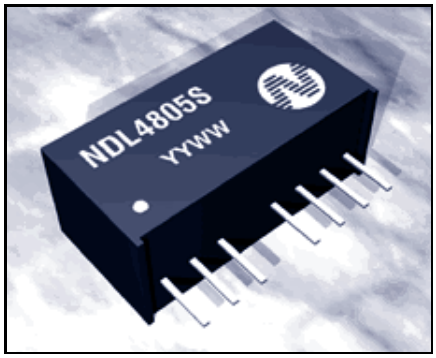
NDL SERIES

Isolated 2W Wide Input Single Output DC-DC Converters



FEATURES

- 2:1 Wide Range Voltage Input
- Continuous Short Circuit Protection with Current Foldback
- Operating Temperature Range –40°C to 85°C
- 0.5% Regulation
- 1kVDC Isolation
- Efficiency to 83%
- 5V, 12V, 24V & 48V Nominal Input
- 5V, 9V, 12V & 15V Output
- Power Density 0.9W/cm^3
- External Control
- No Electrolytic Capacitors
- Low Noise
- Fully Encapsulated

DESCRIPTION

The NDL series is a range of high performance miniature DC-DC converters having regulated outputs over the wide temperature range of –40°C to 85°C. The input voltage range is 2:1 with the output power at 2 watts and the input to output isolation is 1kVDC. Continuous short circuit protection, external control and extremely small SIP packaging provide state of the art functionality. The use of ceramic capacitors and a ceramic substrate, with a tough chip and wire bonded MOSFET power transistor die and SMD construction, provide genuine high reliability. Nominal input voltages of 5,12,24 and 48V with output voltages of 5,9,12 and 15V are available as standard with custom parts on request. The plastic case is rated to UL 94V-0 with encapsulant to UL 94V-1. Connection pins are phosphor bronze with a 60/40 tin lead solder dipped finish.

www.dc-dc.com

SELECTION GUIDE

	Nominal Input Voltage	Rated Output Voltage	Output Current[1]		Input Current[2]	Efficiency	Isolation Capacitance	MTTF[4]
			Min Load[3]	Full Load	Full Load			
Order Code	(V)	(V)	(mA)	(mA)	(mA)	(%)	(pF)	kHrs
NDL0505S	5	5	100	400	606	66	26	2015
NDL0509S	5	9	55	222	558	71	27	1998
NDL0512S	5	12	42	167	559	71	26	1980
NDL0515S	5	15	33	134	549	73	27	1965
NDL1205S	12	5	100	400	228	73	39	1994
NDL1209S	12	9	55	222	211	79	38	1981
NDL1212S	12	12	42	167	208	80	47	1961
NDL1215S	12	15	33	134	206	81	47	1947
NDL2405S	24	5	100	400	112	74	37	1722
NDL2409S	24	9	55	222	102	81	40	1711
NDL2412S	24	12	42	167	100	81	51	1696
NDL2415S	24	15	33	134	100	83	58	1685
NDL4805S	48	5	100	400	57	73	39	1719
NDL4809S	48	9	55	222	52	80	40	1709
NDL4812S	48	12	42	167	51	81	53	1694
NDL4815S	48	15	33	134	51	82	65	1683

INPUT CHARACTERISTICS

Parameter	Conditions	MIN	TYP	MAX	Units
Voltage Range	All NDL05 Types	4.5	5	9	VDC
	All NDL12 Types	9	12	18	
	All NDL24 Types	18	24	36	
	All NDL48 Types	36	48	72	
Reflected Ripple Current	All NDL05 types when 100µF at input			250	mA p-p
	All NDL12 types when 100µF at input			150	
	All NDL24 types when 10µF at input		300	380	
	All NDL48 types when 10µF at input		140	170	

OUTPUT CHARACTERISTICS

Parameter	Conditions[5]	TYP	MAX	Units
Voltage Set Point Accuracy	All NDL 05/12 types with external input/output capacitors	±1	±5	%
	All NDL 24/48 types with external input/output capacitors	±2	±5	
Line Regulation	All NDL 05/12 types, Low line to high line, With external input/output capacitors	0.05	0.5	%
	All NDL 24/48 types, Low line to high line, With external input/output capacitors	0.04	0.4	
Load Regulation	All NDL 05/12 types, Minimum load to rated load, With external input/output capacitors	0.2	0.75	%
	All NDL 24/48 types, Minimum load to rated load, With external input/output capacitors	0.2	0.75	
Ripple	B/W=20Hz to 300kHz With external input/output capacitors	5	10	mV rms
Noise	All NDL 05 types, B/W=DC to 100MHz With external input/output capacitors	20	35	mV p-p
	All NDL 12 types, B/W=DC to 100MHz With external input/output capacitors	110	170	
	All NDL 24/48 types, B/W=DC to 100MHz With external input/output capacitors	50	100	
Shutdown Power	V_{IN} nominal		2.8	mW

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection	continuous
Lead temperature 1.5mm from case for 10 seconds	300°C
Control pin input current	10mA
Input voltage 05 types	10V
Input voltage 12 types	20V
Input voltage 24 types	40V
Input voltage 48 types	80V

1 Refer to power derating graph for operation of 5V input types at 4.5 to 6V.
2 Measured at full load with external input/output capacitors, refer to recommended test circuit.
3 A lower load condition is entirely safe but higher levels of output ripple will be experienced.
4 Calculated using MIL-HDBK-217F with nominal input voltage at full load.
5 Refer to recommended test circuit for external input/output capacitors.
All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

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ISOLATION CHARACTERISTICS

Parameter	Conditions	MIN	TYP	MAX	Units
Isolation Test Voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso=1000VDC	1			GΩ

GENERAL CHARACTERISTICS

Parameter	Conditions	MIN	TYP	MAX	Units
Swiching Frequency	MAX rated load to MIN rated load	100		600	kHz
Control Pin (CTRL) Input Current	Control voltage applied via 1k0 resistor, output voltage must reduce to 0V		4.0	6.0	mA

ENVIRONMENTAL

Parameter	Conditions	MIN	TYP	MAX	Units
Operation		-40		85	°C
Storage		-50		130	°C
Cooling	Free air convection				

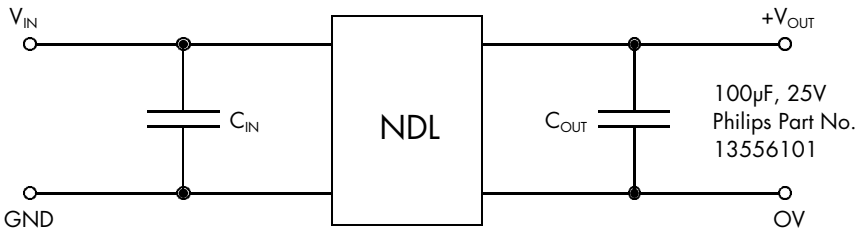
CTRL (PIN 3)

Provides an on/off function. The converter is on when CTRL is not connected or high impedance (Z). The CTRL pin will turn the converter off as indicated in general characteristics.

CS (PIN 8)

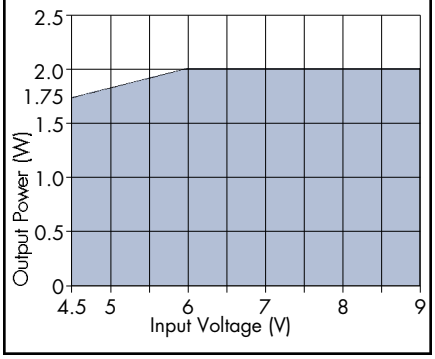
Additional capacitance, up to 100uF can be added from CS to pin 7. A low ESR capacitor if fitted will precede the output filter inductor and will improve ripple and noise.

RECOMMENDED TEST CIRCUIT

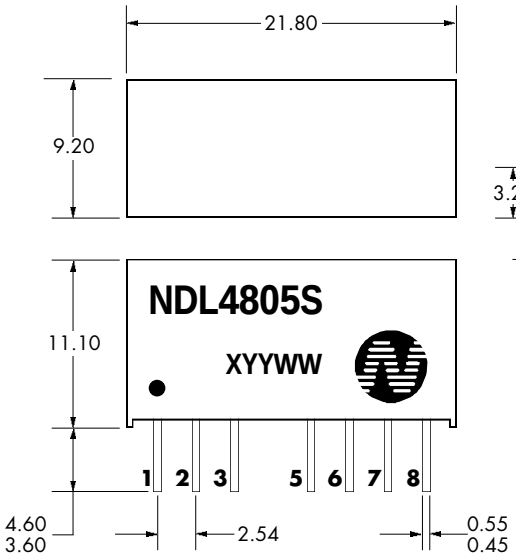


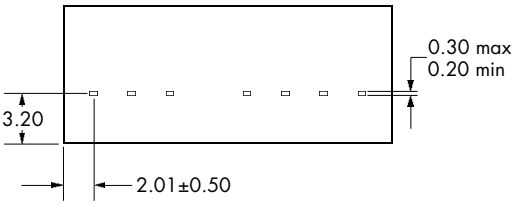
5V & 12V: C_{IN} 100µF, 25V Philips Part No.13556101
24V & 48V: C_{IN} 10µF, 200V Philips Part No.15162109

NDL05 POWER DERATING CURVE



MECHANICAL DIMENSIONS





PIN	
1	GND
2	V_{IN}
3	CTRL
5*	IC
6	$+V_{OUT}$
7	0V
8	C_S

Weight: 5.0g

*Pin 5 is internally connected and must have no external connection

All dimensions in mm XX.XX ±0.25mm. All pins on a 2.54mm pitch and within ±0.25mm of true position.

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