

NCS6 Series

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



FEATURES

- UL 60950 recognized
- RoHS compliant
- 4:1 Wide range voltage input
- Operating temperature range –40°C to 85°C
- Typical load regulation from 0.06%
- 1.5kVDC Isolation
- Typical efficiency to 87%
- 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 & dual 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.







SELECTION GUIDI	E								
	Input Voltage	Output	Output Current	Input (Current	Ripple &	Effici	ency	NATTE:
Order Code	Nom.	Voltage	100% Load	0% Load	100% Load	Noise (Typ.)	Min.	Тур.	MTTF ¹
	V	V	Α	mA	mA	mV p-p	%	%	Hrs
NCS6D1205C	12	±5	±0.6	7	610	15	80	82	384,470
NCS6D1212C	12	±12	±0.25	10	580	10	82	86	406,121
NCS6D1215C	12	±15	±0.2	12	580	20	84	87	344,957
NCS6S1203C	12	3.3	1.52	10	550	30	75	78	662,073
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
NCS6D4805C	48	±5	±0.6	6	160	50	79	80	373,195
NCS6D4812C	48	±12	±0.25	7	150	30	82	84	391,563
NCS6D4815C	48	±15	±0.2	7	150	30	82	84	330,752
NCS6S4803C	48	3.3	1.52	10	150	40	73	76	483,460
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

INPUT CHARACTERIST	ICS						
Parameter	Conditions	Conditions		Тур.	Max.	Units	
12V input types		9	12	36	V		
Voltage range	48V input types		18	48	75	V	
	Turn on threshold 1:	2V input types		8.5			
Under veltage leek out	Turn off threshold 1		7.5		V		
Under voltage lock out	Turn on threshold 48		16.7				
	Turn off threshold 4	8V input types		15.8			
	10V input types	Single output types		12			
Reflected ripple current	12V input types	Dual output types		4			
	40V input tupos	Single output types		9		mAn n	
	48V input types	Dual output types		6		mA p-p	

OUTPUT CHARACTERIS Parameter	Conditions		Min.	Typ.	Max.	Units
Talamotol	5V, 12V & 15V output 1	tynes	IVIIII.	Typ.	6	Office
Rated power	3.3V output types	туроз			5	W
	Positive outputs				+2	
Voltage set point accuracy	•				±2	%
	Negative outputs	B		0.000		70
Line regulation	Low line to high line	Positive outputs		0.002	0.2	%
		Negative outputs		0.09	0.7	
		3V outputs		0.5	0.6	
Load Regulation	10% total load to	5V positive outputs		0.3	0.5	2 %
	100% total load	12V & 15V positive outputs		0.06	0.2	
		All negative outputs		0.2	1.0	
Cross Degulation	% voltage change on negative output when positive load varies	5V			5	%
Cross Regulation	from 12.5% to 37.5% with negative load fixed at 50%	12V & 15V			2.5	90
	3.3V & 5V output	Single output types		2.5		
	types	Dual output types		25		
a	101/	Single output types		4.6		
Start-up Time	12V output types	Dual output types		11		mS
		Single output types		5.5		
	15V output types	Dual output types		14		

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

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



ISOLATION CHARACTERISTICS					
Parameter	Conditions	Min.	Тур.	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

GENERAL CHARACTERISTICS ¹					
Parameter	Conditions	Min.	Тур.	Max.	Units
Switching frequency			180		kHz

TEMPERATURE CHARACTERISTICS							
Parameter	Conditions			Min.	Тур.	Max.	Units
Operation				-40		85	
Storage				-50		125	
			5V		36		
		48V _{IN} Dual outputs	12V		32		
	1000/ Lond Now V	100% Load Nove V			31		°C
Case temperature rise above ambient	re rise above ambient 100% Load, Nom V _{IN} , Still Air		3.3V		32		U
	Juli All	All other output types	5V		32		
		All other output types	12V		28		
			15V		26		
Thermal shutdown	Case Temperature				105		

APPLICATION NOTES

Output Capacitors

The NCS6 series does not require output capacitors to meet datasheet specification. To meet datasheet specification, total 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 positive output voltage will remain within data sheet specification however, output ripple and noise will increase as well as a decrease in accuracy on negative outputs.



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?"

The NCS6 has been recognized by Underwriters Laboratory for functional isolation. 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.

SAFETY APPROVAL

The NCS6 series has been recognised by Underwriters Laboratory (UL) to UL 60950 for functional insulation in a maximum ambient temperature of 85°C and/or case temperature limit of 120°C (case temperature measured on the face opposite the pins). File number E151252 applies.

Note: This series gained UL 60950 recognition for products manufactured on or after datecode G1114, any NCS6 parts manufactured before this date code should not be considered UL 60950 recognized. Any NCS6 that is UL recognized will be printed with the UL logo.

Rohs Compliance Information



This series is compatible with RoHS soldering systems with a peak wave solder temperature of 260°C 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

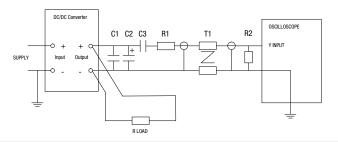
CHARACTERISATION TEST METHODS

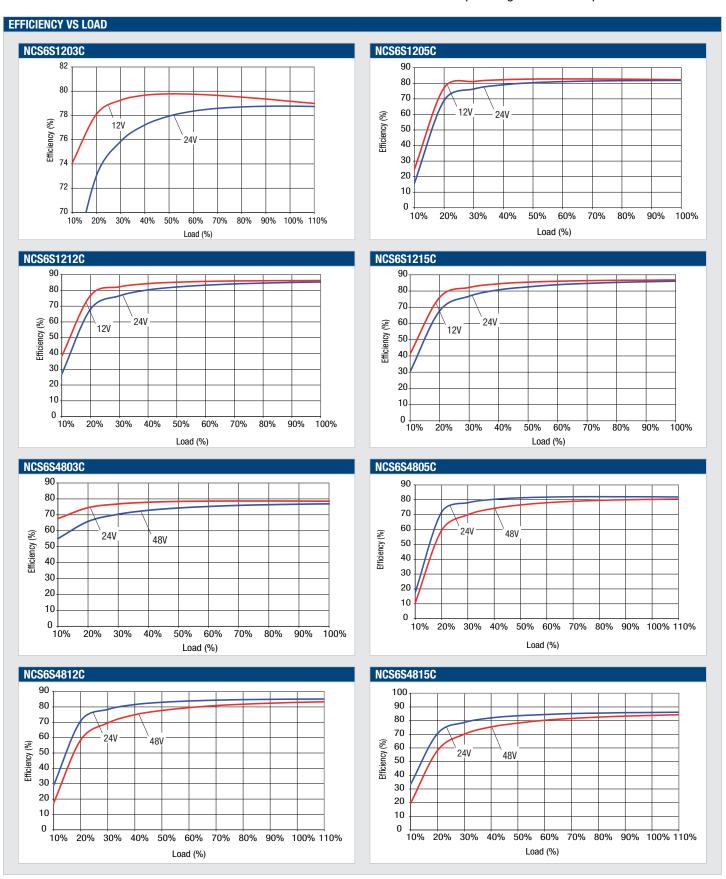
Ripple & Noise Characterisation Method

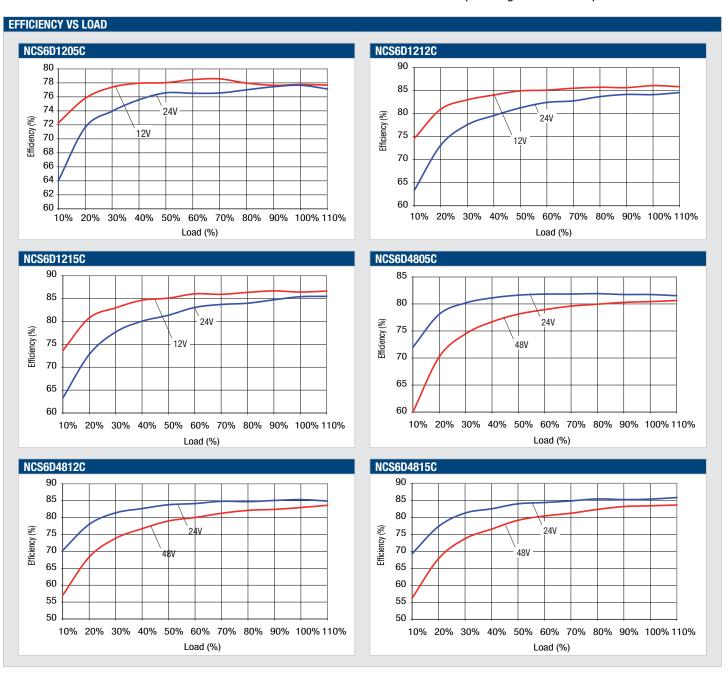
Ripple and noise measurements are performed with the following test configuration.

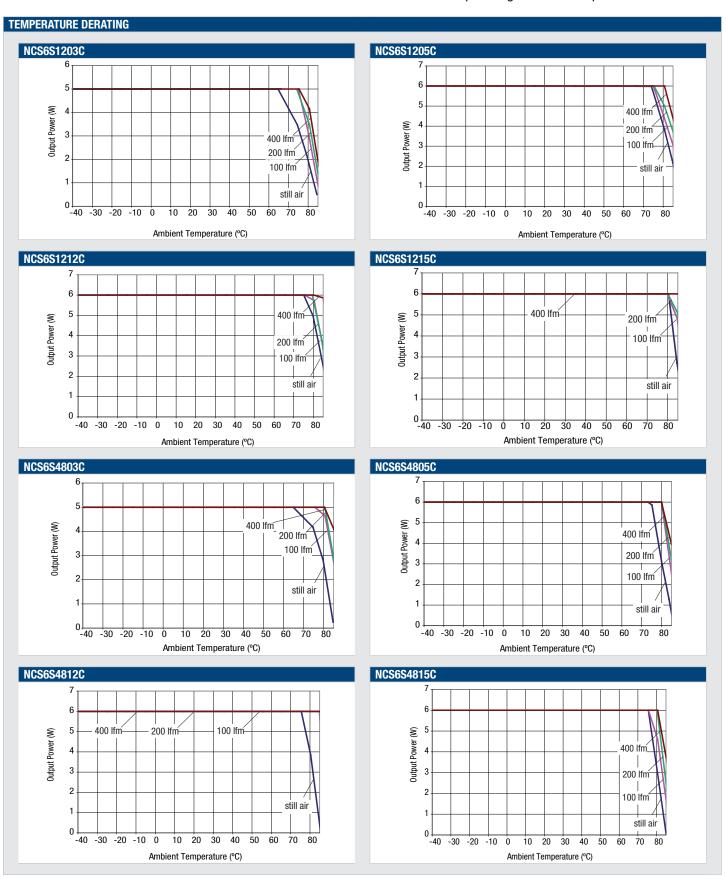
C1	1μF X7R multilayer ceramic capacitor, voltage rating to be a minimum of 3 times the output voltage of the DC/DC converter
C2	$10\mu F$ tantalum capacitor, voltage rating to be a minimum of 1.5 times the output voltage of the DC/DC converter with an ESR of less than $100 \text{m}\Omega$ at 100kHz
C3	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 va	ues are multiplied by 10 to obtain the specified values.

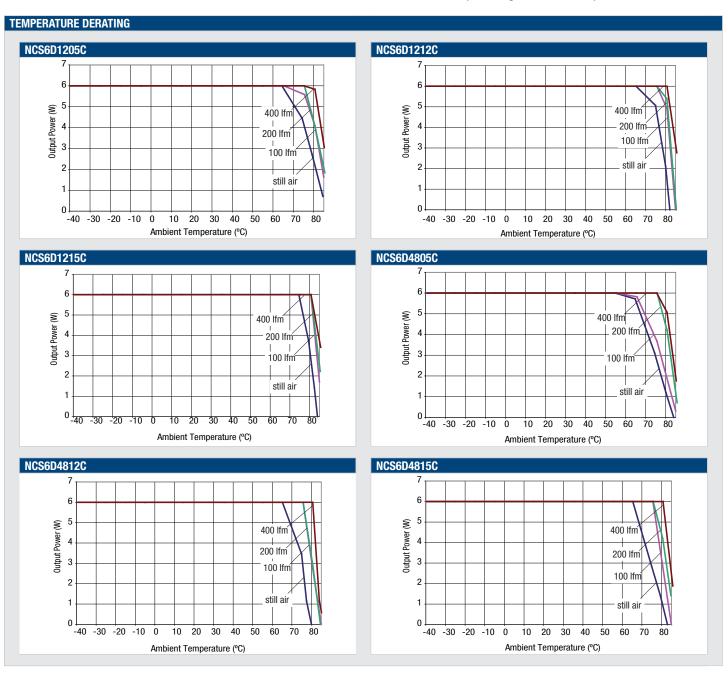
Differential Mode Noise Test Schematic











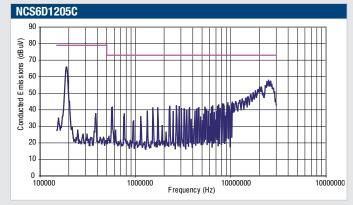
EMC FILTERING AND SPECTRA

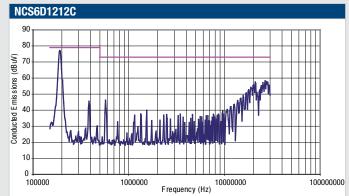
FILTERING

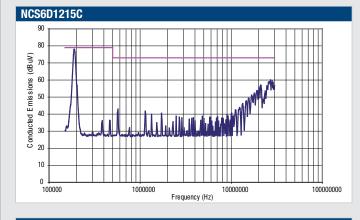
The module includes a basic level of filtering, the following table shows the additional input capacitor typically required to meet EN 55022 Curve A Quasi-Peak EMC limit, as shown in the below plots.

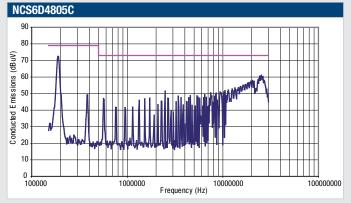
NCS6D1205C	2.2µF
NCS6D1212C	none
NCS6D1215C	none
NCS6D4805C	10µF
NCS6D4812C	10μF
NCS6D4815C	10μF

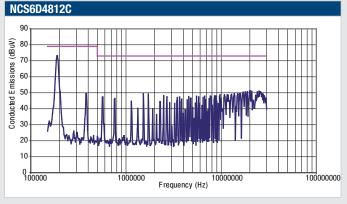
NCS6S1203C	4.7µF
NCS6S1205C	4.7µF
NCS6S1212C	10μF
NCS6S1215C	10μF
NCS6S4803C	4.7µF
NCS6S4805C	10μF
NCS6S4812C	10μF
NCS6S4815C	10μF

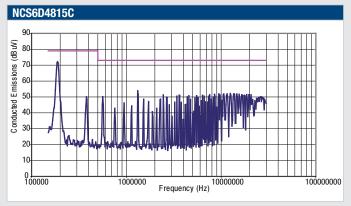


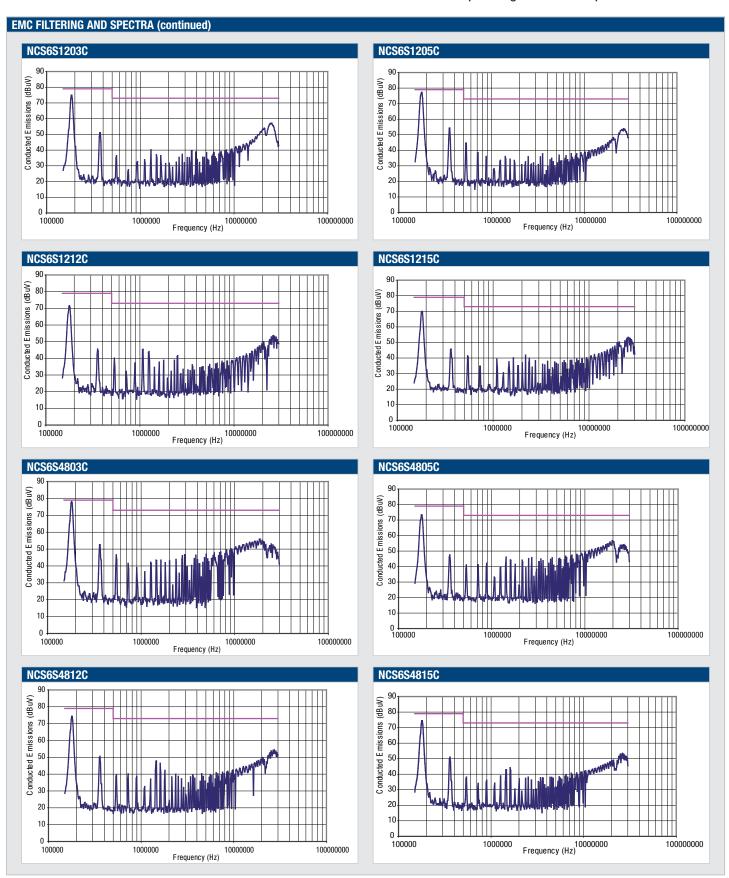




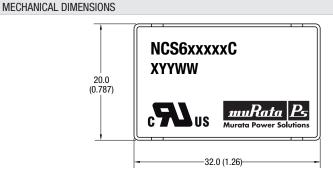


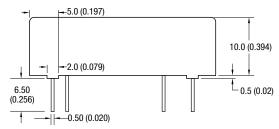


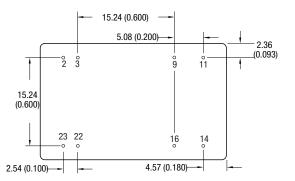




PACKAGE SPECIFICATIONS







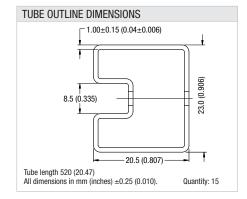
All dimensions in mm (inches) \pm 0.5 (0.020) except pin to pin tolerance \pm 0.25 (0.010). All pins on a 2.54 (0.100) pitch and within 0.25 (0.010) of true position.

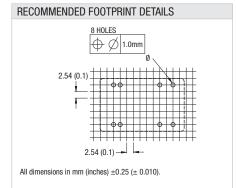
The copper case is connected to the output (-Vour) pin. Care is needed in the design of this circuit board on which the converter is mounted. Top side tracks must not contact the edge of the case on the underside of the unit.

Please note that from 2010 onwards, you may receive either a blue or a black case.

PIN CONNECTIONS

Pin	Functi	on
ГШ	Single	Dual
2	-V _{IN}	-VIN
3	-V _{IN}	-VIN
9	No pin	OV
11	N/C	-Vout
14	+V out	+V out
16	-V _{OUT}	OV
22	+VIN	+VIN
23	+VIN	+VIN





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Weight: 17g

This product is subject to the following <u>operating requirements</u> and the <u>Life and Safety Critical Application Sales Policy</u>:

Refer to: http://www.murata-ps.com/requirements/

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