing errors or inaccuracies. Specifications are subject to change without notice. No rights under any patent accompany the sale of any such product(s) or information contained herein.

ENVIRONMENT SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature	See the Derating Curve	-40		100	°C
Maximum Case Temperature				105	°C
Thermal Impedance	Mounting at FR4 (1.18*1.18 inch) PCB	47.82			°C/W
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30-65 LFM			

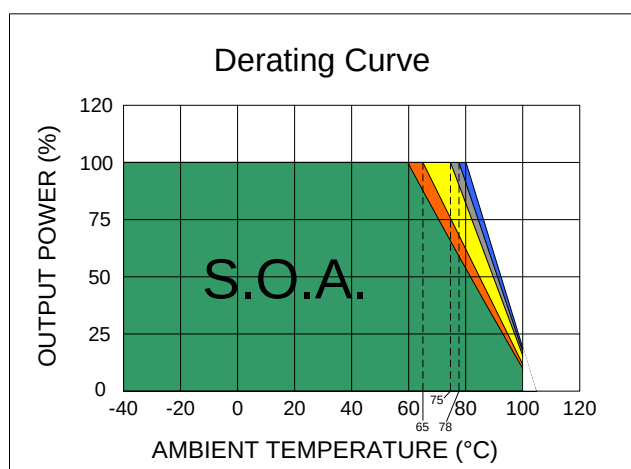
EMC SPECIFICATIONS

Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	B
Radiated Emissions	EN55032		B
ESD	IEC 61000-4-2	Air: ±8kV / Indirect: ±4kV	A
RS	IEC 61000-4-3	10V/m	A
EFT	IEC 61000-4-4	±1.0kV with external components	A
Surge	IEC 61000-4-5	±1.0kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	100A/m	A

PHYSICAL SPECIFICATIONS

Parameter	Value
Case Material	Nonconductive Black Plastic (UL94V-0 rated)
Pin Material	Tinned copper
Potting Material	Silicon (UL94V-0 rated)
Weight	2.3 g, typ.
Dimensions	0.46" x 0.30" x 0.40"

ELECTRICAL CHARACTERISTIC CURVES



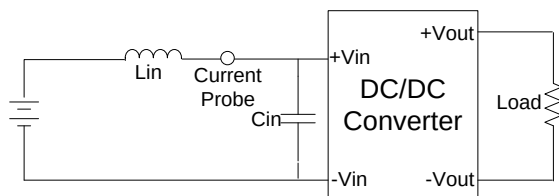
24 V Input

Blue Zone – Vout 1.2 ~ 1.8 VDC models
 Gray Zone – Vout 2.5VDC models
 Yellow Zone – Vout 3.3 ~ 5VDC models
 Orange Zone – Vout 6.5 ~ 9VDC model
 Green Zone – Vout 12 ~ 15VDCmodels

TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

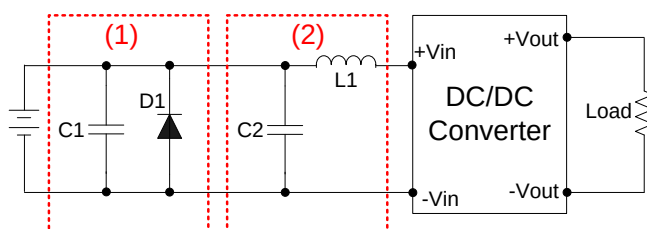
Input reflected ripple current is measured with a source inductor L_{in} ($12\mu\text{H}$) and a source capacitor C_{in} ($10\mu\text{F}$, $\text{ESR} < 1.0\Omega$ at 100kHz) at nominal input and full load.



DESIGN & FEATURE CONFIGURATIONS

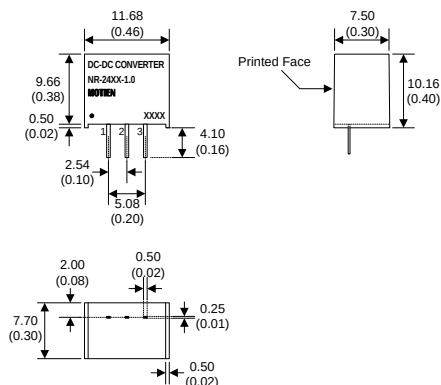
EMC Filter

The part (1) Circuit is used to meet EFT test, and the part (2) Circuit is used to meet EMI test.



	C1	D1	C2	L1
NR-24XX-1.0	NIPPON Chemi-con KY series 330 μF , 100V	SMDJ36A	MLCC 4.7 μF , 50V	33 μH

MECHANICAL SPECIFICATIONS



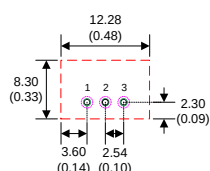
Notes : All dimensions are typical in millimeters (inches).

1. Pin dimension tolerance: ± 0.05 (± 0.002)
2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
3. Pin to case tolerance: ± 0.5 (± 0.02)
4. Case Tolerance: ± 0.5 (± 0.02)

PIN CONNECTIONS

PIN NUMBER	SINGLE
1	+Vin
2	GND
3	+Vout

RECOMMEND FOOTPRINT DETAILS



Notes : 1. All dimensions are typical in millimeters (inches).

- Through hole (black) 1~3: $\varnothing 0.80$ (0.031)
 Top view pad (green) 1~3: $\varnothing 1.00$ (0.039)
 Bottom view pad (pink) 1~3: $\varnothing 1.60$ (0.063)