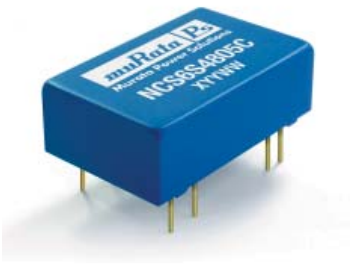
Murata Power Solutions

NCS6 Series

Isolated 6W 4:1 Input Single Output DC/DC Converters



FEATURES

- RoHS compliant
- 4:1 Wide range voltage input
- Operating temperature range –40°C to 85°C
- 0.06% Typical load regulation
- 1.5kVDC Isolation
- Efficiency from 75%
- 12V & 48V Nominal input
- Power density 0.94W/cm³
- UL 94V-0 Package materials
- No electrolytic capacitors
- Low noise
- Under voltage lock out
- Current fold back

PRODUCT OVERVIEW

The NCS6 series of DC/DC converters offers single output voltages from input voltage ranges of 9-36V and 18-75V. The NCS6 is housed in an industry standard package with a standard pinout. The NCS6 is packaged in a metal case for improved EMI shielding and is also encapsulated for superior thermal performance.

Applications include telecommunications, battery powered systems, process control and distributed power systems.

RoHS COMPLIANT 2002/95/EC

For full details go to www.murata-ps.com/rohs

SELECTION GUIDE

Order Code	Input Voltage	Output Voltage	Output Current	Input Current Current		Ripple & Noise (Typ.)	Efficiency		MTTF[1]
	Nom.		100% Load	0% Load	100% Load		Min.	Typ.	
	V	V	A	mA	mA	mV p-p	%	%	kHrs
NCS6S1203C*	12	3.3	1.52	10	550	150	75	76	
NCS6S1205C	12	5	1.2	7	610	30	79	82	521,975
NCS6S1212C	12	12	0.5	10	580	30	84	86	435,567
NCS6S1215C	12	15	0.4	12	580	30	85	87	437,582
NCS6S4803C*	48	3.3	1.52	10	150	150	73	75	
NCS6S4805C	48	5	1.2	6	160	30	78	80	441,850
NCS6S4812C	48	12	0.5	7	150	30	82	84	408,555
NCS6S4815C	48	15	0.4	7	150	30	83	84	416,319

* Contact factory for ordering status, samples available.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	All NCS6S12 types	9	12	36	V
	All NCS6S48 types	18	48	75	
Under voltage lock out	Turn on threshold NCS6S12		8.5		V
	Turn off threshold NCS6S12		7.5		
	Turn on threshold NCS6S48		16.7		
	Turn off threshold NCS6S48		15.8		
Reflected ripple current	All NCS6S12 types		12		mA p-p
	All NCS6S48 types		9		

OUTPUT CHARACTERISTICS

Parameter	Conditions		Min.	Typ.	Max.	Units
Rated power	5V, 12V & 15V output types				6	W
	3.3V output types				5	
Voltage set point accuracy					±2	%
Line regulation	Low line to high line			0.002	0.2	%
Load Regulation	10% total load to 100% total load	NCS6Sxx05C		0.3	0.5	%
		NCS6Sxx12C, NCS6Sxx15C		0.06	0.2	
Start-up Time	5V output types			2.5		mS
	12V output types			4.6		
	15V output types			5.5		

ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 seconds	1500			VDC
Resistance	Viso = 1kVDC	1			GΩ
Capacitance			225		pF

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection (for SELV input voltages)	Continuous
Internal power dissipation	2.1W
Lead temperature 1.0mm from case for 10 seconds (to JEDEC JESD22-B106 ISS C)	260°C
Minimum output load for specification (see application notes)	10% of rated load
Input voltage, NCS6 12V input types	40V
Input voltage, NCS6 48V input types	80V

1 Calculated using MIL-HDBK-217F FN2, parts stress method with nominal input voltage at full load.

All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

GENERAL CHARACTERISTICS[1]

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency			180		kHz

TEMPERATURE CHARACTERISTICS

Parameter	Conditions		Min.	Typ.	Max.	Units
Operation			-40		85	°C
Storage			-50		100	
Case temperature rise above ambient	100% Load, Nom V_{IN}, Still Air,	3.3V				
		5V		32		
		12V		28		
		15V		26		
Thermal shutdown	Case Temperature			110		

APPLICATION NOTES

Output Capacitors

The NCS6 series does not require output capacitors to meet datasheet specification. To meet datasheet specification, output capacitance should not exceed:

Output Voltage (V)	Output Capacitance (µF)
3.3	470
5	470
12	220
15	220

Minimum Load

The minimum load to meet full datasheet specification is 10% of the full rated load across the specified input voltage range.
Between 0% and 10% output loading, the output voltage will remain within data sheet specification however, output ripple and noise will increase but will still be below 50mV p-p.

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 NCS6 series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1.5kVDC for 1 second.

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

For a part holding no specific agency approvals, such as the NCS6 series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

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. The NCS6 series has an ER ferrite core, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. 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.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

RoHS COMPLIANCE INFORMATION

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 a Gold flash (0.05-0.10 micron) over Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems. For further information, please visit www.murata-ps.com/rohs

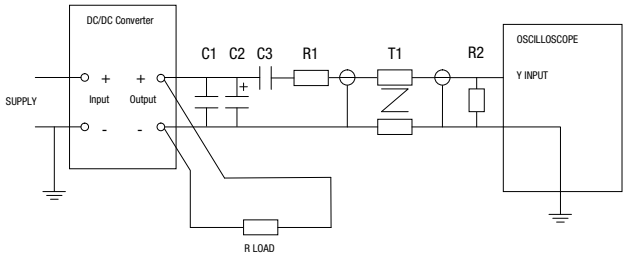
CHARACTERISATION TEST METHODS

Ripple & Noise Characterisation Method

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

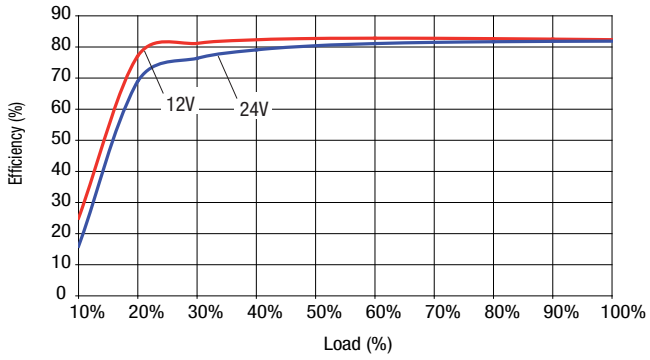
C1	1uF X7R multilayer ceramic capacitor, voltage rating to be a minimum of 3 times the output voltage of the DC/DC converter
C2	10uF tantalum capacitor, voltage rating to be a minimum of 1.5 times the output voltage of the DC/DC converter with an ESR of less than 100mΩ at 100 kHz
C3	100nF multilayer 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



EFFICIENCY VS LOAD

NCS6S1205C



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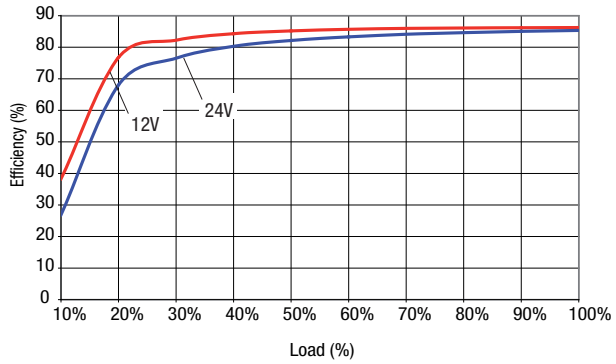

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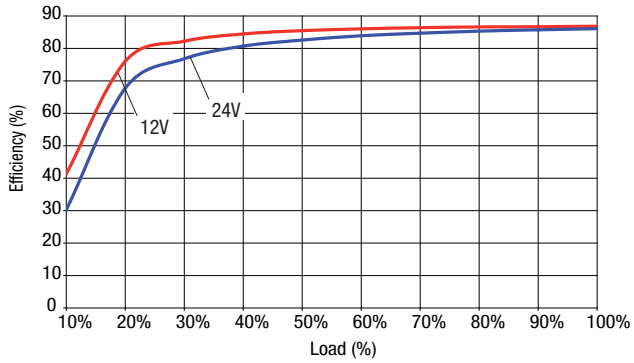

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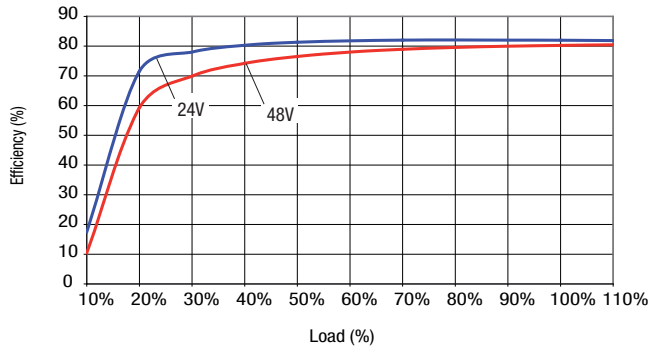

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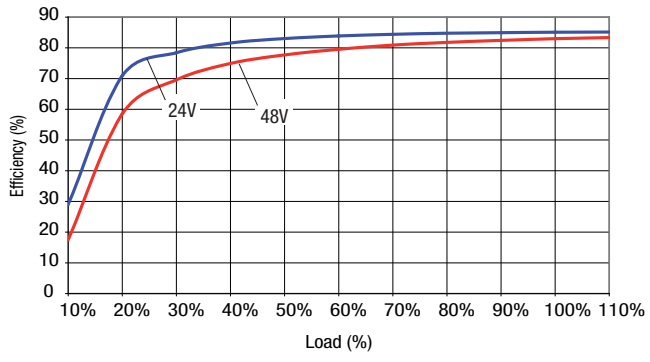

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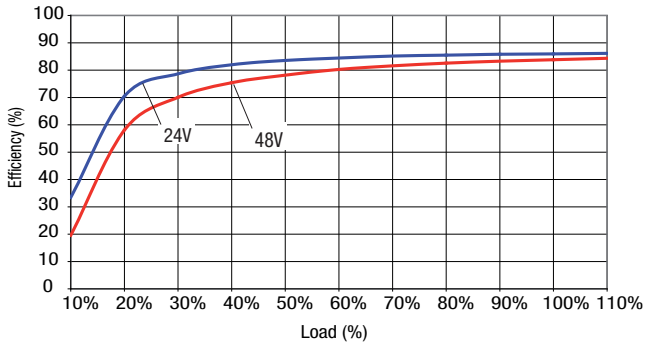
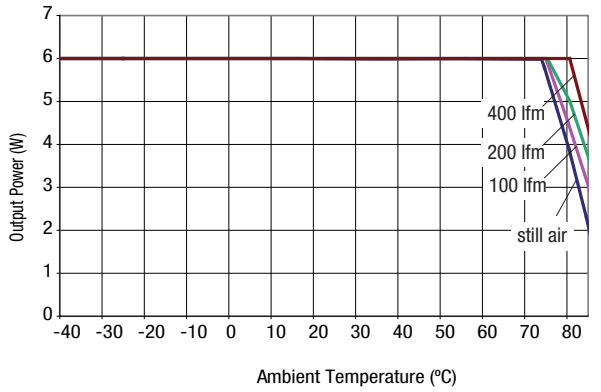


TEMPERATURE DERATING

NCS6S1205C



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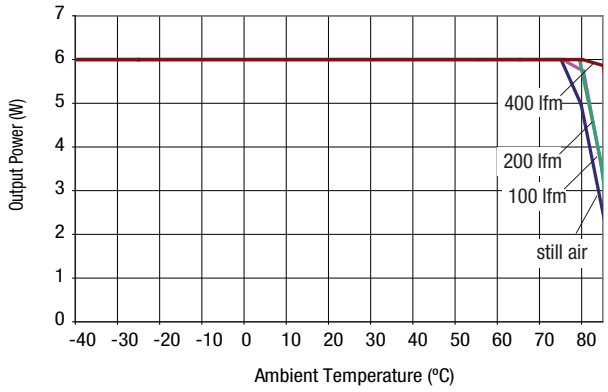

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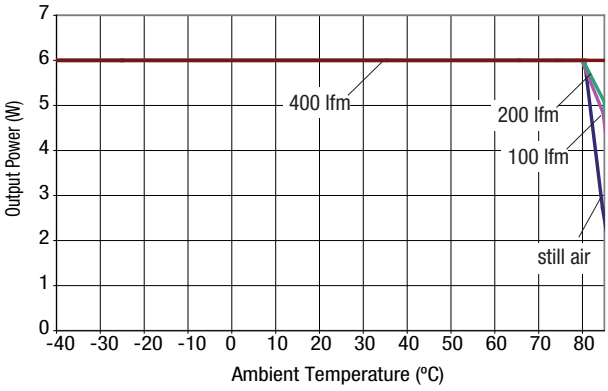

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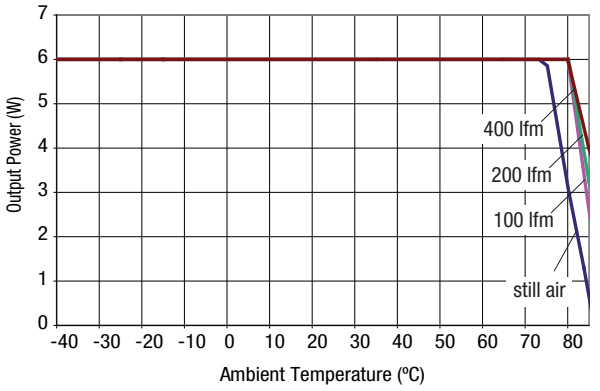

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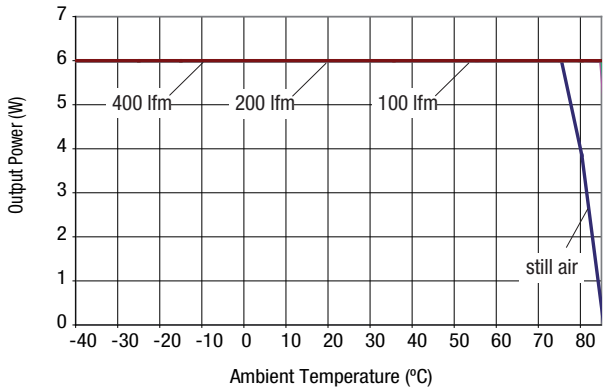

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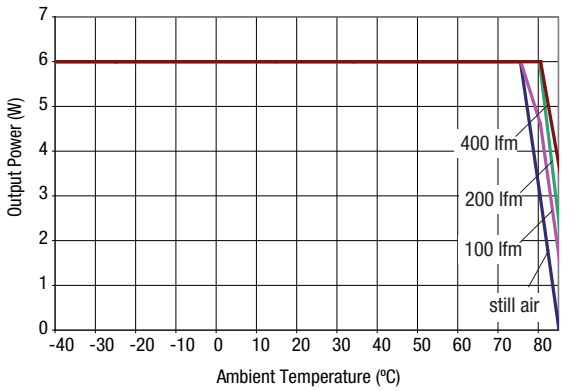
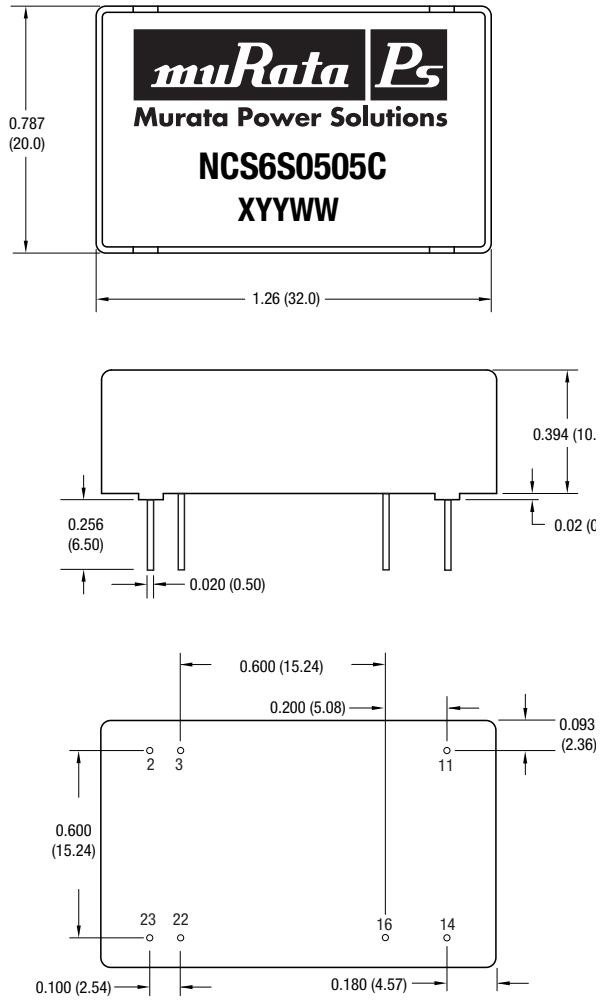


PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



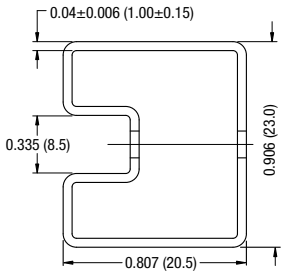
All dimensions in inches ±0.010 (mm 0.25mm).
All pins on a 0.100 (2.54) pitch and within 0.010 (0.25) of true position.

Weight: 17g

PIN CONNECTIONS

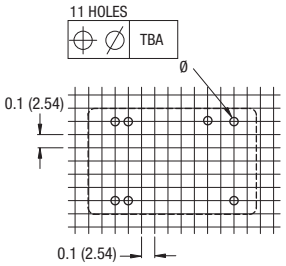
Pin	Function
	Single
2	$-V_{IN}$
3	$-V_{IN}$
11	N/C
14	$+V_{OUT}$
16	$-V_{OUT}$
22	$+V_{IN}$
23	$+V_{IN}$

TUBE OUTLINE DIMENSIONS



Tube length 20.47 (520))
All dimensions in inches ±0.010 (mm 0.25mm). Quantity: 15

RECOMMENDED FOOTPRINT DETAILS



All dimensions in inches ±0.010 (mm 0.25mm).

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