ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	5200			VDC
Resistance	Viso= 500VDC		1		GΩ

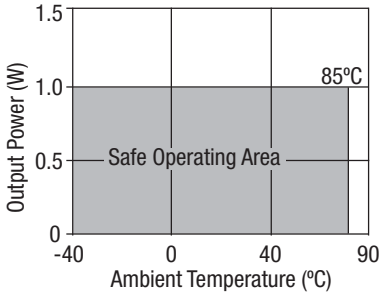
GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	Single output		45		kHz
	Dual output		70		

TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types, see safety approval section for UL temperature specification	-40		85	°C
Storage		-55		130	
Case Temperature above ambient	All output types			33	
Cooling	Free air convection				

TEMPERATURE DERATING GRAPH



TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

Murata Power Solutions NMJ series of DC-DC converters are all 100% production tested at their stated isolation voltage. This is 5.2kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

The NMJ series has been recognized by Underwriters Laboratory to 300Vrms for Supplementary Insulation and 150Vrms for Reinforced Insulation.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

SAFETY APPROVAL

The NMJ series has been recognised by Underwriters Laboratory (UL) to UL60950 for supplementary insulation up to 300Vrms and reinforced insulation up to 150Vrms at a maximum ambient temperature of 75ºC, measured on the side opposite the pins. File number E151252 applies.

RoHS COMPLIANCE INFORMATION

RoHS COMPLIANT

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 260ºC for 10 seconds. The pin termination finish on this product series is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems.
For further information, please visit www.murata-ps.com/rohs

APPLICATION NOTES

Minimum load

The minimum load to meet datasheet specification is 10% of the full rated load across the specified input voltage range. Lower than 10% minimum loading will result in an increase in output voltage, which may rise to typically double the specified output voltage if the output load falls to less than 5%.

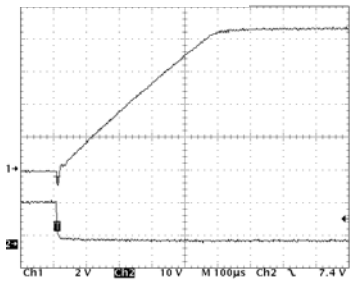
Capacitive loading and start up

Typical start up times for this series, with a typical input voltage rise time of 2.2µs and output capacitance of 10µF, are shown in the table below. The product series will start into a capacitance of 47µF with an increased start time, however, the maximum recommended output capacitance is 10µF.

	Start-up time
	µs
NMJ0505SC	2530
NMJ0509SC	7865
NMJ0512SC	13080
NMJ0515SC	21560
NMJ1205SC	2770
NMJ1209SC	20455
NMJ1212SC	14475
NMJ1215SC	22300
NMJ0303SAC	530
NMJ0503SAC	576

	Start-up time
	µs
NMJ0505SAC	1059
NMJ0509SAC	3454
NMJ0512SAC	7980
NMJ0515SAC	11505
NMJ1205SAC	1286
NMJ1209SAC	3548
NMJ1212SAC	7355
NMJ1215SAC	11535

Typical Start-Up Wave Form

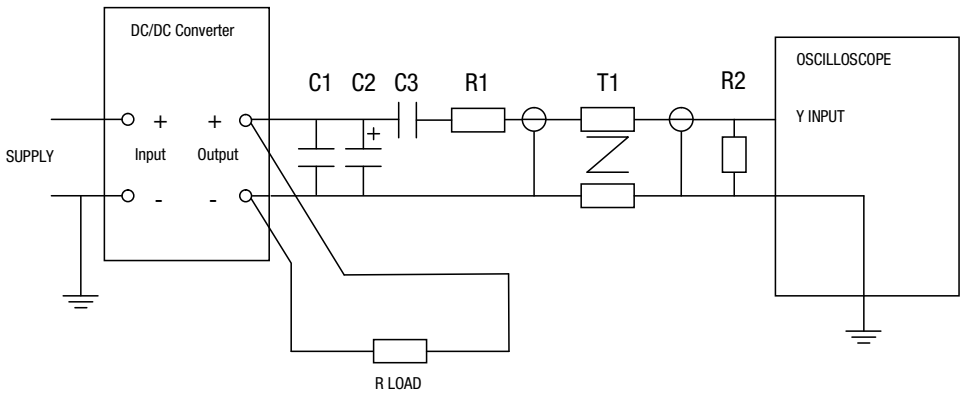


Ripple & Noise Characterisation Method

Ripple and noise measurements are performed with the following test configuration.

C1	1µF X7R multilayer ceramic capacitor, voltage rating to be a minimum of 3 times the output voltage of the DC-DC converter
C2	10µF tantalum capacitor, voltage rating to be a minimum of 1.5 times the output voltage of the DC-DC converter with an ESR of less than 100mΩ at 100 kHz
C3	100nF multilayer ceramic capacitor, general purpose
R1	450Ω resistor, carbon film, ±1% tolerance
R2	50Ω BNC termination
T1	3T of the coax cable through a ferrite toroid
RLOAD	Resistive load to the maximum power rating of the DC-DC converter. Connections should be made via twisted wires
Measured values are multiplied by 10 to obtain the specified values.	

Differential Mode Noise Test Schematic



APPLICATION NOTES (continued)

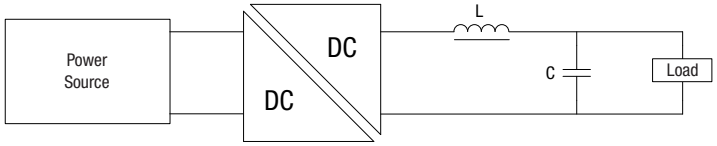
Output Ripple Reduction

By using the values of inductance and capacitance stated, the output ripple at the rated load is lowered to 5mV p-p max.

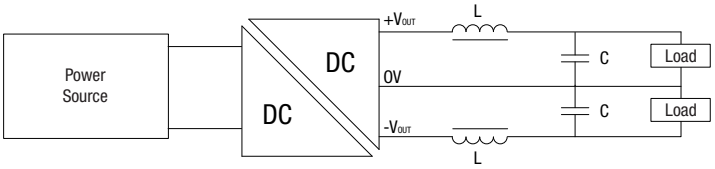
Component selection

Capacitor: It is required that the ESR (Equivalent Series Resistance) should be as low as possible, ceramic types are recommended.
The voltage rating should be at least twice (except for 15V output), the rated output voltage of the DC-DC converter.

Inductor: The rated current of the inductor should not be less than that of the output of the DC-DC converter. At the rated current, the DC resistance of the inductor should be such that the voltage drop across the inductor is <2% of the rated voltage of the DC-DC converter. The SRF (Self Resonant Frequency) should be >20MHz.



	Inductor			Capacitor
	L, µH	Through Hole	SMD	C, µF
3.3V single output types	22	22R223C	82223C	4.7
5V single output types	22	22R223C	82223C	4.7
9V single output types	47	22R473C	82473C	2.2
12V single output types	220	22R224C	82224C	0.47
15V single output types	220	22R224C	82224C	0.47

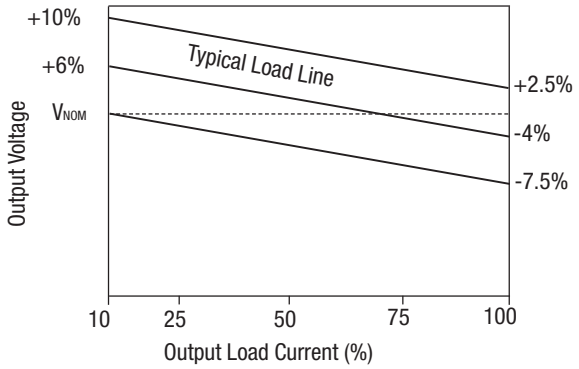


	Inductor			Capacitor
	L, µH	Through Hole	SMD	C, µF
5V dual output types	22	22R223C	82223C	4.70
9V dual output types	47	22R473C	82473C	2.2
12V dual output types	220	22R224C	82224C	0.47
15V dual output types	220	22R224C	82224C	0.47

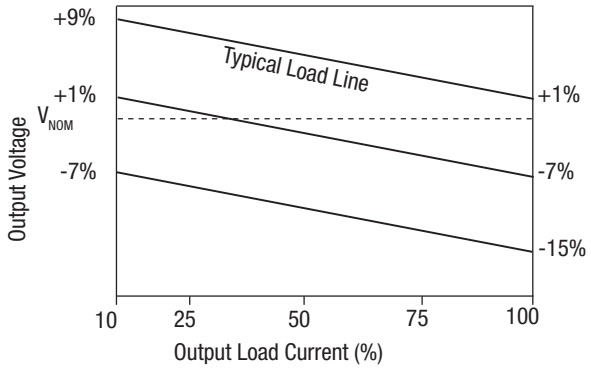
TOLERANCE ENVELOPES

The voltage tolerance envelopes show typical load regulation characteristics for this product series. The tolerance envelope is the maximum output voltage variation due to changes in output loading and set point accuracy.

3.3, 5, 9, 12 & 15V output types

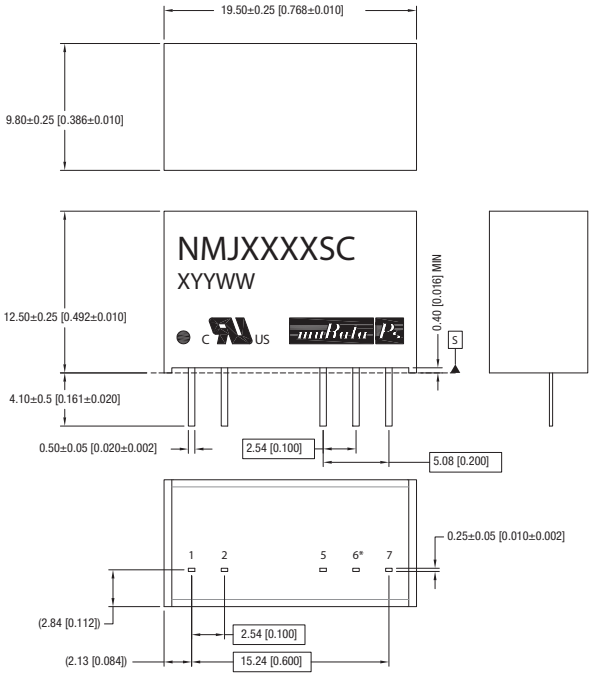


NMJ0303SAC



PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



* Pin not fitted on single output variants.

Weight: 4.3g

All dimensions in mm (inches) Controlling dimension is mm.

All pins on a 2.54 (0.100) pitch and within ±0.1 (0.004) of true position from pin 1 at seating plane 'S'

PIN CONNECTIONS

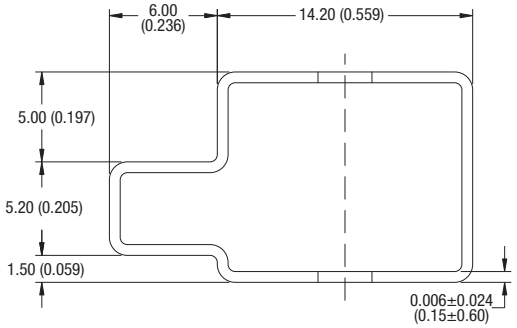
Dual Output

Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$-V_{OUT}$
6	0V
7	$+V_{OUT}$

Single Output

Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$-V_{OUT}$
7	$+V_{OUT}$

TUBE OUTLINE DIMENSIONS



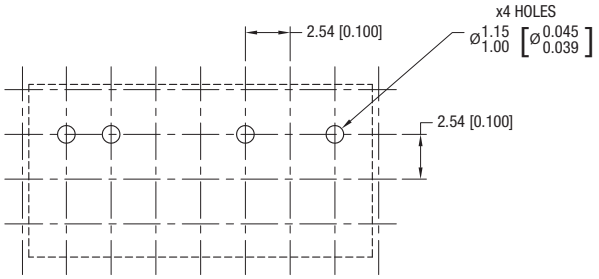
Unless otherwise stated all dimensions in mm ±0.5mm (inches ±0.02).

Tube length : 525mm±2mm (20.669±0.079).

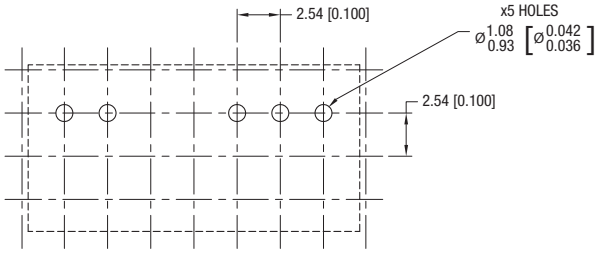
Tube Quantity : 25

RECOMMENDED FOOTPRINT DETAILS

Single Output Package:



Dual Output Package:



All dimensions in mm (inches) Controlling dimension is mm.