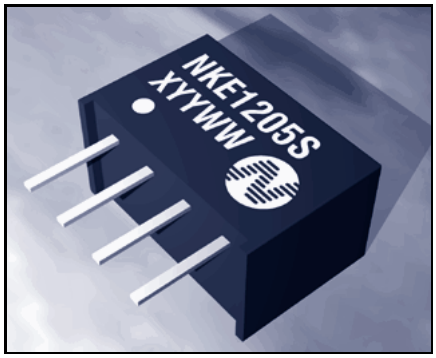
NKE SERIES

Isolated Sub-Miniature 1W Single Output DC-DC Converters



FEATURES

- New Sub-Miniature SIP & DIP Styles
- 3kVDC Isolation
- Efficiency to 81%
- Wide Temperature performance at full 1 Watt load, –40°C to 85°C
- Increased Power Density to 1.95W/cm³
- UL 94V-0 Package Material
- Footprint 0.69cm²
- Single Isolated Output
- Industry Standard Pinout
- 3.3V, 5V & 12V Input
- 3.3V, 5V, 9V, 12V and 15V Output
- No Heatsink Required
- Internal SMD Construction
- Fully Encapsulated with Toroidal Magnetics
- No External Components Required
- MTTF up to 2.4 Million hours
- Custom Solutions Available
- No Electrolytic or Tantalum Capacitors

DESCRIPTION

The NKE sub-miniature series of DC-DC Converters is particularly suited to isolating and/or converting DC power rails. A smaller package size, improved efficiency, lower output ripple and 3kVDC isolation capability through state of the art packaging and improved technology. The galvanic isolation allows the device to be configured to provide an isolated negative rail in systems where only positive rails exist. The wide temperature range guarantees startup from –40°C and full 1 watt output at 85°C.

SELECTION GUIDE

	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Efficiency	Isolation Capacitance	MTTF[1]
OrderCode†	(V)	(V)	(mA)	(mA)	(%)	(pF)	kHrs
NKE0303S	3.3	3.3	303	400	75	30	1234
NKE0305S	3.3	5	200	400	76	35	632
NKE0503S	5	3.3	303	270	75	40	619
NKE0505SE	5	5	200	250	78	34	419
NKE0505S	5	5	200	289	69	28	2414
NKE0509S	5	9	111	266	75	29	1173
NKE0512S	5	12	83	260	77	30	633
NKE0515S	5	15	66	256	78	32	360
NKE1205S	12	5	200	117	71	35	620
NKE1209S	12	9	111	107	78	50	488
NKE1212S	12	12	83	105	79	57	360
NKE1215S	12	15	66	103	81	60	252

† For DIP package style replace suffix S with D, eg NKE0303D.

i When operated **without** additional external load capacitance, the output voltage of the devices is guaranteed to be within 95% of its steady state value within 100ms after the input voltage has reached 95% of its steady state value, **irrespective of the rise time of the input voltage**.

ii When operated **with** additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

INPUT CHARACTERISTICS

Parameter	Conditions	MIN	TYP	MAX	Units
Voltage Range	Continuous operation, 3.3V input types	2.97	3.3	3.63	V
	Continuous operation, 5V input types	4.5	5.0	5.5	
	Continuous operation, 12V input types	10.8	12.0	13.2	
Reflected Ripple Current			40	60	mA p-p

OUTPUT CHARACTERISTICS

Parameter	Conditions	TYP	MAX	Units
Rated Power[2]	T_A = –40°C to 85°C		1	W
Voltage Set Point Accuracy	See tolerance envelope			
Line regulation	High V_{IN} to low V_{IN}	1.0	1.2	%/%
Load Regulation[3]	10% load to rated load, 3.3V output types	10	15	%
	10% load to rated load, 5V output types	12	15	
	10% load to rated load, 9V output types	7.5	10	
	10% load to rated load, 12V output types	6.5	9.5	
	10% load to rated load, 15V output types	6.0	8.5	
Ripple and Noise	BW=DC to 20MHz, 3.3V output types	40	80	mV p-p
	BW=DC to 20MHz, 5V output types	77	100	
	BW=DC to 20MHz, 9V output types	43	90	
	BW=DC to 20MHz, 12V output types	35	65	
	BW=DC to 20MHz, 15V output types	32	55	

ABSOLUTE MAXIMUM RATINGS

Short circuit duration[4]	1 second
Internal power dissipation	530mW
Lead temperature 1.5mm from case for 10 seconds	300°C
Input voltage V_{in} NKE03 types	5.5V
Input voltage V_{in} NKE05 types	7V
Input voltage V_{in} NKE12 types	15V

1 Calculated using MIL-HDBK-217F with nominal input voltage at full load.
2 See derating curve.
3 12V input types have typically 3% less load regulation change.
4 Supply voltage must be discontinued at the end of the short circuit duration.
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	3000			VDC
Resistance	Viso=500VDC		10		GΩ

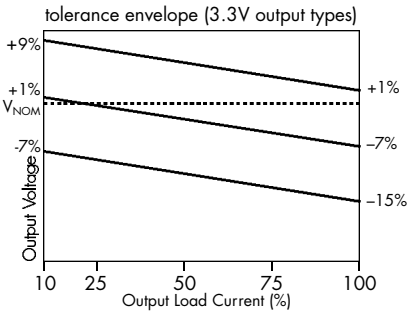
GENERAL CHARACTERISTICS

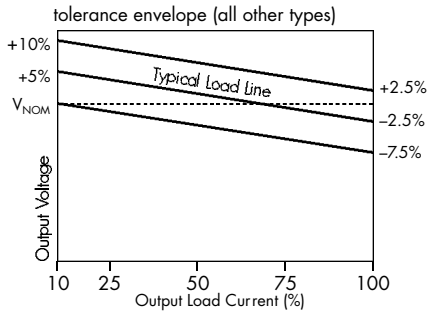
Parameter	Conditions	MIN	TYP	MAX	Units
Switching Frequency	All input types		115		kHz

TEMPERATURE CHARACTERISTICS

Parameter	Conditions	MIN	TYP	MAX	Units
Specification	All output types	-40		85	°C
Storage		-50		130	°C
Case Temperature above ambient	0505D/S, 1205D/S			41	°C
	All other output types			32	
Cooling	Free air convection				

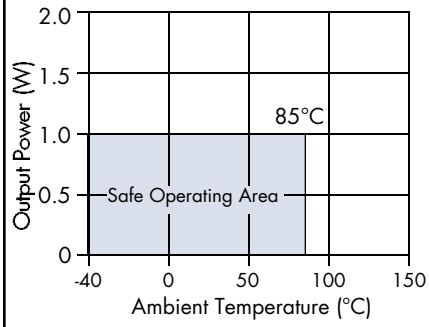
PERFORMANCE CHARACTERISTICS



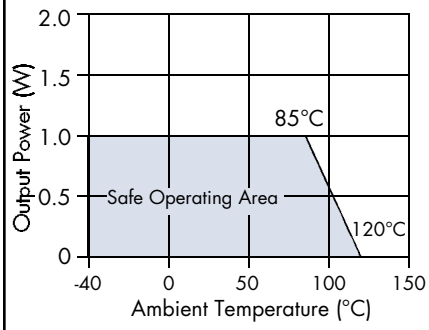


TEMPERATURE CHARACTERISTICS

Temperature Derating Graph
NKE 0303D/S, 0305D/S,
0503D/S, 0505DE/SE Types

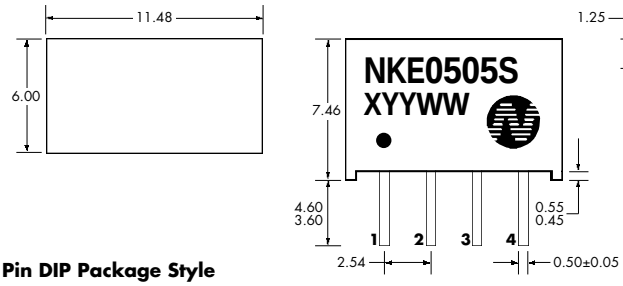


Temperature Derating Graph
All other types

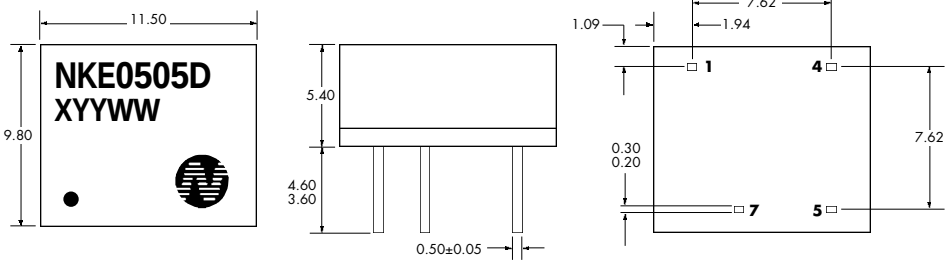


MECHANICAL DIMENSIONS

4 Pin SIP Package Style



8 Pin DIP Package Style



4 Pin SIP

PIN	
1	GND
2	V_{IN}
3	0V
4	+V

8 Pin DIP

PIN	
1	GND
4	V_{IN}
5	+V
7	0V

Weight: 1.09g

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

Instructions for use are available from www.dc-dc.com

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