NCS6 Series





FEATURES

- UL 60950 recognised
- 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.



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	Input Voltage	Output	Output Current	Input Current		Ripple &	Effici	ency	MATTE
Order Code	Nom.	Voltage	100% Load	0% Load	100% Load	Noise (Typ.)	Min.	Тур.	MTTF
	V	V	А	mA	mA	mV p-p	%	%	Hrs
NCS6D1205C	12	±5	±0.6	7	610	15	80	82	384,47
NCS6D1212C	12	±12	±0.25	10	580	10	82	86	406,12
NCS6D1215C	12	±15	±0.2	12	580	20	84	87	344,95
NCS6S1203C	12	3.3	1.52	10	550	30	75	78	662,07
NCS6S1205C	12	5	1.2	7	610	30	79	82	521,97
NCS6S1212C	12	12	0.5	10	580	30	84	86	435,56
NCS6S1215C	12	15	0.4	12	580	30	85	87	437,58
NCS6D4805C	48	±5	±0.6	6	160	50	79	80	373,19
NCS6D4812C	48	±12	±0.25	7	150	30	82	84	391,56
NCS6D4815C	48	±15	±0.2	7	150	30	82	84	330,75
NCS6S4803C	48	3.3	1.52	10	150	40	73	76	483,46
NCS6S4805C	48	5	1.2	6	160	30	78	80	441,85
NCS6S4812C	48	12	0.5	7	150	30	82	84	408,55
NCS6S4815C	48	15	0.4	7	150	30	83	84	416,31

CS					
Conditions		Min.	Тур.	Max.	Units
12V input types	9	12	36	v	
48V input types		18	48	75	v
Turn on threshold 12V input types			8.5		
Turn off threshold 12V input types			7.5		V
Turn on threshold 48V i		16.7		v	
Turn off threshold 48V		15.8			
1.2V input types	Single output types		12		
12v Iliput types	Dual output types		4		
19V input types	Single output types		9		mAnn
40V IIIput types	Dual output types		6		mA p-p
	Conditions 12V input types 48V input types Turn on threshold 12V Turn off threshold 12V Turn on threshold 48V	Conditions 12V input types 48V input types Turn on threshold 12V input types Turn off threshold 12V input types Turn on threshold 48V input types Turn off threshold 48V input types 12V input types Single output types Ural output types 48V input types Single output types Single output types Single output types	Conditions Min. 12V input types 9 48V input types 18 Turn on threshold 12V input types 1 Turn off threshold 12V input types 1 Turn off threshold 12V input types 1 Turn off threshold 48V input types 1 12V input types 1 12V input types 1 Single output types 1 48V input types 1 Single output types 1	$\begin{array}{c c} \mbox{Conditions} & \mbox{Min.} & \mbox{Typ.} \\ 12V input types & \mbox{9} & 12 \\ 48V input types & \mbox{18} & 48 \\ 1urn on threshold 12V input types & \mbox{18} & 8.5 \\ 1urn off threshold 12V input types & \mbox{7.5} \\ 1urn off threshold 48V input types & \mbox{16.7} \\ 1urn off threshold 48V input types & \mbox{16.7} \\ 12V input types & \mbox{12} & \mbox{5ingle output types} & \mbox{12} & \mbox{12} \\ 12V input types & \mbox{3ingle output types} & \mbox{4} \\ 48V input types & \mbox{9} & \mbox{9} \\ \end{array}$	$\begin{array}{c c c c c c c } \hline \mbox{Conditions} & \mbox{Min.} & \mbox{Typ.} & \mbox{Max.} \\ \hline 12V input types & \mbox{9} & 12 & 36 \\ \hline 48V input types & \mbox{18} & 48 & 75 \\ \hline 18 & 48 & 75 \\ \hline 18 & 48 & 75 \\ \hline 18 & 48 & \mbox{75} & \mbox{8.5} & \mbox{75} \\ \hline 18 & \mbox{48V} & \mbox{199} types & \mbox{7.5} & \mbox{7.5} & \mbox{7.5} \\ \hline 19 & \mbox{101} types & \mbox{16.7} & \mbox{7.5} \\ \hline 12V input types & \mbox{12} & \mbox{199} & \mbox{12} & \mbox{11} \\ \hline 12V input types & \mbox{12} & \mbox{13} & \mbox{14} & \mbo$

OUTPL	JT CHARACTERIS	TICS	5
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Parameter	Conditions		Min.	Тур.	Max.	Units
Dated power	5V, 12V & 15V output	5V, 12V & 15V output types			6	w
Rated power	3.3V output types			5	vv	
	Positive outputs				±2	
Voltage set point accuracy	Negative outputs				±3	%
Line regulation	Low line to high line	Positive outputs		0.002	0.2	%
Line regulation	Low line to high line	Negative outputs		0.09	0.7	70
		3V outputs		0.5	0.6	
Load Desulation	10% total load to 100% total load	5V positive outputs		0.3	0.5	%
Load Regulation		12V & 15V positive outputs		0.06	0.2	
		All negative outputs		0.2	1.0	
Orace Devulation	% 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	%
	3.3V & 5V output	Single output types		2.5		
	types	Dual output types		25		
Ctart un Tima	10V output types	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.

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NCS6 Series

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

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

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

TEMPERATURE CHARACTERISTICS								
Parameter	Conditions						Units	
Operation	All output types (see dera	Il output types (see derating graphs)				85		
Storage						125		
	100% Load, Nom Vℕ, Still Air		5V		36			
		48VIN Dual outputs	12V		32		°C	
			15V		31			
Case temperature rise above ambient		All other output types	3.3V		32			
			5V		32			
			12V		28			
			15V		26			
Thermal shutdown	Case Temperature				105			

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
Wave solder	Wave Solder profile not to exceed the profile recommended in IEC 61760-1 Section 6.1.3. Please refer to <u>application notes</u> for further information.
Input voltage, NCS6 12V input types	40V
Input voltage, NCS6 48V input types	80V

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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 recognised 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 enamelled 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 recognised 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.

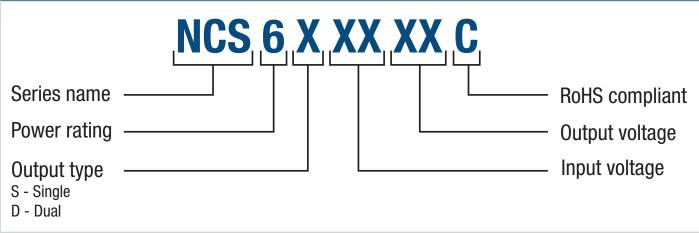
Note: This series gained UL 60950 recognition for products manufactured on or after datecode G1114, any NCS6 parts manufactured before this date code should not be considered UL 60950 recognised. Any NCS6 that is UL recognised will be printed with the UL logo.

RoHS COMPLIANCE INFORMATION



This series is compatible with RoHS soldering systems with a peak wave solder temperature of 260°C for 10 seconds. Please refer to <u>application</u> <u>notes</u> for further information. 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

PART NUMBER STRUCTURE



NCS6 Series

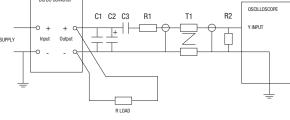
Isolated 6W 4:1 Input Single & Dual Output DC-DC Converters

CHARACTERISATION TEST METHODS

Ripple & Noise Characterisation Method

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

02	10 μ 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 100m Ω at 100 kHz					
23	100nF multilayer ceramic capacitor, general purpose					
31	450Ω resistor, carbon film, ±1% tolerance					
32	50Ω BNC termination					
51	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 value	es are multiplied by 10 to obtain the specified values.					



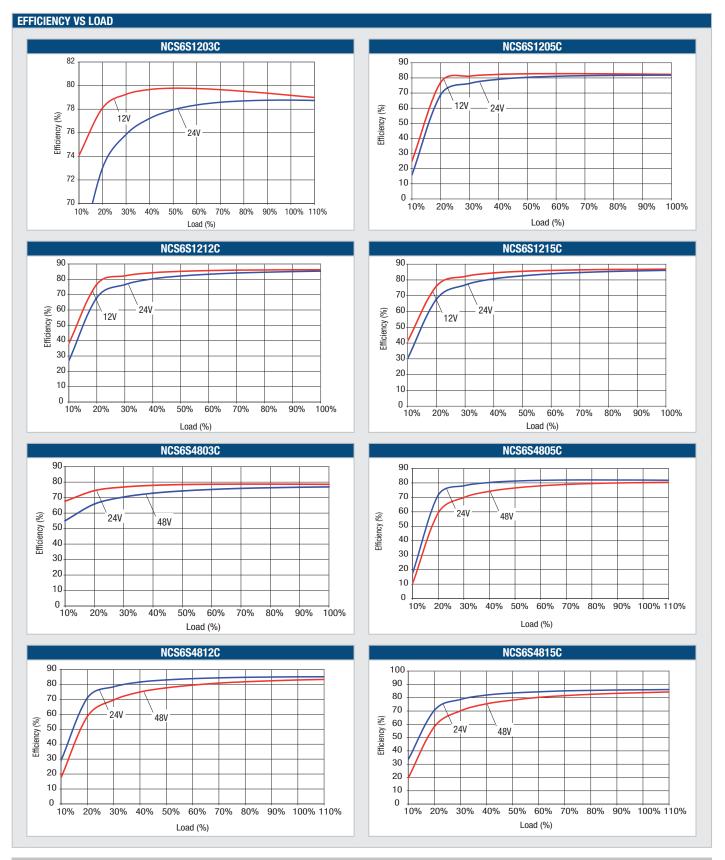
APPLICATION NOTES

Output Capacitors Output Capacitors Output voltage (V) Output capacitance (µF) 3.3 470 5 470 12 220 15 220

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.

NCS6 Series

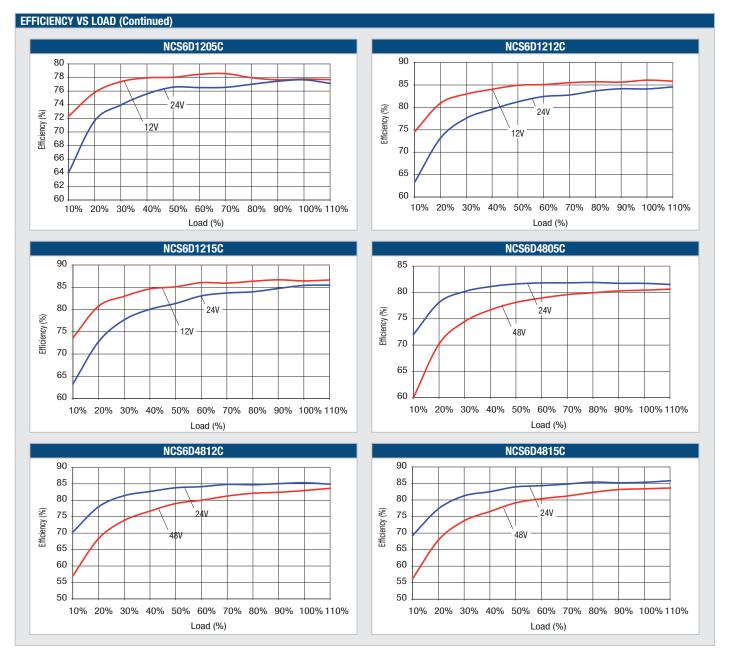
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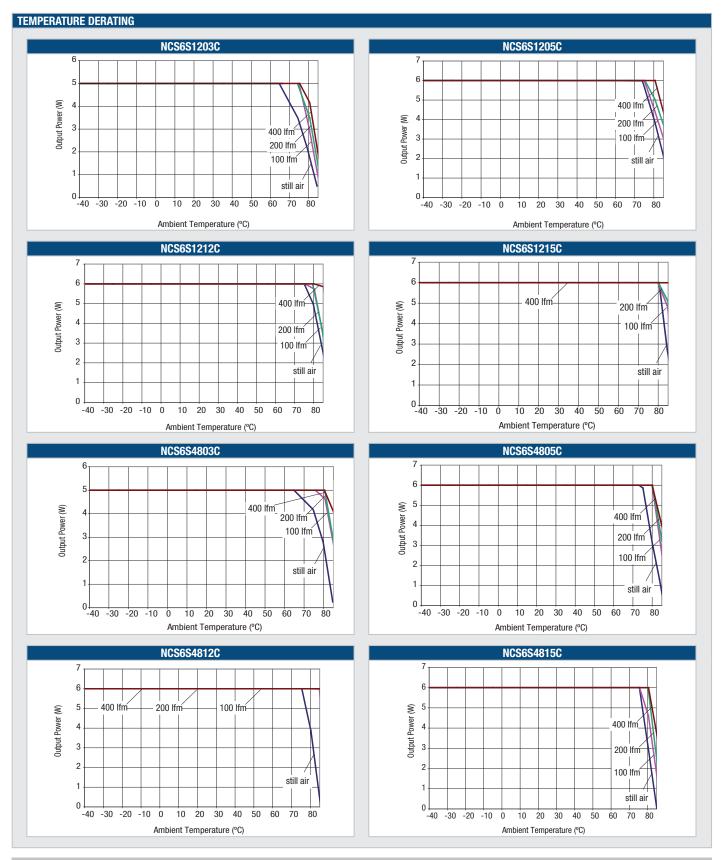
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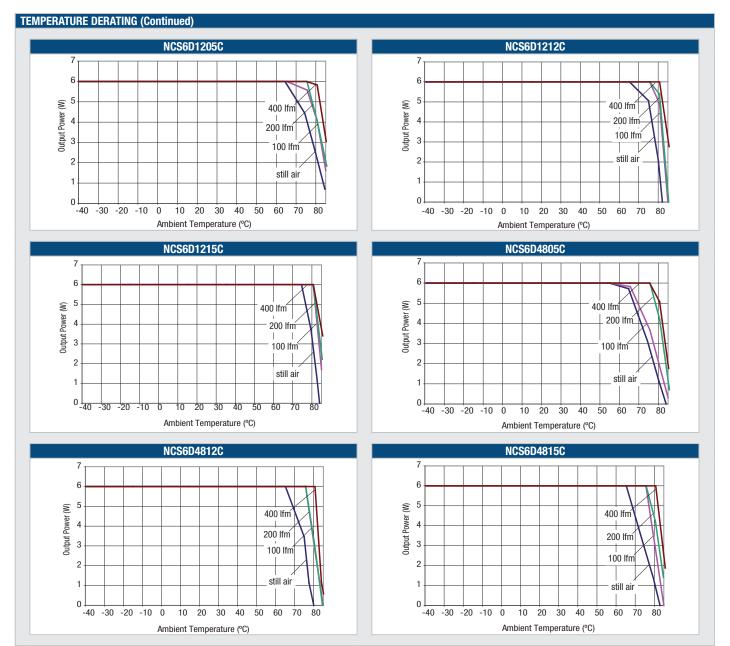
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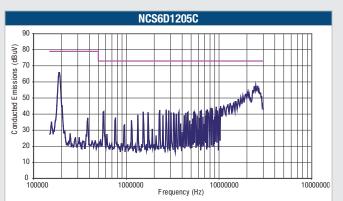
Isolated 6W 4:1 Input Single & Dual Output DC-DC Converters

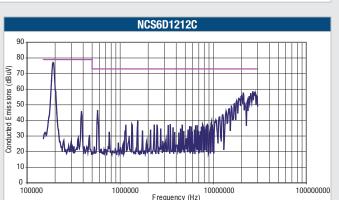
EMC FILTERING AND SPECTRA

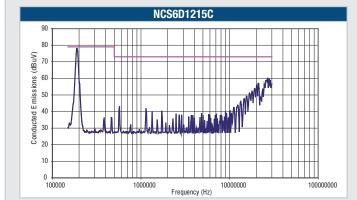
FILTERING

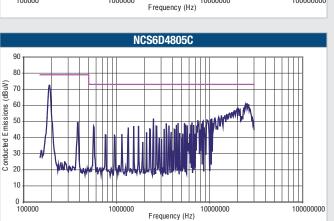
The module includes a basic level of filtering, the following table shows the additional input capacitor typically required to meet EN 55022 Curve A Quasi-Peak EMC limit, as shown in the below plots.

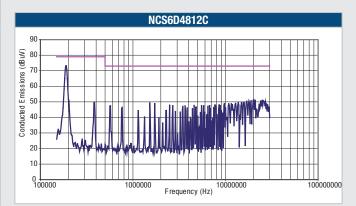
NCS6D1205C	2.2µF	NCS6S1203C	4.7µF
NCS6D1212C	none	NCS6S1205C	4.7µF
NCS6D1215C	none	NCS6S1212C	10µF
NCS6D4805C	10µF	NCS6S1215C	10µF
NCS6D4812C	10µF	NCS6S4803C	4.7µF
NCS6D4815C	10µF	NCS6S4805C	10µF
		NCS6S4812C	10µF
		NCS6S4815C	10µF

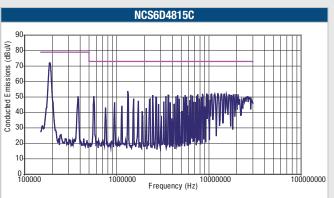








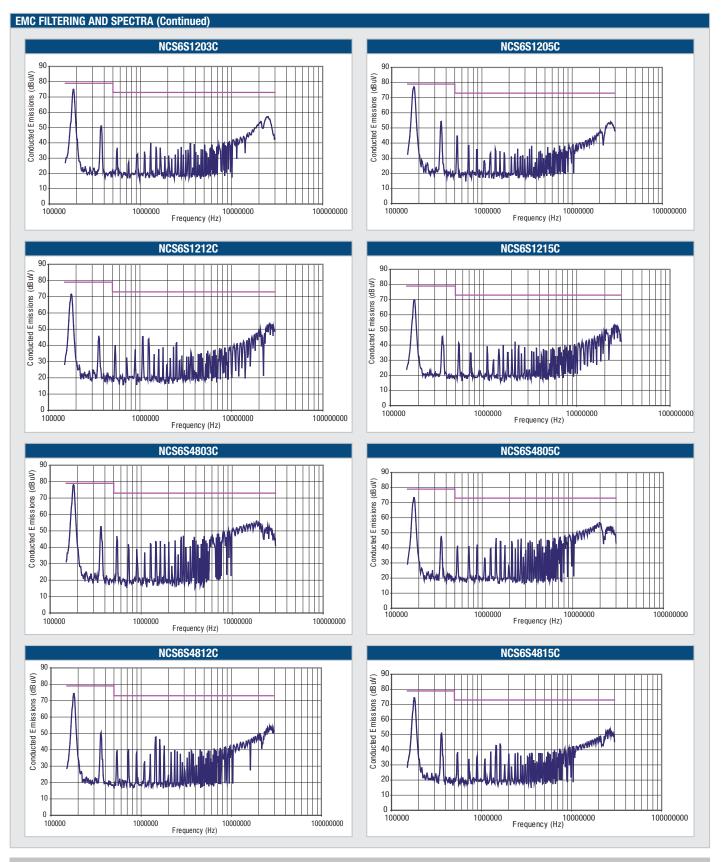




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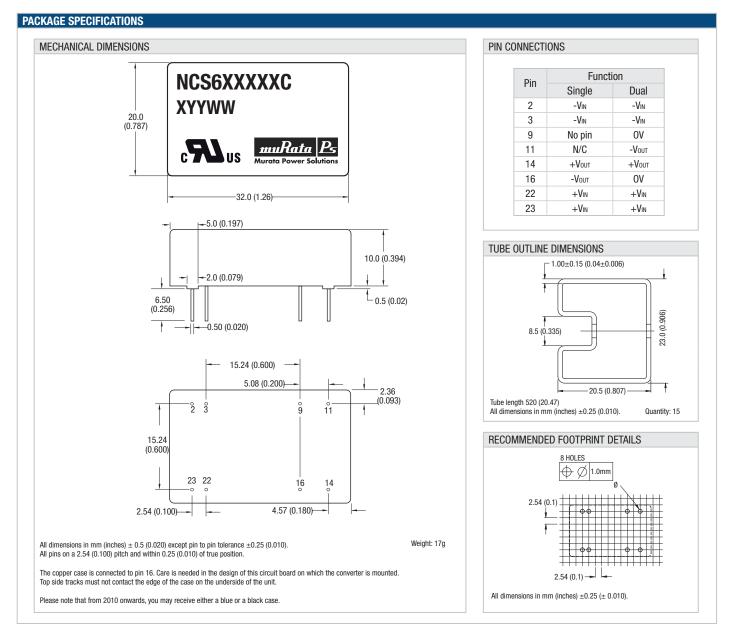


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DISCLAIMER

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Particularly for safety-critical and/or life-critical applications, i.e. applications that may directly endanger or cause the loss of life, inflict bodily harm and/or loss or severe damage to equipment/property, and severely harm the environment, a prior explicit written approval from Murata is strictly required. Any use of Murata standard products for any safety-critical, life-critical or any related applications without any prior explicit written approval from Murata shall be deemed unauthorised use.

These applications include but are not limited to:

- Aircraft equipment
- Aerospace equipment
- Undersea equipment
- Power plant control equipment
- Medical equipment
- Transportation equipment (automobiles, trains, ships, etc.)
- Traffic signal equipment
- Disaster prevention / crime prevention equipment
- Data Processing equipment

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