

NE3 Series

3W Unregulated Single output

Features

- 4 Pin SIL Package
- 3000 VDC Isolation
- Low Ripple and Noise
- Efficiency up to 91%
- -40 ~ 90°C Operation Temperature Range
- Non-Conductive Black Plastic Case
- EMI Complies With EN55032 Class B



The NE3 series is a family of cost effective 3W single output DC-DC converters. These converters achieve low cost and ultra-miniature SIP 4 pin size. Devices are encapsulated using flame retardant resin. The models operate from input voltage of 5, 12, 24 Vdc with output voltage of 5, 9, 12, 15 Vdc. High performance features include 3000Vdc input/output isolation, high efficiency operation and output voltage accuracy of $\pm 3\%$ maximum. Standard features include an input range of $\pm 10\%$ tolerance and low output noise and ripple.

All specifications typical at $T_a = 25^\circ\text{C}$, nominal input voltage and full load unless otherwise specified

OUTPUT SPECIFICATIONS		ABSOLUTE MAXIMUM RATINGS ⁽⁵⁾	
Output Voltage accuracy	$\pm 3\%$, max.	These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.	
Line regulation	$\pm 1.2\%$ / Per 1% V_{in} Change, max.	Input Surge Voltage(100mS)	
Load regulation	(From 10% to 100% Load) $\pm 10\%$, max.	5 Models	7 Vdc, max.
Ripple & noise (20 MHz bandwidth) ⁽¹⁾	100mVpk-pk, max.	12 Models	15 Vdc, max.
Temperature coefficient	$\pm 0.02\%/^\circ\text{C}$	24 Models	28 Vdc, max.
Capacitor load ⁽²⁾	See table, max.	Soldering Temperature	260°C, max.
INPUT SPECIFICATIONS		GENERAL SPECIFICATIONS	
Input Voltage Range	$\pm 10\%$, max.	Efficiency	See table, typ.
Input Current(Full-Load)	See table, typ.	I/O Isolation Voltage ^(tested for 60 sec)	3000Vdc
Input Current(No-Load)	See table, max.	Input/Output	
Input Filter	Capacitors	I/O Isolation Capacitance	65 pF, Max.
Input Reflected Ripple Current ⁽³⁾	20mApk-pk, typ.	I/O Isolation Resistance	1000M Ohm
Start up Time	20mS, typ.	Switching Frequency	40~70kHz
(Nominal V_{in} and constant resistive load)		Humidity	95% rel H
PHYSICAL SPECIFICATIONS		Reliability Calculated MTBF(MIL-HDBK-217 F)	>6.7Mhrs@25°C
Case Material	Non-conductive Black Plastic(UL94V-0 rated)	Safety Standard : (designed to meet)	IEC/UL/EN 60950-1 IEC/UL/EN 62368-1
Pin Material	C5191R-H Solder-coated	EMC SPECIFICATIONS	
Potting Material	Silicon (UL94V-0 rated)	Conducted Emissions ⁽⁶⁾	EN55032 CLASS B
Weight	2.2g, typ.	Radiated Emissions	EN55032 CLASS B
Dimensions	0.46" x 0.29" x 0.40"	ESD	IEC 61000-4-2 Perf. Criteria A
ENVIRONMENT SPECIFICATIONS		RS	IEC 61000-4-3 Perf. Criteria A
Operating Temperature	-40°C ~ +100°C (See Derating Curve)	EFT ⁽⁷⁾	IEC 61000-4-4 Perf. Criteria A
	-40°C ~ +90°C (For 100% Load)	Surge ⁽⁷⁾	IEC 61000-4-5 Perf. Criteria A
Maximum Case Temperature	115°C	CS	IEC 61000-4-6 Perf. Criteria A
Storage Temperature	-55°C ~ 125°C	PfMF	IEC 61000-4-8 Perf. Criteria A
Cooling ⁽⁴⁾	Nature Convection		

NE3 Unregulated Single output

PART NUMBER STRUCTURE

NE3 - 05 05 S

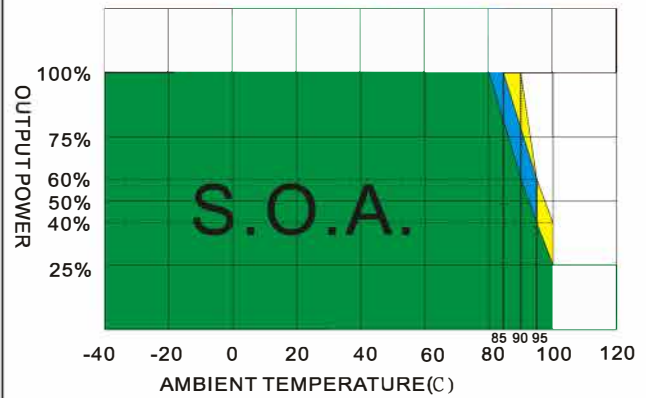
Series Name

Input Voltage
05 - 5V
12 - 12V
24 - 24V

Output Voltage
05 - 5V
09 - 9V
12 - 12V
15 - 15V

Case Type
S - SIP Case

Derating Curve



Green Zone : Efficiency 83%~85% models
Blue Zone : Efficiency 87%~88% models
Yellow Zone : Others

MODEL SELECTION GUIDE

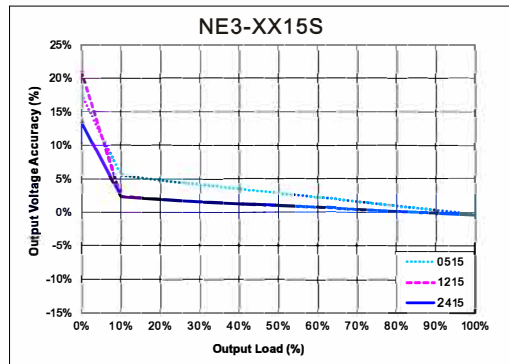
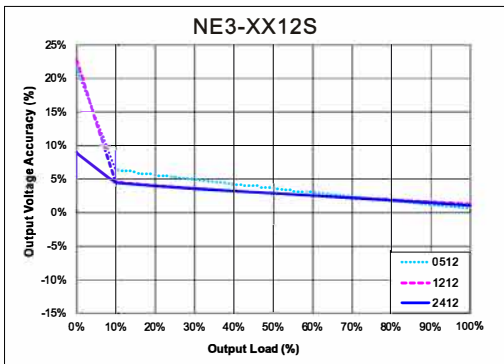
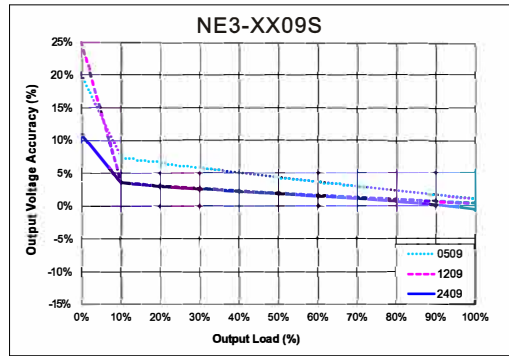
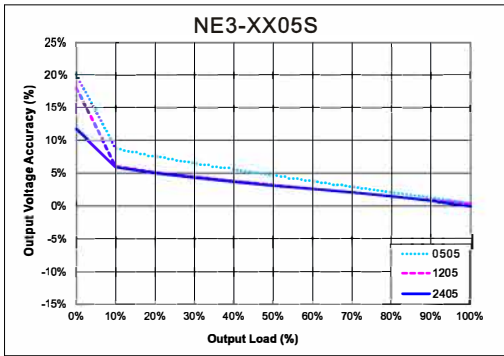
MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current		OUTPUT Voltage (Vdc)	OUTPUT Current Full load (mA)	EFFICIENCY @FL (% , typ.)	Capacitor Load @FL (uF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)				
NE3-0505S	5 (4.5 ~ 5.5)	50	723	5	600	83	3300
NE3-0509S	5 (4.5 ~ 5.5)	60	690	9	333	87	1200
NE3-0512S	5 (4.5 ~ 5.5)	55	682	12	250	88	1000
NE3-0515S	5 (4.5 ~ 5.5)	60	682	15	200	88	820
NE3-1205S	12 (10.8 ~ 13.2)	25	294	5	600	85	3300
NE3-1209S	12 (10.8 ~ 13.2)	30	281	9	333	89	1200
NE3-1212S	12 (10.8 ~ 13.2)	30	278	12	250	90	1000
NE3-1215S	12 (10.8 ~ 13.2)	30	275	15	200	91	820
NE3-2405S	24 (21.6 ~ 26.4)	15	147	5	600	85	3300
NE3-2409S	24 (21.6 ~ 26.4)	15	141	9	333	89	1200
NE3-2412S	24 (21.6 ~ 26.4)	15	139	12	250	90	1000
NE3-2415S	24 (21.6 ~ 26.4)	15	138	15	200	91	820

NOTE

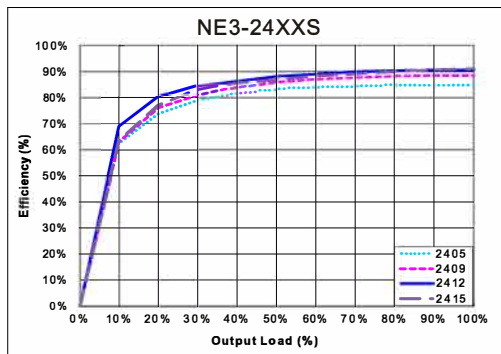
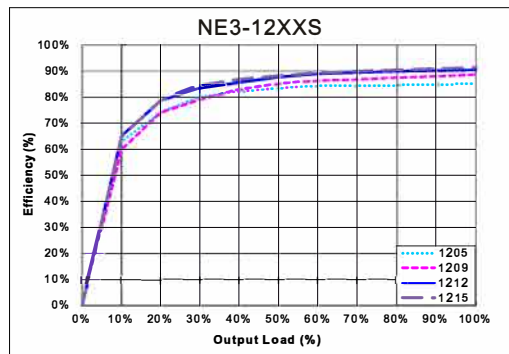
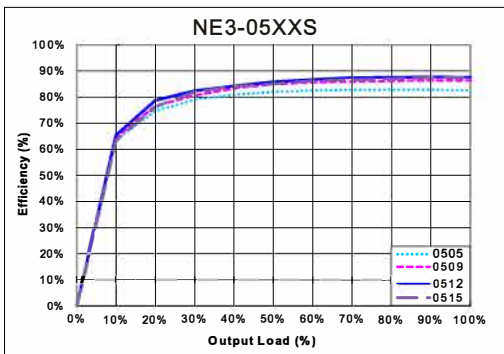
- Ripple/Noise measured with a 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor.
- Tested by minimal Vin and constant resistive load.
- Measured Input reflected ripple current with a simulated source inductance of 12 μ H and a source capacitor Cin(10 μ F, ESR<1.0 Ω at 100KHz).
- "Nature Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).
- Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.
- Input filter components are required to help meet conducted emission class B, which application refer to the EMI Filter of design & feature configuration.
- An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.
The filter capacitor Motien suggest: two electrolytic capacitors (Ruby-con BXF series, 100 μ F/250V) in parallel.
- Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.

DERATING CURVE AND EFFICIENCY vs OUTPUT CURRENT CURVE

Accuracy vs. Load

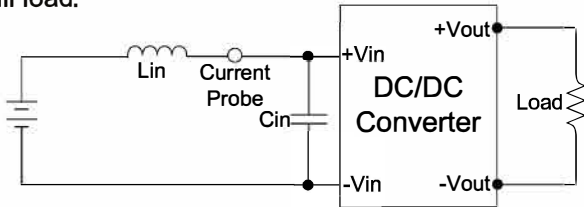


Efficiency vs. Load



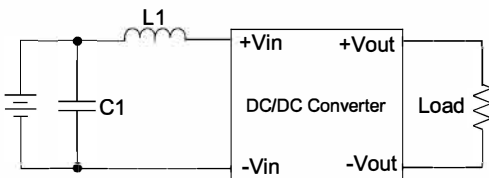
TEST CONFIGURATIONS
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through 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.


EMI Filter(Conducted Emissions)

Input filter components ($C1, L1$) are used to help meet conducted emissions requirement for the module.

These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.

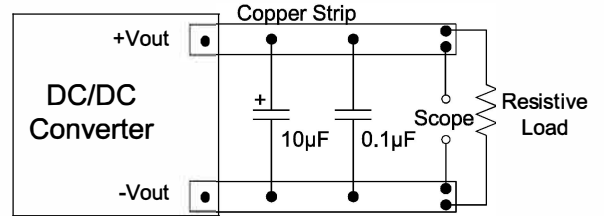


	C1	L1
NE3-05XXS	1206, $2.2\mu\text{F}$, 50V	$2.2\mu\text{H}$
NE3-12XXS	1206, $4.7\mu\text{F}$, 50V	$4.7\mu\text{H}$
NE3-24XXS	1206, $4.7\mu\text{F}$, 50V	$4.7\mu\text{H}$

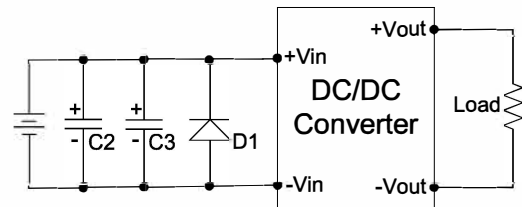
Output Ripple & Noise Measurement Test

Use a $10\mu\text{F}$ electrolytic capacitor and $0.1\mu\text{F}$ ceramic capacitor.

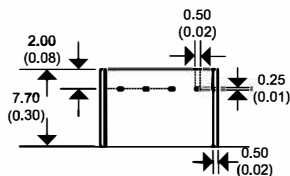
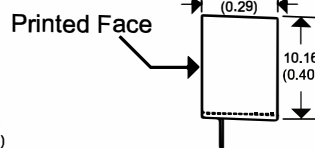
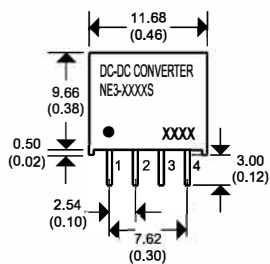
The Scope measurement bandwidth is 20MHz .


EFT/ Surge Filter

Input components ($C2, C3, D1$) are used to help meet IEC61000-4-4 and IEC61000-4-5.



	C2	C3	D1
NE3-05XXS	$100\mu\text{F}$, 250V	$100\mu\text{F}$, 250V	SMDJ8.0A
NE3-12XXS	$100\mu\text{F}$, 250V	$100\mu\text{F}$, 250V	SMDJ16A
NE3-24XXS	$100\mu\text{F}$, 250V	$100\mu\text{F}$, 250V	SMDJ30A

MECHANICAL SPECIFICATIONS

4 Pin SIL Package

- Notes : All dimensions are typical in millimeters (inches).
1. Pin diameter: 0.5 ± 0.05 (0.02 ± 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	-V Input
2	+V Input
3	-V Output
4	+V Output