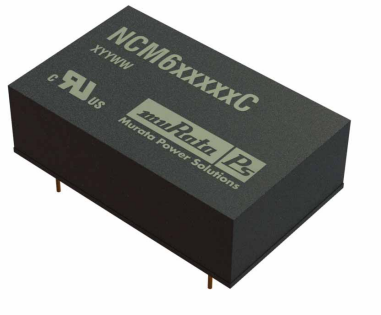
Murata Power Solutions

NCM6 Series

Isolated 6W Wide Input Single & Dual Output DC-DC Converters



FEATURES

- UL60950 reinforced insulation
- ANSI/AAMI ES60601-1, 1 MOPP/2 MOOP's recognised
- 4:1 wide range voltage input[3]
- Operating temperature range –40°C to 85°C
- 5.2kVDC isolation 'Hi Pot Test'
- Typical efficiency to 88%
- 5V, 12V & 48V nominal inputs
- Power density 0.94W/cm³
- 5mm creepage guaranteed
- Under voltage lock out
- Control pin option

PRODUCT OVERVIEW

The NCM6 series of DC-DC converters offers single & dual output voltages from wide input voltage ranges of 4.5-9V, 9-36V & 18-75V. The NCM6 is housed in an industry standard package with a standard pinout. The NCM6 is encapsulated for superior thermal performance.

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

SELECTION GUIDE

Order Code[1]	Input Voltage Nom. V	Output Voltage V	Output Current A	Efficiency 5V/12V/48V Input Min. %	Efficiency 5V/12V/48V Input Typ. %	Efficiency 24V Input Min. %	Efficiency 24V Input Typ. %	Isolation Capacitance pF	MTTF[2] Hrs	Recommended Alternative
Recommended / In Production										
NCM6D0505EC	5	±5	±0.6	78	80			10	492,600	
NCM6D0512EC	5	±12	±0.25	81	83			15	537,754	
NCM6D0515EC	5	±15	±0.2	81	83			15	462,042	
NCM6S0505C	5	5	1.2	77	80			15	576,445	
NCM6D1205EC	12	±5	±0.6	81	83	79	80	15	285,466	
NCM6D1212C	12	±12	±0.25	86	88	81	84	25	412,808	
NCM6D1215C	12	±15	±0.2	85	87	82	84	25	366,356	
NCM6S1205EC	12	5	1.2	81	82	79	80	15	475,352	
NCM6S1212C	12	12	0.5	84	86	81	83	25	490,876	
NCM6S1212EC	12	12	0.5	84	86	81	83	25	490,876	
NCM6S1215C	12	15	0.4	85	87	82	84	25	457,651	
Discontinued										
NCM6D0505C	5	±5	±0.6	78	80			10	492,600	NCM6D0505EC
NCM6D0512C	5	±12	±0.25	81	83			15	537,754	Contact Murata
NCM6D0515C	5	±15	±0.2	81	83			15	462,042	Contact Murata
NCM6D1205C	12	±5	±0.6	81	83	79	80	15	285,466	NCM6D1205EC
NCM6D1212EC	12	±12	±0.25	86	88	81	84	25	412,808	NCM6D1212C
NCM6D1215EC	12	±15	±0.2	85	87	82	84	25	366,356	NCM6D1215C
NCM6D4805C	48	±5	±0.6	77	80	79	81	10	393,923	NCS6D4805C
NCM6D4805EC	48	±5	±0.6	77	80	79	81	10	393,923	NCS6D4805C
NCM6D4812C	48	±12	±0.25	78	82	82	84	22	444,419	NCS6D4812C
NCM6D4812EC	48	±12	±0.25	78	82	82	84	22	444,419	NCS6D4812C
NCM6D4815C	48	±15	±0.2	81	83	84	86	25	409,328	NCS6D4815C
NCM6D4815EC	48	±15	±0.2	81	83	84	86	25	409,328	NCS6D4815C
NCM6S0503C	5	3.3	1.52	73	75			15	548,686	Contact Murata
NCM6S0503EC	5	3.3	1.52	73	75			15	548,686	Contact Murata
NCM6S0505EC	5	5	1.2	77	80			15	576,445	NCM6S0505C
NCM6S0512C	5	12	0.5	80	82			20	608,806	Contact Murata
NCM6S0512EC	5	12	0.5	80	82			20	608,806	Contact Murata
NCM6S0515C	5	15	0.4	80	82			15	566,572	Contact Murata
NCM6S0515EC	5	15	0.4	80	82			15	566,572	Contact Murata
NCM6S1203C	12	3.3	1.52	75	79	74	77	12	685,045	NCS6S1203C
NCM6S1203EC	12	3.3	1.52	75	79	74	77	12	685,045	Contact Murata
NCM6S1205C	12	5	1.2	81	82	79	80	15	475,352	NCM6S1205EC
NCM6S1215EC	12	15	0.4	85	87	82	84	25	457,651	NCM6S1215C

RoHS COMPLIANT

25

For full details go to https://www.murata.com/en-global/products/power/rohs

c UL us

1 To order with optional control pin insert an 'E' prior to the suffix C, i.e. NCM6S1205EC.
2 Calculated using MIL-HDBK-217F FN2, parts stress method with nominal input voltage at full load.
3. 5V inputs have a 2:1 input range.
All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

SELECTION GUIDE (Continued)

Order Code[1]	Input Voltage Nom.	Output Voltage	Output Current	Efficiency 5V/12V/48V Input		Efficiency 24V Input		Isolation Capacitance	MTTF[2]	Recommended Alternative
	V	V	A	Min. %	Typ. %	Min. %	Typ. %	pF	Hrs	
Discontinued										
NCM6S4803C	48	3.3	1.52	71	74	71	76	12	552,818	NCS6S4803C
NCM6S4803EC	48	3.3	1.52	71	74	71	76	12	552,818	NCS6S4803C
NCM6S4805C	48	5	1.2	74	78	75	80	15	467,793	NCS6S4805C
NCM6S4805EC	48	5	1.2	74	78	75	80	15	467,793	NCS6S4805C
NCM6S4812C	48	12	0.5	79	82	83	84	20	520,610	NCS6S4812C
NCM6S4812EC	48	12	0.5	79	82	83	84	20	520,610	NCS6S4812C
NCM6S4815C	48	15	0.4	81	83	85	86	25	499,288	NCS6S4815C
NCM6S4815EC	48	15	0.4	81	83	85	86	25	499,288	NCS6S4815C

SELECTION GUIDE (Continued)

Order Code	Input Current				Ripple & Noise	Recommended Alternative
	0% Load	100% Load	0% Load	100% Load		
	Typ. 5V, 12V or 48V Input		Typ. 24V Input		Typ.	
	mA	mA	mA	mA	mVp/p	
	Recommended / In Production					
NCM6D0505EC	20	1500			20	
NCM6D0512EC	25	1450			20	
NCM6D0515EC	30	1450			15	
NCM6S0505C	20	1500			20	
NCM6D1205EC	11	600	9	310	100	
NCM6D1212C	13	560	12	300	100	
NCM6D1215C	15	570	13	300	100	
NCM6S1205EC	10	610	9	315	25	
NCM6S1212C	15	575	12	300	70	
NCM6S1212EC	15	575	12	300	70	
NCM6S1215C	15	575	13	300	105	
	Discontinued					
NCM6D0505C	20	1500			20	NCM6D0505EC
NCM6D0512C	25	1450			20	Contact Murata
NCM6D0515C	30	1450			15	Contact Murata
NCM6D1205C	11	600	9	310	100	NCM6D1205EC
NCM6D1212EC	13	560	12	300	100	NCM6D1212C
NCM6D1215EC	15	570	13	300	100	NCM6D1215C
NCM6D4805C	6	160	7	310	150	NCS6D4805C
NCM6D4805EC	6	160	7	310	150	NCS6D4805C
NCM6D4812C	8	150	9	300	100	NCS6D4812C
NCM6D4812EC	8	150	9	300	100	NCS6D4812C
NCM6D4815C	8	150	10	300	150	NCS6D4815C
NCM6D4815EC	8	150	10	300	150	NCS6D4815C
NCM6S0503C	8	1300			10	Contact Murata
NCM6S0503EC	8	1300			10	Contact Murata
NCM6S0505EC	20	1500			20	NCM6S0505C
NCM6S0512C	25	1500			90	Contact Murata
NCM6S0512EC	25	1500			90	Contact Murata
NCM6S0515C	30	1500			90	Contact Murata
NCM6S0515EC	30	1500			90	Contact Murata
NCM6S1203C	10	525	9	270	60	NCS6S1203C
NCM6S1203EC	10	525	9	270	60	Contact Murata
NCM6S1205C	10	610	9	315	25	NCM6S1205EC
NCM6S1215EC	15	575	13	300	105	NCM6S1215C
NCM6S4803C	10	140	7	275	30	NCS6S4803C
NCM6S4803EC	10	140	7	275	30	NCS6S4803C
NCM6S4805C	10	160	7	300	25	NCS6S4805C
NCM6S4805EC	10	160	7	300	25	NCS6S4805C
NCM6S4812C	10	150	9	300	70	NCS6S4812C
NCM6S4812EC	10	150	9	300	70	NCS6S4812C
NCM6S4815C	10	150	10	300	95	NCS6S4815C
NCM6S4815EC	10	150	10	300	95	NCS6S4815C

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	NCM6X05	4.5	5	9	V
	NCM6X12	9	12	36	
	NCM6X48	18	48	75	
Under voltage lock out	Turn on threshold NCM6X05		4.2		V
	Turn off threshold NCM6X05		3.6		
	Turn on threshold NCM6X12		8.2		
	Turn off threshold NCM6X12		6.5		
	Turn on threshold NCM6X48		14		
	Turn off threshold NCM6X48		13.7		
Reflected ripple current	All variants		10		mA p-p

GENERAL CHARACTERISTICS[1]

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency			300		kHz
Control pin input	Module on (or pin unconnected)			1.0	V
	Module off	3.0			

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	D4812C & D4815C, SXX03C, SXX12C & SXX15C				±2	%
	SXX05C				±2.5	
	D1212C & D1215C				±3	
	D0505C, D0512C, D0515C, D1205C & D4805C	Positive			±2	
		Negative			±3	
Line regulation	Low line to high line	Single		0.1	0.5	%
		Dual		0.1	0.75	
Load Regulation	10% total load to 100% total load	NCM6xxx03C, D0512C & D0515C		0.5	1	%
		NCM6xxx05C		0.3	1	
		NCM6Sxx12C, NCM6Sxx15C, D1212C, D1215C, D4812C & D4815C		0.06	0.5	
Cross Regulation	% voltage change on negative output when positive load varies from 12.5% to 37.5% with negative load fixed at 50%	5V			5	%
		12V & 15V			3	
Minimum output load for specification (see application notes)	10% of rated load					
Transient Response	Peak deviation - Single Output (25-75% & 75-25% swing) - Dual Output (12.5-37.5% & 37.5-12.5% swing)					%Vout
	SXX03C			10		
	SXX05C			8		
	S4815			2		
	D0505, S0512 & S0515			5		
	D0512 & D0515			2		
	D1205			6		
	D1212, D1215 & S4812			3		
	D4805 & D4815			9		
	D4812			1		
	S1212 & S1215			4		
	Settling time (within 1% Vout Nom.)			250		µs

ISOLATION CHARACTERISTICS

Parameter		Conditions	Min.	Typ.	Max.	Units
Isolation test voltage		Production tested for 1 second	5200			VDC
		Qualification tested for 1 minute	5200			
Resistance		Viso = 1kVDC	1			GΩ
Safety standard	UL60950-1	Reinforced			250	Vrms
	ANSI/AAMI ES60601-1	1 MOPP/ 2 MOOP			250	

TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Operation	Please refer to derating graphs	-40		85	°C
Storage		-50		125	
Case temperature rise above ambient	D0515, D1212, D1215, D4815, S1212, S1215, S4812, S4815		35		
	D0512, D4812, S1203, S1205		40		
	D0505, D1205, D4805, S0503, S0512, 0515, 4803, 4805		45		
	S0505C		47		
Thermal shutdown	Case Temperature		+105		

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection (for SELV input voltages)	Continuous
Lead temperature 1.0mm from case for 10 seconds (to JEDEC JESD22-B106 ISS C)	260°C
Wave Solder	Wave Solder profile not to exceed the profile recommended in IEC 61760-1 Section 6.1.3. Please refer to application notes for further information.
Input voltage, NCM6X05	10V
Input voltage, NCM6X12	40V
Input voltage, NCM6X48	80V
Control pin input voltage	±20V

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 NCM6 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 NCM6 series has been recognised by Underwriters Laboratory to 250Vrms 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

ANSI/AAMI ES60601-1

The NCM6 series has been recognised by Underwriters Laboratory (UL) to ANSI/AAMI ES60601-1 and provides 1 MOPP (Means Of Patient Protection) and 2 MOOP (Means Of Operator Protection) based upon a working voltage of 250 Vrms max., between Primary and Secondary. File number E202895 applies.

UL 60950

The NCM6 series has been recognised by Underwriters Laboratory (UL) to UL 60950 for reinforced insulation to a working voltage of 250Vrms. File number E151252 applies.

FUSING

The NCM6 Series of converters are not internally fused so to meet the requirements of UL an anti-surge input line fuse should always be used with ratings as defined below.

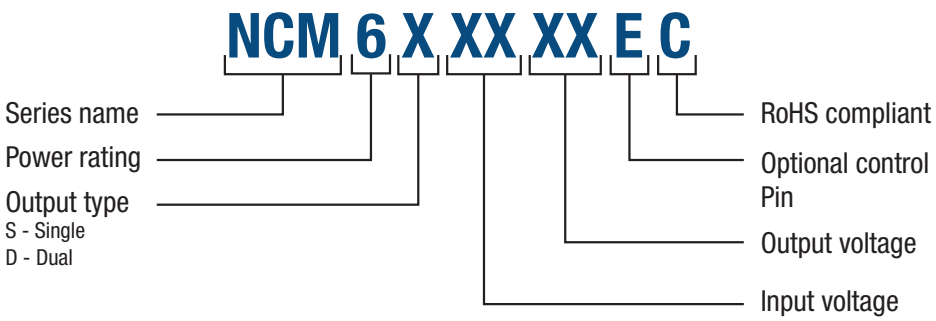
Input Voltage, 5V 3A
Input Voltage, 12V 2A
Input Voltage, 48V 1A

All fuses should be UL recognised and rated to at least the maximum allowable DC input voltage.

RoHS COMPLIANCE INFORMATION

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 260ºC for 10 seconds. Please refer to application notes 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.com/en-global/products/power/rohs

PART NUMBER STRUCTURE



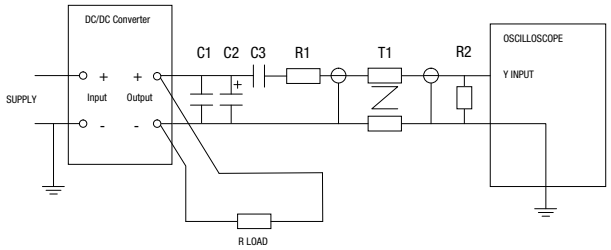
CHARACTERISATION TEST METHODS

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	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

Output Capacitance and start-up times

The NCM6 series does not require output capacitors to meet datasheet specification. To meet datasheet specification, output capacitance should not exceed:

Part No.	Maximum Load Capacitance (per output)	Start-up times
	µF	ms
NCM6D0505C	220	6
NCM6D0512C	100	12
NCM6D0515C	100	18
NCM6S0503C	470	4
NCM6S0505C	220	7
NCM6S0512C	100	12
NCM6S0515C	100	17
NCM6D1205C	220	5
NCM6D1212C	100	12
NCM6D1215C	100	17
NCM6S1203C	470	2
NCM6S1205C	220	6
NCM6S1212C	100	14
NCM6S1215C	100	17
NCM6D4805C	220	10
NCM6D4812C	100	40
NCM6D4815C	100	60
NCM6S4803C	470	2
NCM6S4805C	220	5
NCM6S4812C	100	15
NCM6S4815C	100	20

Control Pin

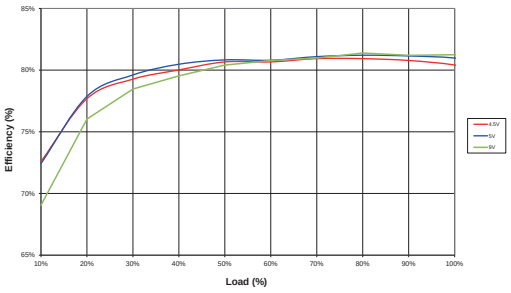
This provides an OFF function which puts the converter into a low power mode when >3V is applied to the pin. When the control pin is left unconnected or less than 1V the converter is ON

Minimum Load

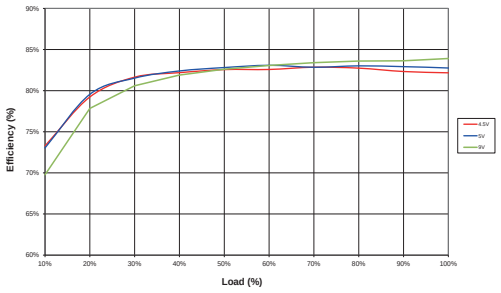
The minimum load to meet full datasheet specification is 10% of the full rated load across the specified input voltage range.
Between 0% and 10% output loading, the output voltage will remain within data sheet specification however, output ripple and noise may increase but will still be below 150mV p-p.

EFFIECIENCY VS LOAD

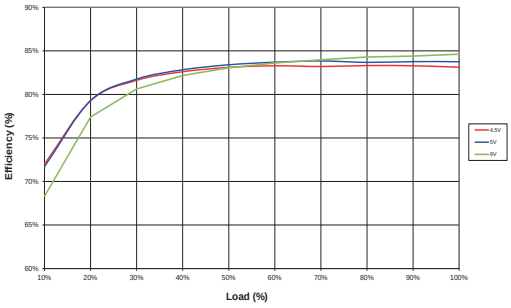
NCM6D0505C



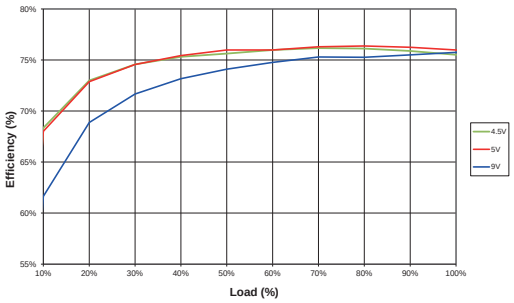
NCM6D0512C



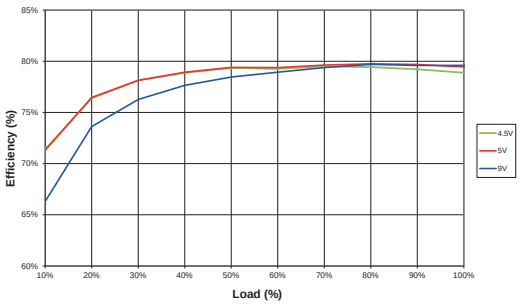
NCM6D0515C



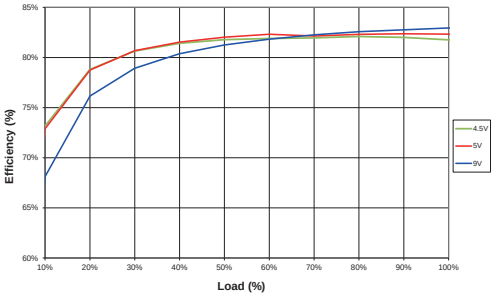
NCM6S0503C



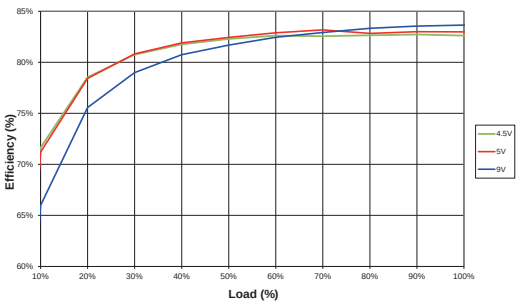
NCM6S0505C



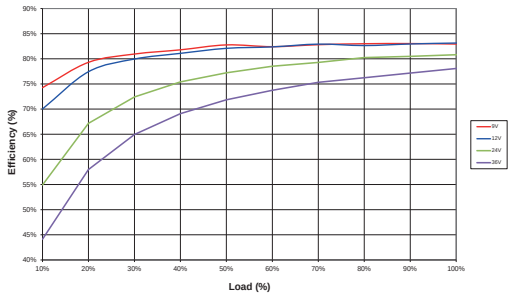
NCM6S0512C



NCM6S0515C

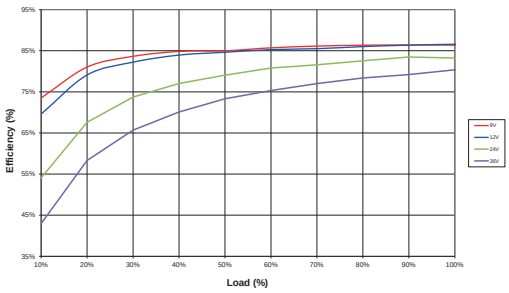


NCM6D1205C

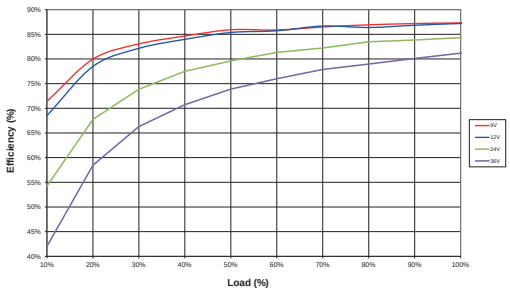


EFFIECIENCY VS LOAD (Continued)

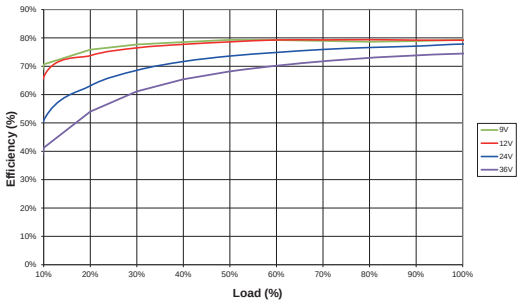
NCM6D1212C



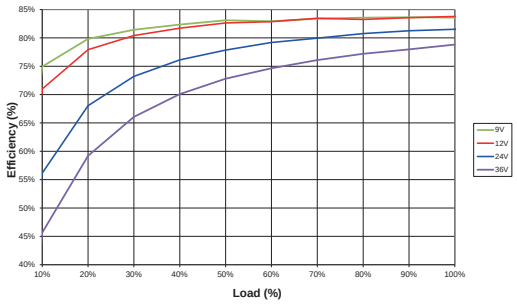
NCM6D1215C



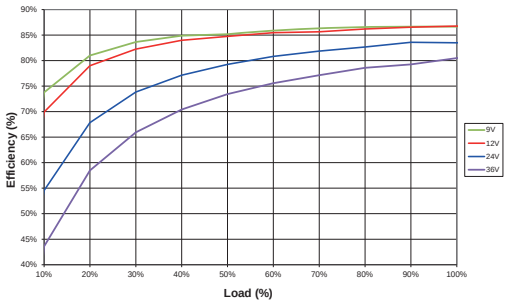
NCM6S1203C



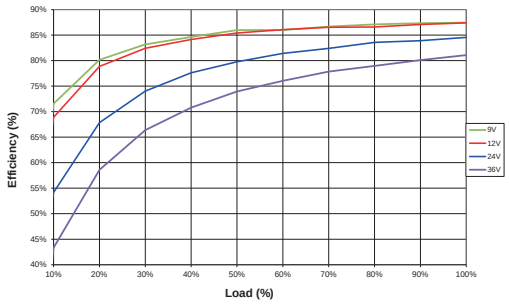
NCM6S1205C



NCM6S1212C



NCM6S1215C



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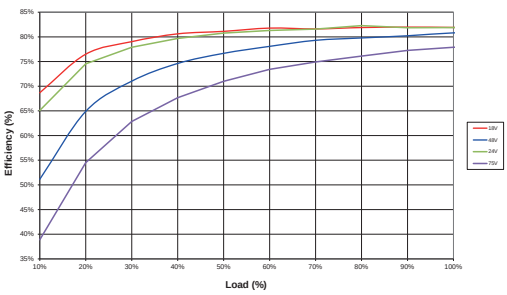

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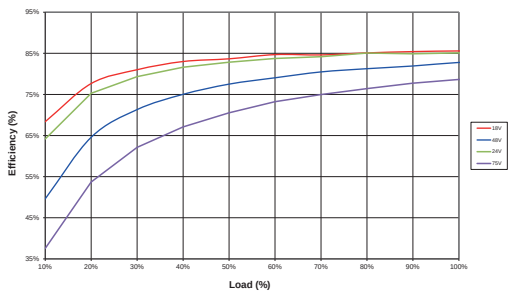

EFFIECIENCY VS LOAD (Continued)

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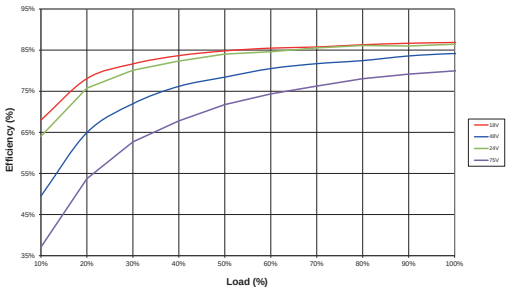

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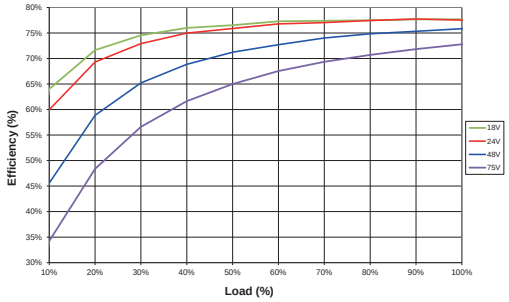

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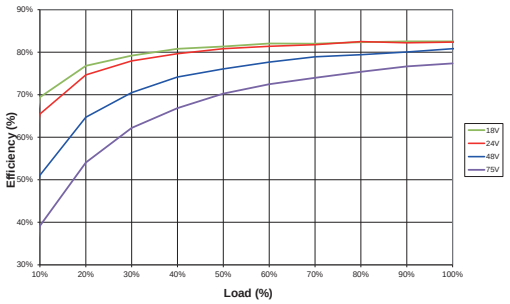

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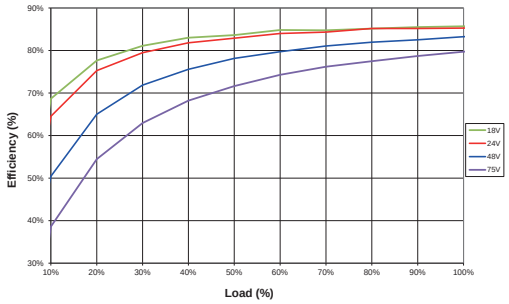

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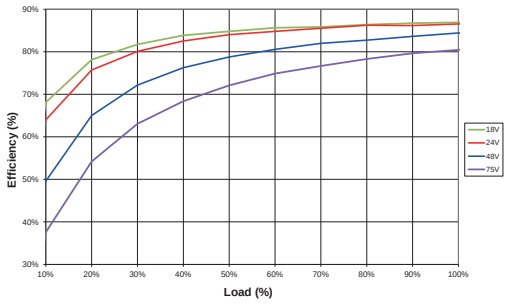

TEMPERATURE DERATING

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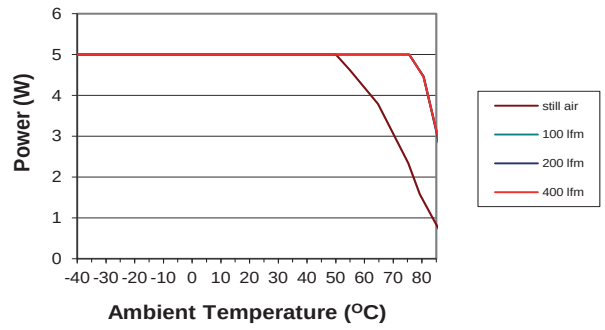

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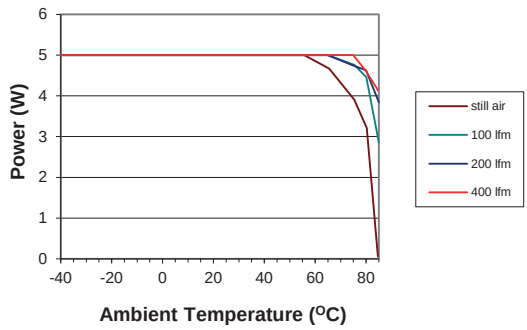

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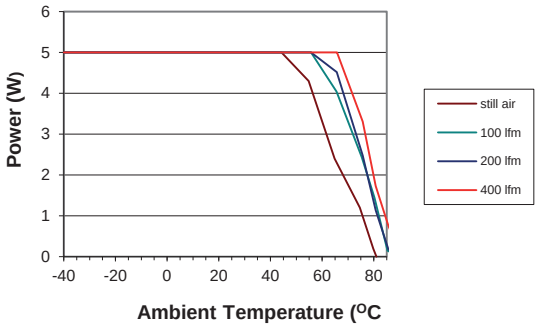

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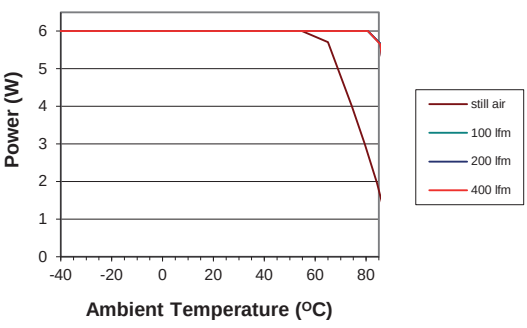

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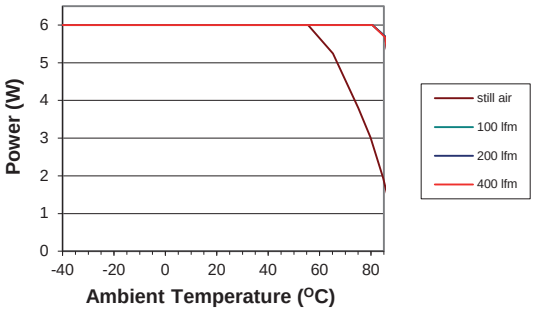

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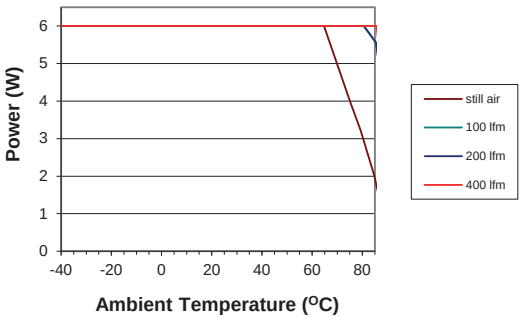

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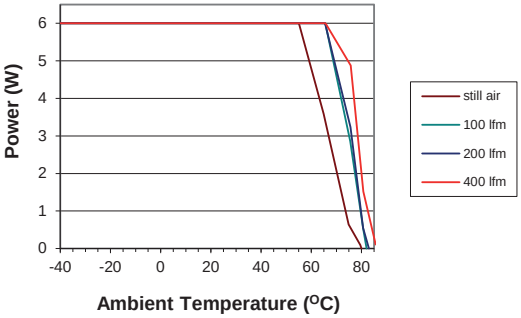

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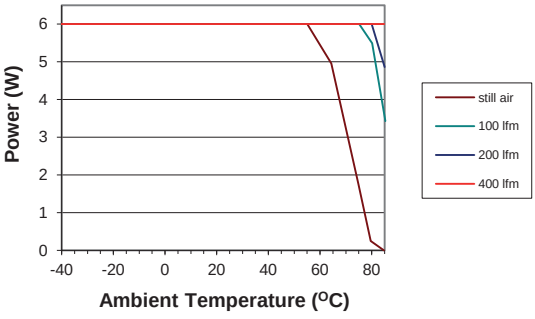

TEMPERATURE DERATING (Continued)

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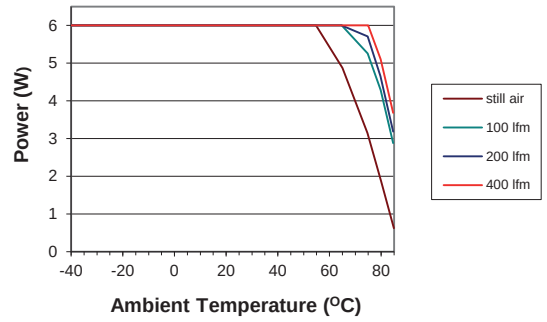

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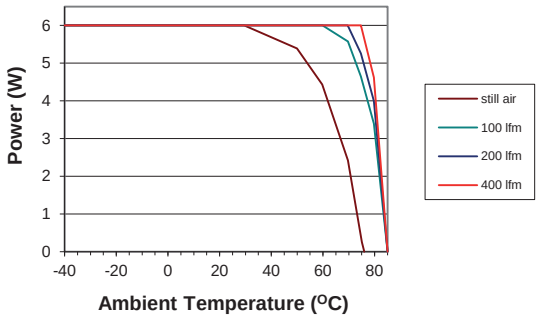

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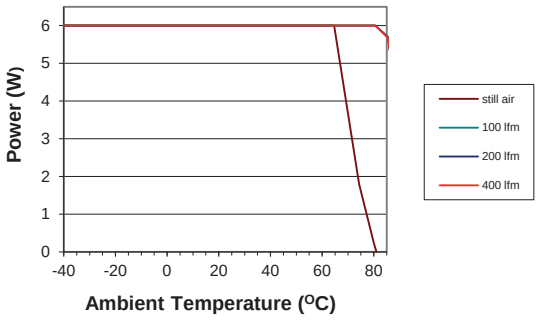

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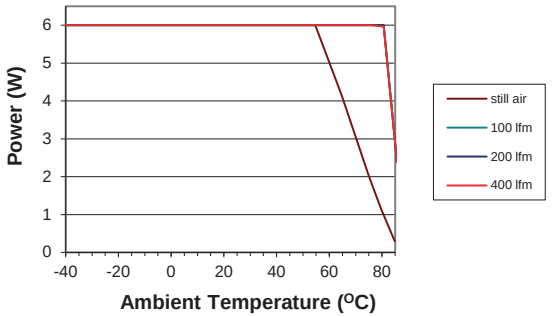


EMC FILTERING AND SPECTRA

FILTERING

The module includes a basic level of filtering, sufficient for many applications. Where lower noise levels are desired, filters can easily be added to achieve any required noise performance.

A DC-DC converter generates noise in two principle forms: that which is radiated from its body and that conducted on its external connections. There are three separate modes of conducted noise: input differential, output differential and input-output.

This last appears as common mode at the input and the output, and cannot therefore be removed by filtering at the input or output alone. The first level of filtering is to connect capacitors between input and output returns, to reduce this form of noise. It typically contains high harmonics of the switching frequency, which tend to appear as spikes on surrounding circuits. The voltage rating of this capacitor must match the required isolation voltage. (Due to the great variety in isolation voltage and required noise performance, this capacitor has not been included within the converter.)

Input ripple is a voltage developed across the internal Input decoupling capacitor. It is therefore measured with a defined supply source impedance. Although simple series inductance will provide filtering, on its own it can degrade the stability. A shunt capacitor is therefore recommended across the converter input terminals, so that it is fed from a low impedance.

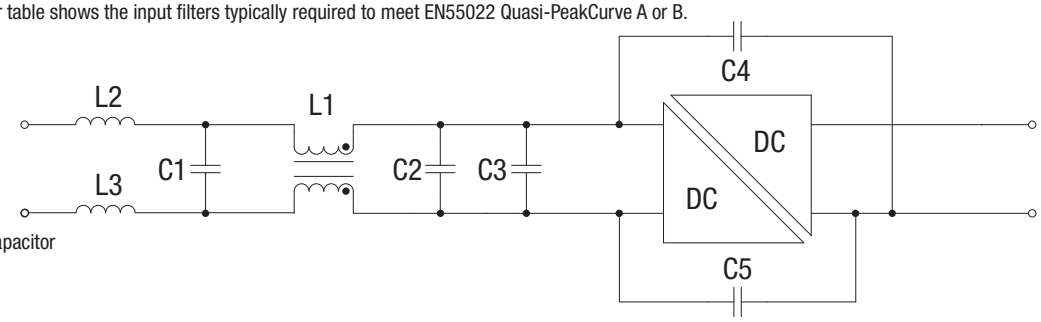
If no filtering is required, the inductance of long supply wiring could also cause a problem, requiring an input decoupling capacitor for stability. An electrolytic will perform well in these situations. The input-output filtering is performed by the common-mode choke on the primary. This could be placed on the output, but would then degrade the regulation and produce less benefit for a given size, cost, and power loss.

Radiated noise is present in magnetic and electrostatic forms. Thanks to the small size of these units, neither form of noise will be radiated “efficiently”, so will not normally cause a problem. Any question of this kind usually better repays attention to conducted signals.

EMC FILTERING AND SPECTRA (Continued)

EMC FILTER AND VALUES TO OBTAIN SPECTRA AS SHOWN

The following filter circuit and filter table shows the input filters typically required to meet EN55022 Quasi-PeakCurve A or B.



C1, C2 Polyester or ceramic capacitor

C3 Electrolytic capacitor

C4 & C5 250 VAC Y Rated

TO MEET CURVE B

Part Number	C1	C2	C3	C4	C5	L1	L2	L3
NCM6S0503C	1µF	1µF	1000µF	10nF	10nF	51105C	20µH	Not required
NCM6S0505C	1µF	1µF	1000µF	10nF	10nF	51105C	60µH	Not required
NCM6S0512C	1µF	1µF	1000µF	15nF	15nF	51305C	60µH	60µH
NCM6S0515C	1µF	1µF	1000µF	15nF	15nF	51305C	60µH	60µH
NCM6D0505C	1µF	1µF	1000µF	10nF	10nF	51105C	20µH	Not required
NCM6D0512C	1µF	1µF	1000µF	10nF	10nF	51105C	20µH	Not required
NCM6D0515C	1µF	1µF	1000µF	10nF	10nF	51105C	20µH	Not required
NCM6S1203C	1µF	1µF	47µF	10nF	10nF	51105C	Not required	Not required
NCM6S1205C	1µF	1µF	47µF	10nF	10nF	51105C	60µH	Not required
NCM6S1212C	1µF	1µF	47µF	10nF	10nF	51105C	20µH	Not required
NCM6S1215C	1µF	1µF	47µF	10nF	10nF	51105C	20µH	Not required
NCM6D1205C	1µF	1µF	47µF	10nF	10nF	51105C	Not required	Not required
NCM6D1212C	1µF	1µF	47µF	10nF	10nF	51105C	Not required	Not required
NCM6D1215C	1µF	1µF	47µF	10nF	10nF	51105C	20µH	Not required
NCM6S4803C	1µF	1µF	47µF	10nF	10nF	51105C	Not required	Not required
NCM6S4805C	1µF	1µF	47µF	10nF	10nF	51505C	Not required	Not required
NCM6S4812C	1µF	1µF	47µF	10nF	10nF	51505C	Not required	Not required
NCM6S4815C	1µF	1µF	47µF	10nF	10nF	51505C	Not required	Not required
NCM6D4805C	1µF	1µF	47µF	10nF	10nF	51505C	Not required	Not required
NCM6D4812C	1µF	1µF	47µF	10nF	10nF	51505C	60µH	Not required
NCM6D4815C	1µF	1µF	47µF	10nF	10nF	51505C	Not required	Not required

EMC FILTERING AND SPECTRA (Continued)

TO MEET CURVE A

Part Number	C1	C2	C3	C4	C5	L1	L2	L3
NCM6S0503C	1µF	1µF	1000µF	Not required	Not required	51105C	60µH	60µH
NCM6S0505C	1µF	1µF	1000µF	Not required	Not required	51105C	60µH	60µH
NCM6S0512C	1µF	1µF	1000µF	Not required	Not required	51305C	60µH	60µH
NCM6S0515C	1µF	1µF	1000µF	Not required	Not required	51305C	60µH	60µH
NCM6D0505C	1µF	1µF	1000µF	Not required	Not required	51105C	60µH	60µH
NCM6D0512C	1µF	1µF	1000µF	Not required	Not required	51105C	60µH	60µH
NCM6D0515C	1µF	1µF	1000µF	Not required	Not required	51105C	60µH	60µH
NCM6S1203C	1µF	1µF	47µF	Not required	Not required	51105C	60µH	60µH
NCM6S1205C	1µF	1µF	47µF	Not required	Not required	51105C	60µH	60µH
NCM6S1212C	1µF	1µF	47µF	Not required	Not required	51105C	60µH	60µH
NCM6S1215C	1µF	1µF	47µF	Not required	Not required	51105C	60µH	60µH
NCM6D1205C	1µF	1µF	47µF	Not required	Not required	51105C	60µH	60µH
NCM6D1212C	1µF	1µF	47µF	Not required	Not required	51105C	60µH	60µH
NCM6D1215C	1µF	1µF	47µF	Not required	Not required	51105C	60µH	60µH
NCM6S4803C	1µF	1µF	47µF	Not required	Not required	51105C	60µH	60µH
NCM6S4805C	1µF	1µF	47µF	Not required	Not required	51505C	60µH	60µH
NCM6S4812C	1µF	1µF	47µF	Not required	Not required	51505C	60µH	60µH
NCM6S4815C	1µF	1µF	47µF	Not required	Not required	51505C	60µH	60µH
NCM6D4805C	1µF	1µF	47µF	Not required	Not required	51505C	60µH	60µH
NCM6D4812C	1µF	1µF	47µF	Not required	Not required	51505C	60µH	60µH
NCM6D4815C	1µF	1µF	47µF	Not required	Not required	51505C	60µH	60µH

EMC FILTERING AND SPECTRA (Continued)

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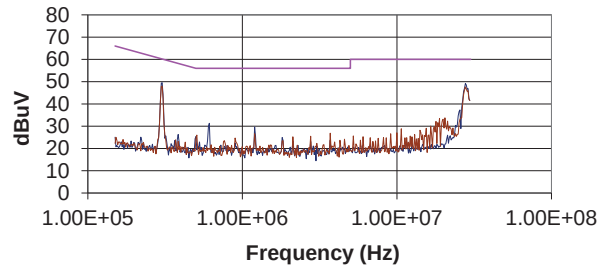

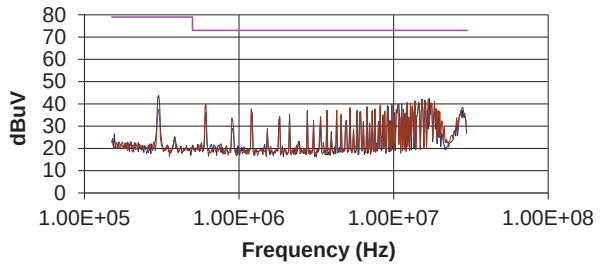

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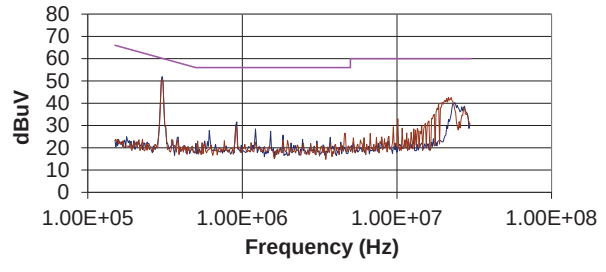

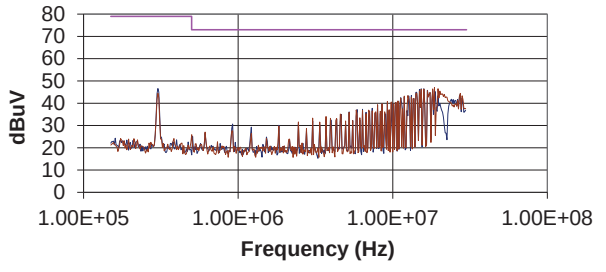

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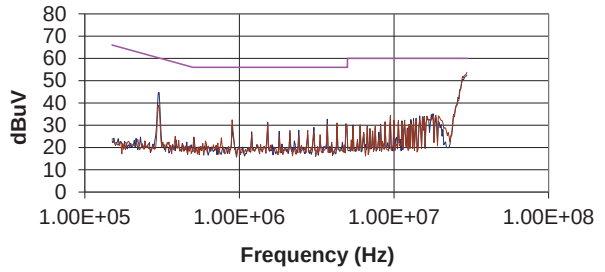

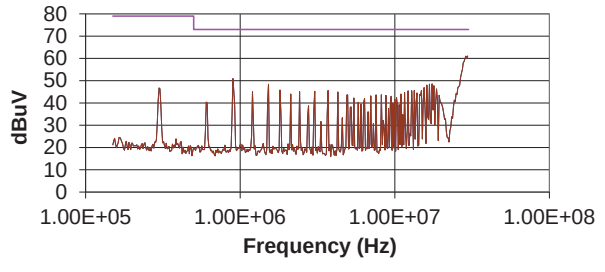

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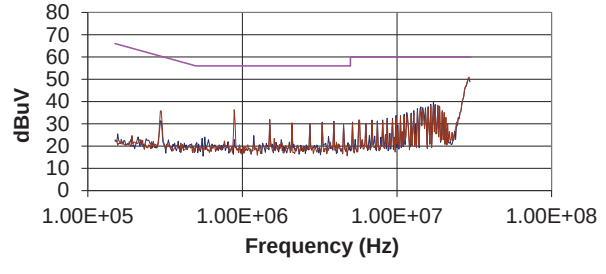

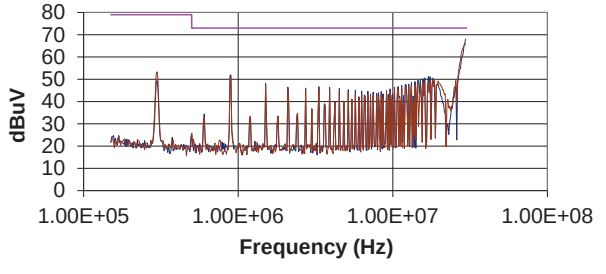

EMC FILTERING AND SPECTRA (Continued)

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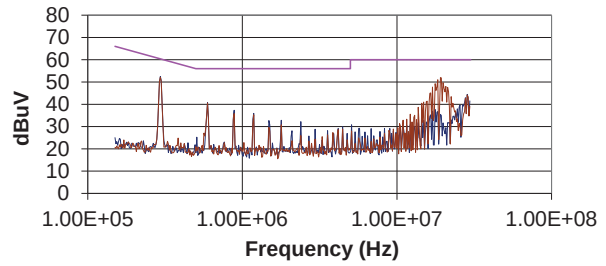

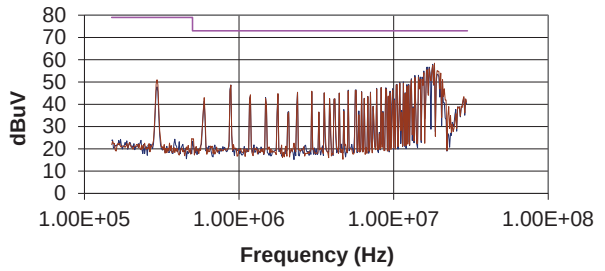

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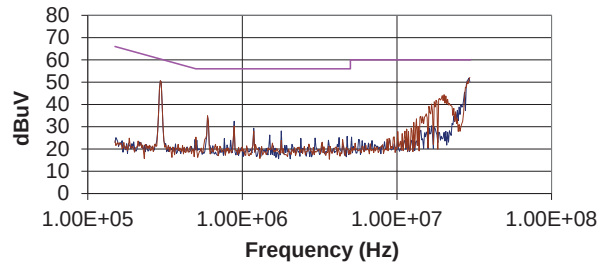

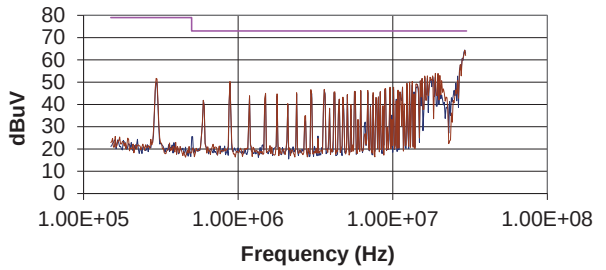

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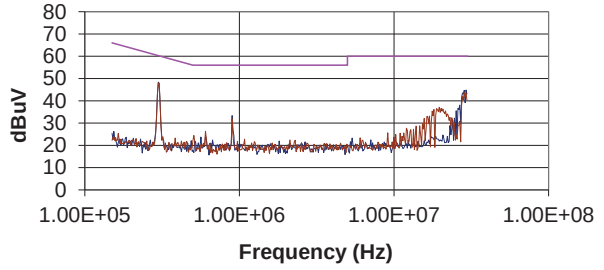

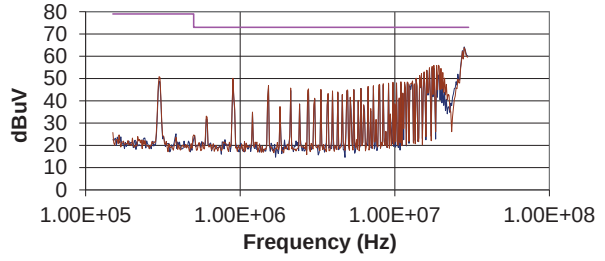

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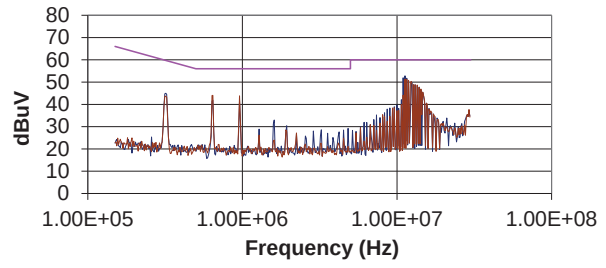

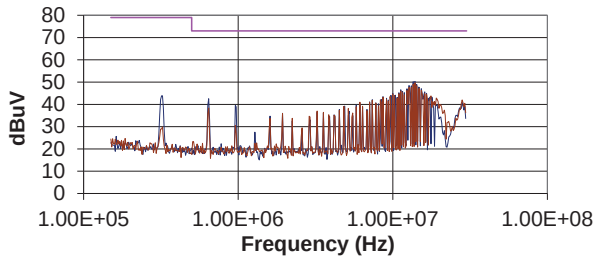

EMC FILTERING AND SPECTRA (Continued)

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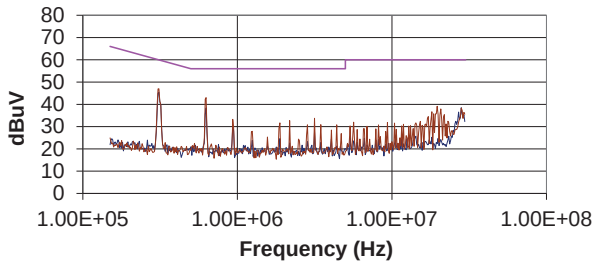

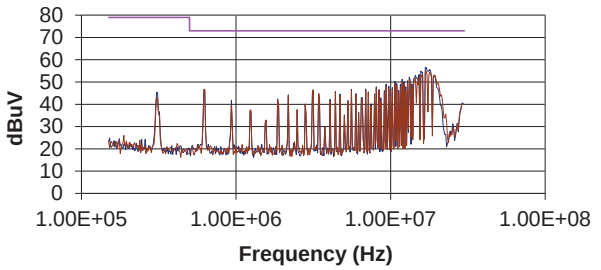

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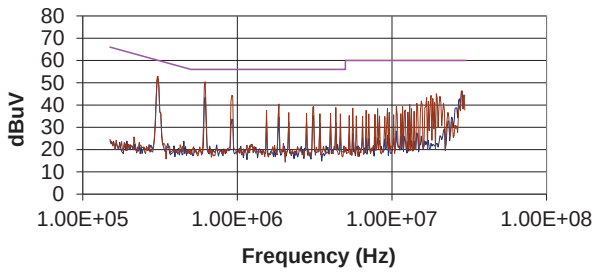

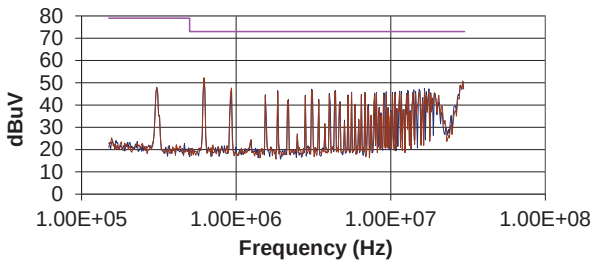

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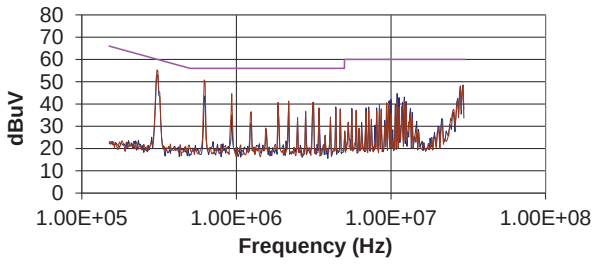

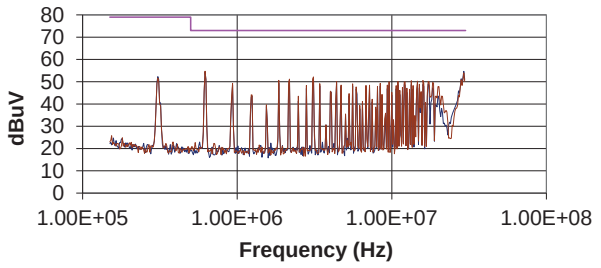

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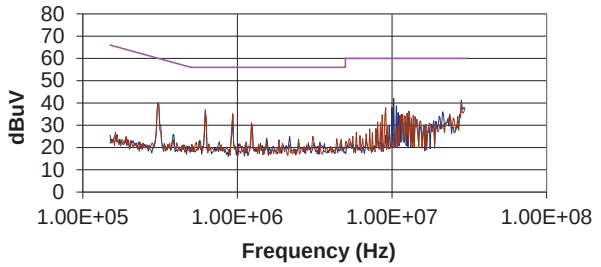

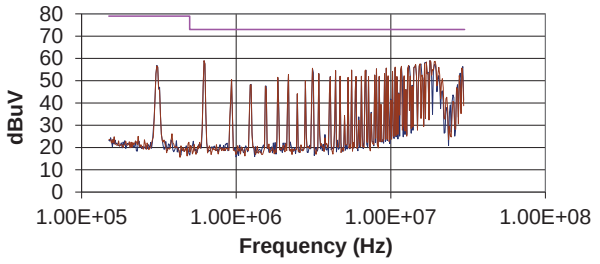

EMC FILTERING AND SPECTRA (Continued)

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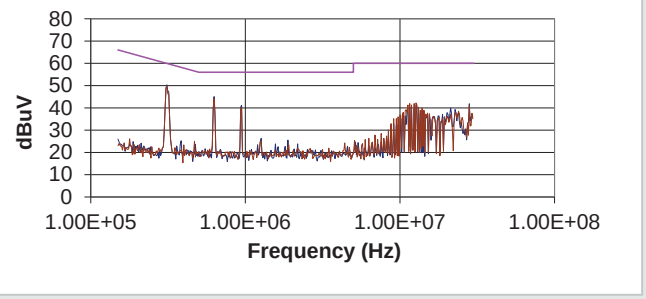

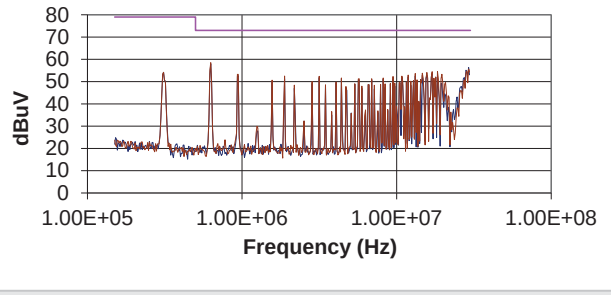

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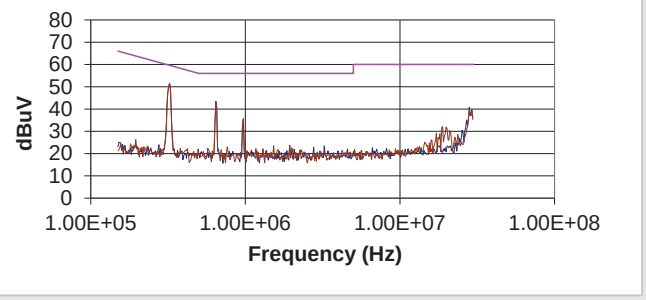

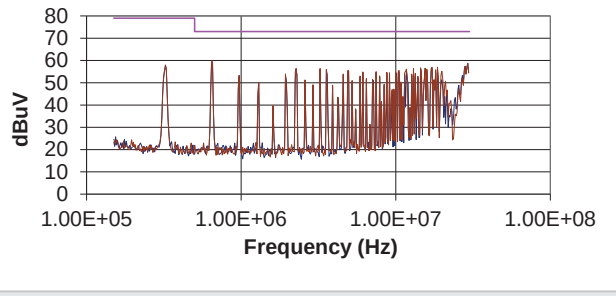

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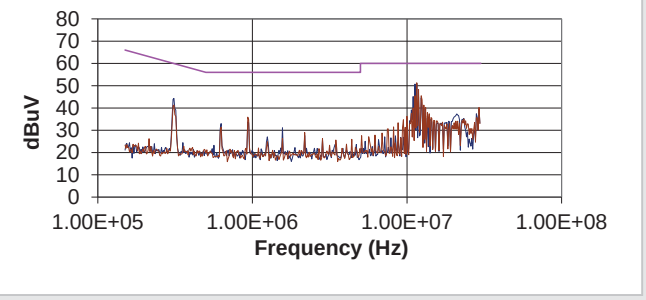

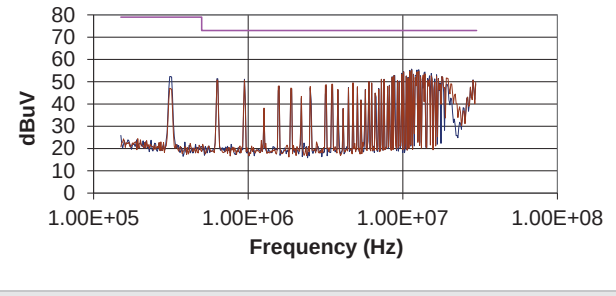

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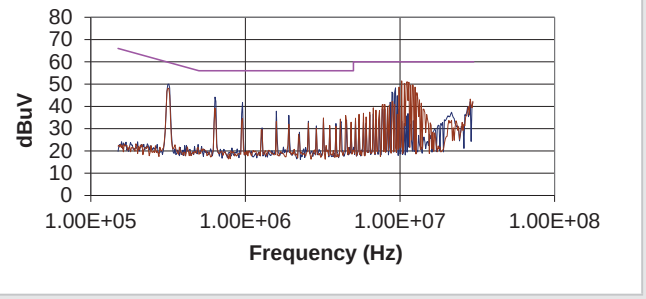

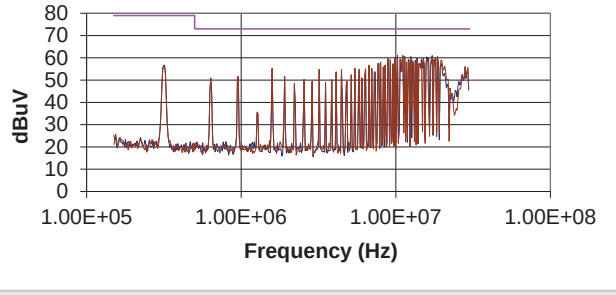

EMC FILTERING AND SPECTRA (Continued)

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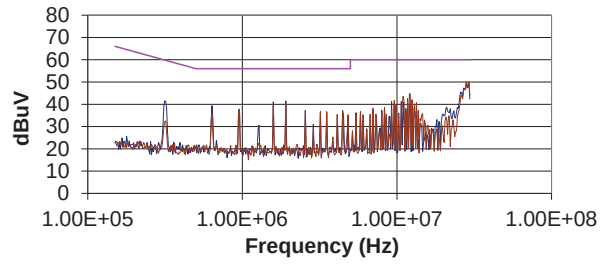

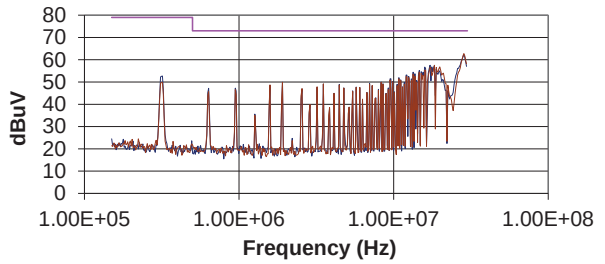

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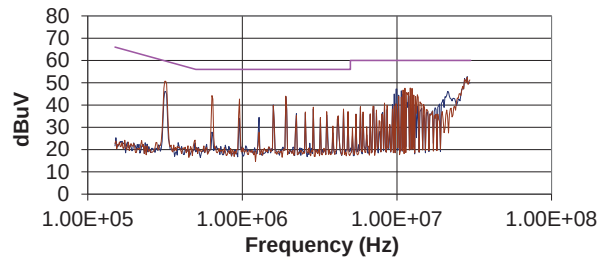

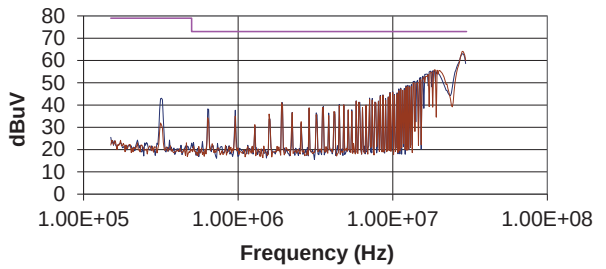

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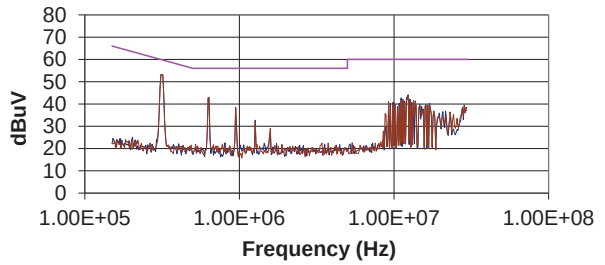

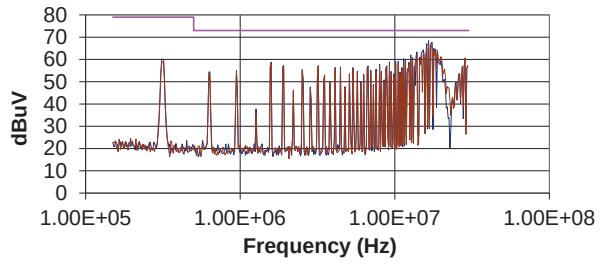

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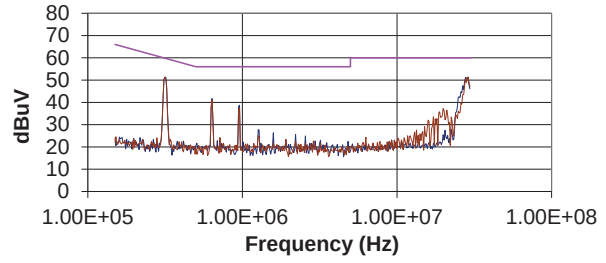

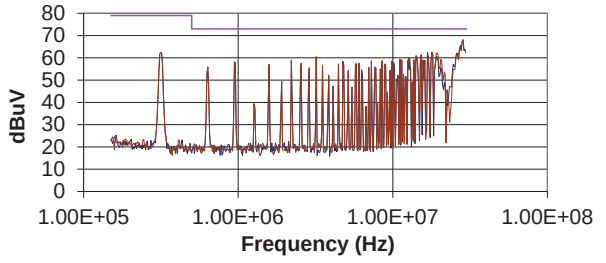

EMC FILTERING AND SPECTRA (Continued)

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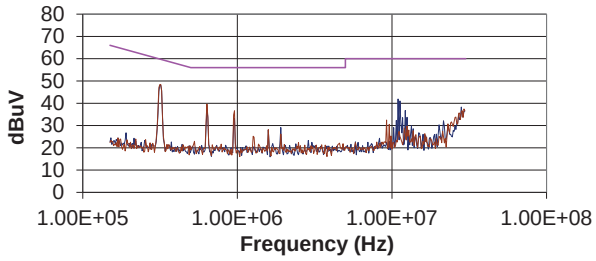
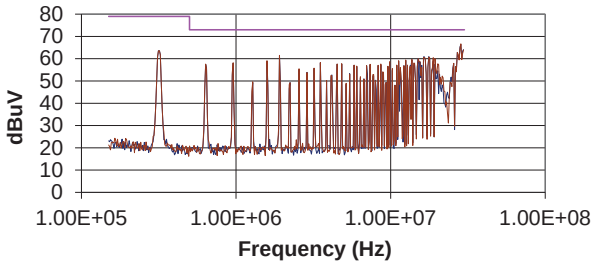
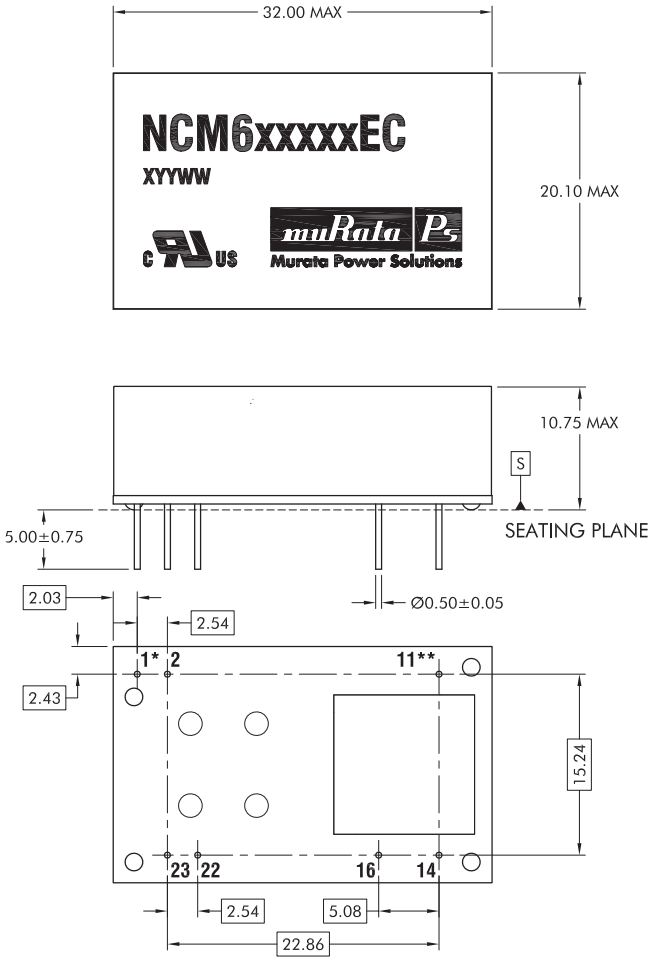




PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



* Control pin fitted on EC variants only.
** Not connected on NCM6SxxxxC/NCM6SxxxxEC variants.
All dimensions in mm.
All pins on a 2.54 pitch and within ±0.25 of true position.

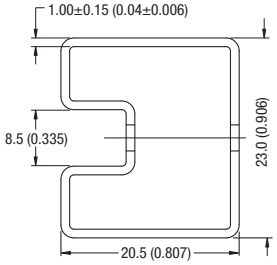
Case material: plastic.

Weight: 10.61g

PIN CONNECTIONS

Pin	Function	
	Single	Dual
1*	ON/OFF	ON/OFF
2	-V_{IN}	-V_{IN}
11**	N/C	-V_{OUT}
14	+V_{OUT}	+V_{OUT}
16	0V	0V
22	+V_{IN}	+V_{IN}
23	+V_{IN}	+V_{IN}

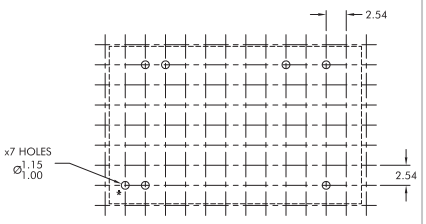
TUBE OUTLINE DIMENSIONS



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

Quantity: 15

RECOMMENDED FOOTPRINT DETAILS



All dimensions in mm ±0.25.
* This hole required for EC variants only.

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- 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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