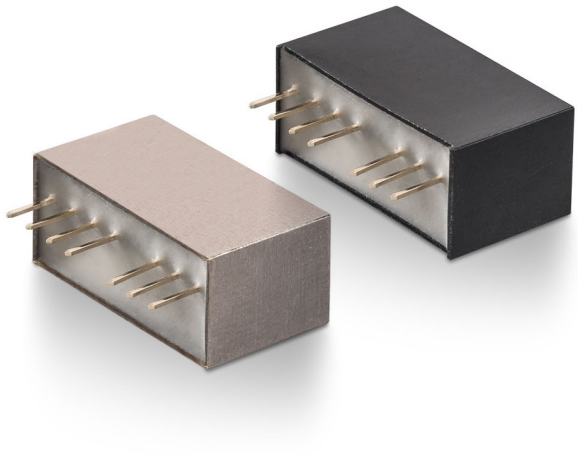
MDN Family
MDN5 Series

SIP-package DC/DC converters



Description

MDN5 is a series of isolated DC/DC converters with output power 2, 3 or 5 W and wide input voltage range (2:1). These products are produced in a compact SIP-8 package (22,3×12,1×9,8 mm) with small footprint.

An exellent efficiency allows –60...+105°C case operating temperature. These units are designed for using in industrial and special purpose applications and are optimized for operating in harsh environment.

Compliance

- MIL-STD-810G
- MIL-STD-461F (CE102)

Features

- 3 year warranty
- Compact SIP-8 package
- Wide input voltage range (2:1)
- Ambient operating temperature –60...+85°C
- 105 °C baseplate operation without derating
- Remote on/off
- High efficiency
- Metal or plastic case
- PFM topology

Description of MDN Family on the manufacturer's website
eng.aedon.ru/pr-low-power.php

Order registration
+7 473 200 87 80, Global Operations Team

Technical support
techsup@aedon.ru

Reliability test
eng.aedon.ru/downloads/documentation/Reliability-Test_ENG.pdf

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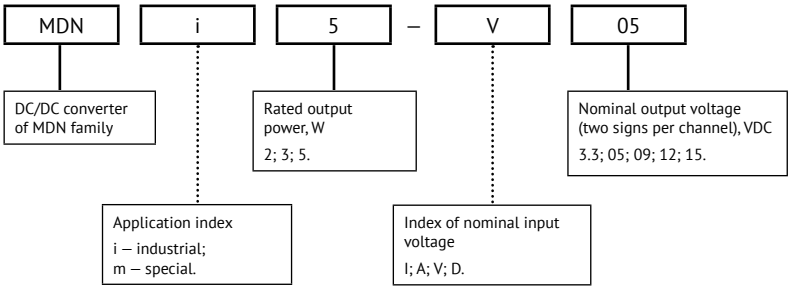
Ordering information



For more information please contact our Global Operations Team
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Application index

Parameter		Index "m"	Index "i"
Case operating temperature		–60...+105°C	–40...+85°C
Compliance	MIL-STD-810G	+	–
	EN60950-1	+	
	MIL-STD-461F	CE102	
Total regulation (Inom 10–100%)		±2,5%	
Vibration proof		+	–
Moisture proof (Tamb.=25°C)		98%	60%
Dust proof		+	–
Salt fog resistant		+	–
Typical MTBF		2 000 000 hrs	500 000 hrs
Failure rate		<0,05%	<1%
Warranty		3 years	

Rated output power and current

Power	2 W					3 W					5 W				
Output voltage, VDC	3,3	5	9	12	15	3,3	5	9	12	15	3,3	5	9	12	15
Rated output current, A	0,6	0,4	0,22	0,16	0,13	0,9	0,6	0,33	0,25	0,2	1,5	1	0,55	0,416	0,33

A product with special output voltage rating can be made by customized order.

Index of nominal input voltage*

Parameter	Index "I"	Index "A"	Index "V"	Index "D"
Nominal input voltage, VDC	5	12	24	48
Input voltage range, VDC	4,5...9	9...18	18...36	36...75
Transient deviation, 1 s, VDC	4...15	8,5...36	17...50	34...100
Typical efficiency for Uout.=9 VDC	82%	83%	80%	79%

* Reflected input ripple current (10–10000 Hz) – 8% Uin. nom

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Specifications

All specifications valid for normal climatic conditions (ambient temp. 15…35°C; relative humidity 45…80%; air pressure 8,6*10^4…10,6*10^4 Pa), Uin. nom, Iout. nom, unless otherwise stated. It is important to note that the information herein is not full. More detailed information (specific requirements, basic connection circuits, operating instructions etc.) can be found on our web-site: eng.aedon.ru

Output specifications

Parameter			Value
Temperature regulation			max ±2% Uout.nom
Voltage set accuracy			max ±2% Uout.nom
Total regulation			max ±2,5% Uout.nom
Ripple and noise (p-p)			<2% Uout. nom
Maximum capacitive load	Output voltage 3…6 VDC	2 W 3 W 5 W	2800 uF 4200 uF 7000 uF
	6…15 VDC	2 W 3 W 5 W	700 uF 1000 uF 1700 uF
Start up time (remote)			max 0,1 s
Short circuit protection			none
Trancient responce deviation			see fig. 7 (d)

* Parameters are stated for the information purposes and could not be used at long term work, exciding maximum output current, at work outside of a range of operating temperatures.

General specifications

Parameter		Value
Case temperature	Operating (natural convection) – power derating (natural convection)	–60…+105°C see power derating diagram (solid curve)
	Storage	–60…+105°C
Switching frequency		300–1500 kHz
Isolation capacitance	input/output	1500 pF
Isolation voltage (60 s)	input/output, input/case, output/case	1500 VDC
Isolation resistance @ 500 VDC	input/output, input/case, output/case	20 MOhm min
Thermal impedance		42°C/W
Remote on/off		2,4…5,5 VDC to “ON” and “–IN”

Physical specifications

Parameter	Value
Case material	aluminium / polimer
Potting	epoxy polimer
Pin material	phosphor bronze, SnP8 plated
Weight	max 9 g
Soldering temperature	260°C @ 5 s

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Design topology

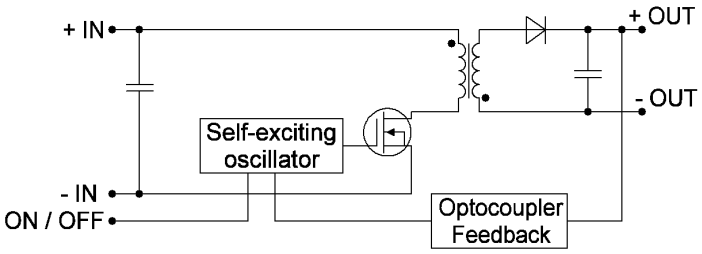

Figure 1. Design topology.

Service functions

Typical connection

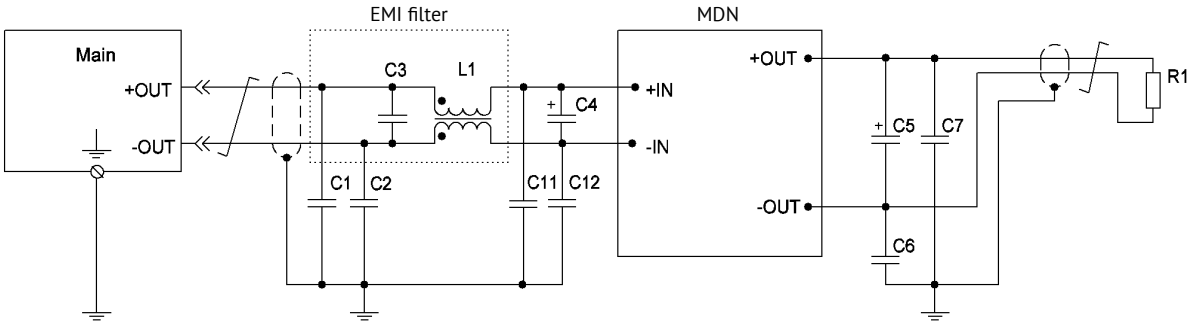

Figure 2. Design topology with filtration unit.

C1, C2, C6, C7, C11, C12		ceramic capacitor			10000 pF 500 VDC min
C4		tantalum capasitor	Input voltage	5 VDC 12 VDC 24 (28) VDC 48 VDC	68 uF 50 V 68 uF 50 V 10 uF 100 V 4,7 uF 100 V
C5		tantalum capasitor	Output voltage 3–6 VDC	2 W 3 W 5 W	10 uF 22 uF 47 uF
			Output voltage 6–15 VDC	2 W 3 W 5 W	4,7 uF 10 uF 22 uF
EMI Filter	L1	common mode choke			8 mH
	C3	ceramic capacitor	Input voltage	5 VDC 12 VDC 24 (28) VDC 48 VDC	22 uF 50 V 10 uF 50 V 4,7 uF 100 V 2,2 uF 100 V

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Service functions (cont.)

Remote control

Remote off function is activated by feeding 2,4…2,5 VDC to "–IN" and "ON" pins. The unit is powered on by removing this voltage.

To arrange remote power off/on of several units simultaneously it is not allowed to use additional elements in the circuit to connect outputs "ON" and "–IN" and a switch.

If the function of remote power off/on is not used, "ON" output is allowed to be left unconnected.

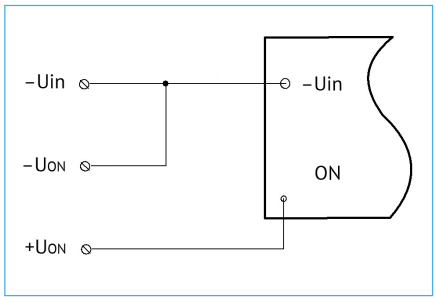

Figure 3. Logic voltage control.

Noise spectrogram

Testing according to MIL-STD-461F CE102. (Tcase=25°C, Vin.=+5 V, full load, unless otherwise specified)

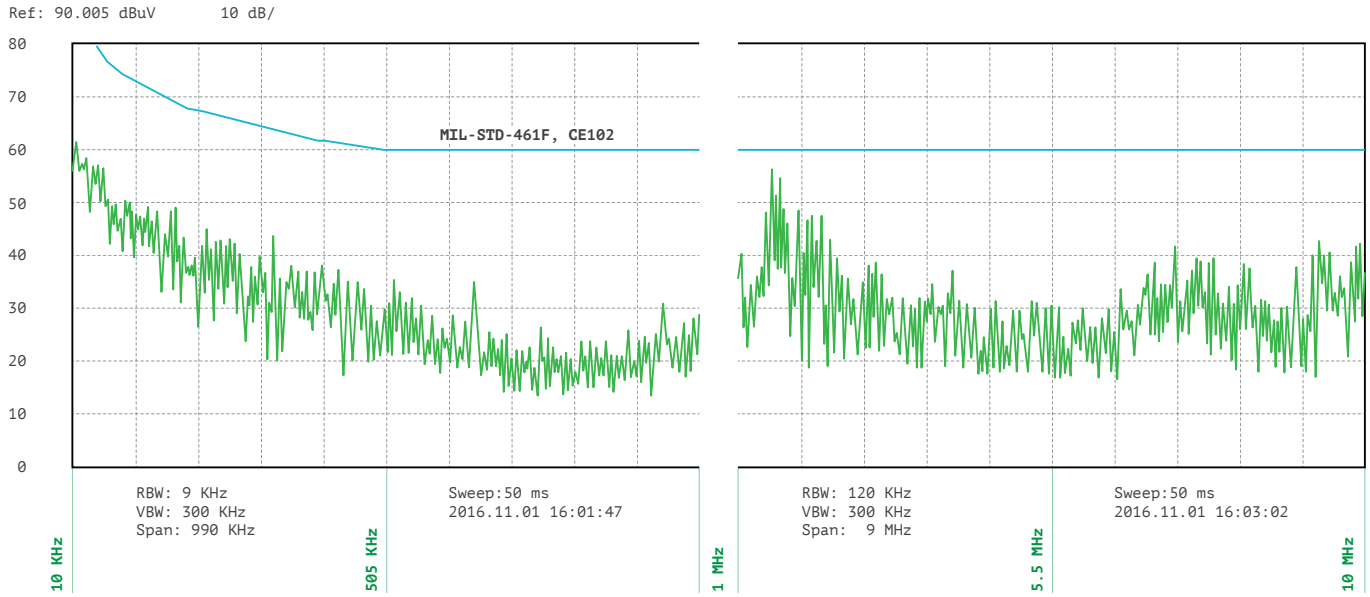

Figure 4. Spectrogram of MDN5-I09 with typical connection diagram.

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Effiency

VS load

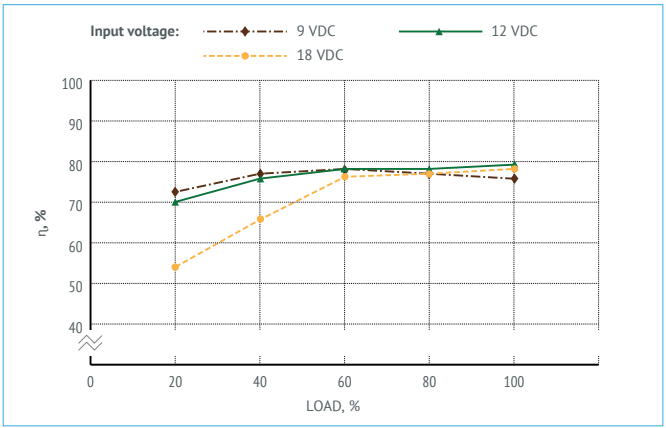

Figure 5 (a). Efficiency of MDNx3-A3,3.

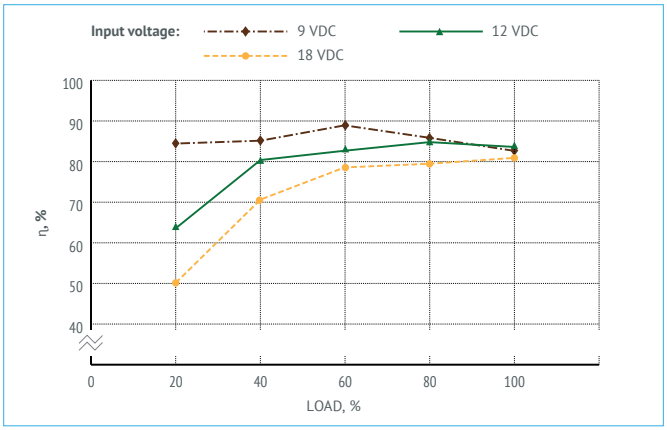

Figure 5 (b). Efficiency of MDNx3-A09.

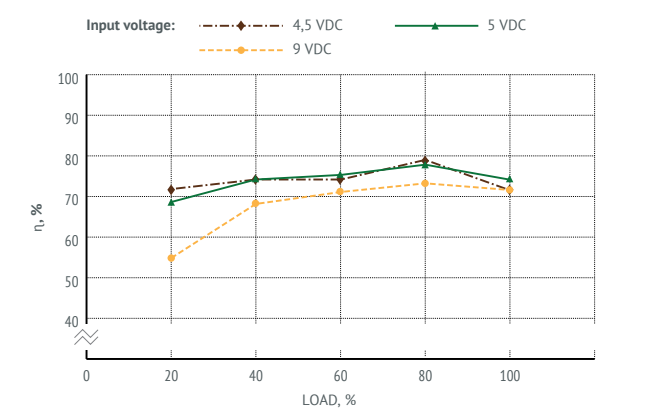

Figure 5 (c). Efficiency of MDVx5-I3,3.

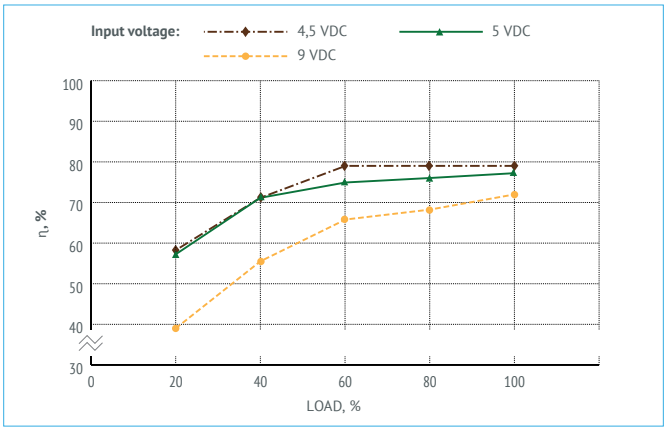

Figure 5 (d). Efficiency of MDVx5-I09.

Power derating

VS ambient temperature and baseplate temperaturetemperature

The PSU is able to operate with 100% load within the complete range of case operating temperature (–60…+105 °C). On condition the case temperature is kept from –60°C to 105 °C the PSU will operate without derating regardless of the ambient temperature. Thermal Management section of the Application Notes shows the resulting heatsink area, as well as baseplate-vs-ambient thermal resistance, the min thickness of the heatsink, and the max PSU output power without heatsink.

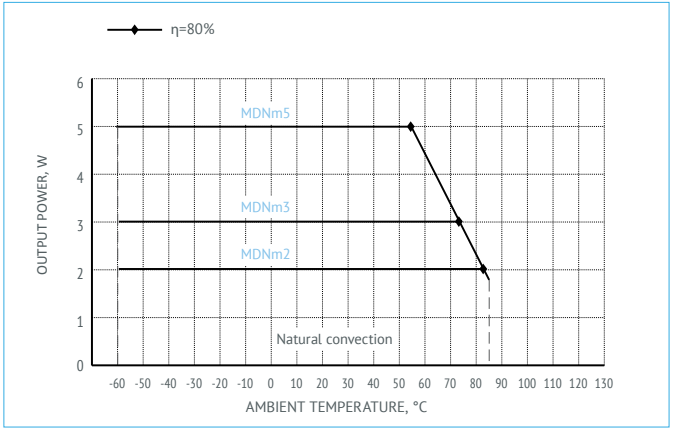

Figure 6. Power derating of MDNm5.

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Oscillograph charts

Testing conditions of MDN2: Uin.=27 VDC, Iout.=0,22 A, Tamb.=25°C, Uout.=9 VDC, Cout.=4,7 uF.

The database of regulated parameters of the maunfactured products is available. Pls. contact your personal manager or customer support service to get necessary information.

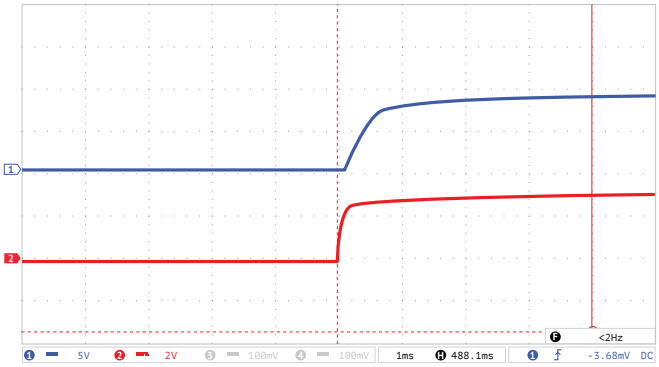

Figure 7 (a). Oscillograph chart of setting output voltage after supplying remote control signal to ON-output.

Ray 1 (red) – voltage at ON-output. Scale 2 V/div.
Ray 2 (blue) – output voltage. Scale 5 V/div.
Time scale t=1 ms/div.

Figure 7 (b). Oscilliograph chart of output voltage after supplying the input voltage.

Ray 1 (red) – input voltage. Scale 10 V/div.
Ray 2 (blue) – output voltage. Scale 5 V/div.
Time scale t=500 us/div.

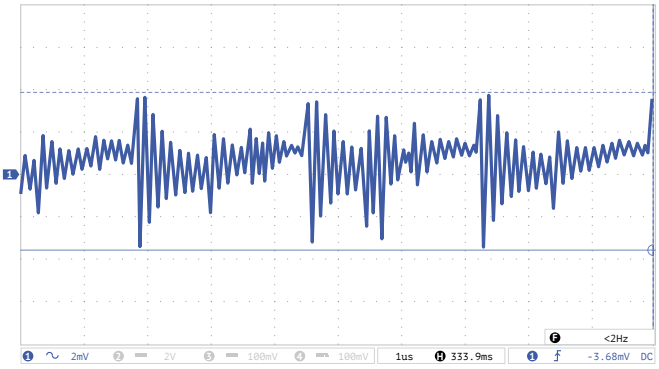

Figure 7 (c). Oscillograph chart of output voltage ripple.

Ray 1 (blue) – ripple of output voltage. Scale 2 mV/div.
Time scale 1 us/div.
Measuring technique: see Electrical Test Screen.

Figure 7 (d). Oscillograph chart of voltage transient deviation during load "drop/rise".

Ray 1 (blue) - output voltage. Scale 200 mV/div.
Time scale t=50 ms/div.

Modes:
– "drop" output current variation (10...100%) Inom;
– "rise" output current variation (10...100%) Inom;
– build-up time 500 us.

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Outline dimensions

Models packed in reinforced case with flanges

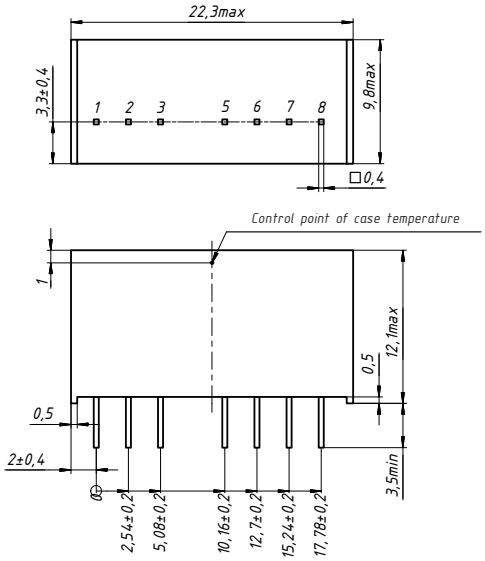

Figure 8.

Pin out

Pin #	1	2	3	4	5	6	7	8
Function	–IN	+IN	ON	NO PIN	NOT USE	+OUT	–OUT	NOT USE

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AEDON, LLC is the leading Russian developer and manufacturer of DC/DC converters and power supply systems for critical applications.

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This datasheet is valid for the following units: MDNi2-I3.3; MDNi2-I05; MDNi2-I09; MDNi2-I12; MDNi2-I15; MDNi3-I3.3; MDNi3-I05; MDNi3-I09; MDNi3-I12; MDNi3-I15; MDNi5-I3.3; MDNi5-I05; MDNi5-I09; MDNi5-I12; MDNi5-I15; MDNi3-I3.3; MDNi3-I05; MDNi3-I09; MDNi3-I12; MDNi3-I15; MDNi2-A3.3; MDNi2-A05; MDNi2-A09; MDNi2-A12; MDNi2-A15; MDNi3-A3.3; MDNi3-A05; MDNi3-A09; MDNi3-A12; MDNi3-A15; MDNi5-A3.3; MDNi5-A05; MDNi5-A09; MDNi5-A12; MDNi5-A15; MDNi3-A3.3; MDNi3-A05; MDNi3-A09; MDNi3-A12; MDNi3-A15; MDNi2-V3.3; MDNi2-V05; MDNi2-V09; MDNi2-V12; MDNi2-V15; MDNi3-V3.3; MDNi3-V05; MDNi3-V09; MDNi3-V12; MDNi3-V15; MDNi5-V3.3; MDNi5-V05; MDNi5-V09; MDNi5-V12; MDNi5-V15; MDNi3-V3.3; MDNi3-V05; MDNi3-V09; MDNi3-V12; MDNi3-V15; MDNi2-D3.3; MDNi2-D05; MDNi2-D09; MDNi2-D12; MDNi2-D15; MDNi3-D3.3; MDNi3-D05; MDNi3-D09; MDNi3-D12; MDNi3-D15; MDNi5-D3.3; MDNi5-D05; MDNi5-D09; MDNi5-D12; MDNi5-D15; MDNi3-D3.3; MDNi3-D05; MDNi3-D09; MDNi3-D12; MDNi3-D15; MDNm2-M3.3; MDNm2-M05; MDNm2-M09; MDNm2-M12; MDNm2-M15; MDNm3-M3.3; MDNm3-M05; MDNm3-M09; MDNm3-M12; MDNm3-M15; MDNm5-M3.3; MDNm5-M05; MDNm5-M09; MDNm5-M12; MDNm5-M15; MDNm3-M3.3; MDNm3-M05; MDNm3-M09; MDNm3-M12; MDNm3-M15; MDNm2-A3.3; MDNm2-A05; MDNm2-A09; MDNm2-A12; MDNm2-A15; MDNm3-A3.3; MDNm3-A05; MDNm3-A09; MDNm3-A12; MDNm3-A15; MDNm5-A3.3; MDNm5-A05; MDNm5-A09; MDNm5-A12; MDNm5-A15; MDNm3-A3.3; MDNm3-A05; MDNm3-A09; MDNm3-A12; MDNm3-A15; MDNm2-V3.3; MDNm2-V05; MDNm2-V09; MDNm2-V12; MDNm2-V15; MDNm3-V3.3; MDNm3-V05; MDNm3-V09; MDNm3-V12; MDNm3-V15; MDNm5-V3.3; MDNm5-V05; MDNm5-V09; MDNm5-V12; MDNm5-V15; MDNm3-V3.3; MDNm3-V05; MDNm3-V09; MDNm3-V12; MDNm3-V15; MDNm2-D3.3; MDNm2-D05; MDNm2-D09; MDNm2-D12; MDNm2-D15; MDNm3-D3.3; MDNm3-D05; MDNm3-D09; MDNm3-D12; MDNm3-D15; MDNm5-D3.3; MDNm5-D05; MDNm5-D09; MDNm5-D12; MDNm5-D15; MDNm3-D3.3; MDNm3-D05; MDNm3-D09; MDNm3-D12; MDNm3-D15.

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